



Research Paper

Causes and Consequences of Flood and Bank Erosion Special Reference to the Middle Assam Brahmaputra Valley of Assam

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ABSTRACT:-

The Brahmaputra valley is the back bone of Assam economy, the vast area occupied about 720 km in its length and 80 to 90 km consisted with most fertile alluvial soil. As a domination of agrarian economy most of the agricultural activities of the state are practices in the vast Brahmaputra valley. The immense mentioning point regarding the valley is that each and every year massive flood occurred the valley with huge loss of life and properties.

KEYWORDS :-The middle Assam Brahmaputra Valley, Bank Erosion, Causes and Impact.

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I. INTRODUCTION

The Brahmaputra valley of Assam is the land of consisted with mainly alluvial sandy soils, that situated in central position by the East-West direction of the state. The middle Assam Brahmaputra valley is one of the most sensitive part of the valley that is consisted with mainly two districts as Nagaon(including Hojai) and Morigaon. Physiographically, both the two districts of the valley has distinguished physiographic character of its own. It is seen that Physiographically the middle Assam Brahmaputra valley is a gentle slope, lies towards the North-Western direction. Along the Brahmaputra river the low lying area of the middle Assam Brahmaputra valley is consisted with fertile soil, surrounded by hilly terrain of Karbi - Anglong, N. C. Hills and Meghalaya plateau from the South- Eastern to Western boundary of the valley. The average slope of the valley than 1 is not more meter per 10 k. m. Due to hilly terrain in the Southern part of the valley kolong and Kapily river catchment area the sloppiness is quite steep. During the summer heavy rainfall occurred on these hilly area and all the rain water flowed through the foot hills towards the plain low land as a great stream of the valley known as Kopili, which is finally submerged with the mighty Brahmaputra. As the Southern rivers of the valley entered in to the flat alluvial plain the runoff water suddenly lost their velocity and influence to occurred massive flood in the low lying areas of the South-Western of the part of the valley mainly Dharamtul, Neli, Bhakatgaon to Mayong. Similarly due to massive rain the run-off water of the Brahmaputra basin become over flow that due to which flood situation become worst as the over flow water enter in to the low lying areas of Laharighat, Bhuragaon, Bokani Mouzas. Each and every year due to the heavy rainfall in the catchment areas of the Brahmaputra river over loaded water has broken the embankment and river water rashly flow out towards the low lying areas and occurred flood along with bank erosion. So far the causes of flood and erosion of the study area is concerned, out of the various factors the main factors that detect by the prominent scholars can be mention as :-

i) Meteorological factor, ii) Hydrological factor, iii) Geomorphological factor, iv) Deforestation, v) Jhum cultivation etc. are some related with the basin, and some other factors as channel characteristics, deforestation, jhum cultivation etc. are the main factors for flood and erosion that occurred in the middle Assam Brahmaputra valley. of the specific factors are describe below.

i) Metrological factor :- In the middle Assam Brahmaputra valley the Brahmaputra is the main river system that flows in the Northern boundary, in the valley along with the Brahmaputra another two major river system that Kapili, and Killing are influence the valley in its hydrological system. The Brahmaputra river is depends for

its run-off both melting of snow and rain water, on the other hand the runoff of Kapili and Killing are depends upon only rain water in its source i.e. in the hilly catchment of Karbi-Anglong, N.C.Hills, and Meghalaya plateau region. Each and every year flood and erosional havoc destroyed the socio-economic status of the middle Assam valley, though the main causes of the fresh flood occurred in the valley is due to over flow runoff of the mighty Brahmaputra, consequently the run-off water of the Kapili and Killing play an important role for flood and erosion of the low lying area of the middle Assam Brahmaputra valley. According to flood report of the middle Assam Brahmaputra valley it reveals that as the massive and long term rain occurred in the valley, devastating flood occurred and immediately affect low lying area of the valley. As per Assam State Disaster Management Authority (ASDMA) report it reveals that if the annual rainfall of the middle Assam Brahmaputra Valley crosses 3000mm. in any season then high flood occurred in the valley. Another characteristics feature of rainfall of the valley is observed that during the summer season rainfall continuously increased in the monsoon season in the month from June, July, and August, on the other hand during the post monsoon periods, i.e. in the month of September, October, and November the rainfall start to decreases. According to the discussion it reveals that the special characteristics of the middle Assam Brahmaputra valley is that the catchment area of the Kapili river rainfall and its runoff has greatly impact on flood disaster in the valley low lying areas.

ii . Hydrological factor :-

The hydrological aspect of a fluvial river means the distribution and transportations of fluvial water that movement in an area. Here hydrological aspects will be discuss about the water bodies of mighty Brahmaputra and its three tributaries i.e. Kalong, Kapili, and Killing, that flow in the middle Assam Brahmaputra valley.

In the middle Assam Brahmaputra valley along with the mighty Brahmaputra river the Kapili and Killing river has great importance in its hydrological importance. The devastating flood occurred in the low lying areas of the valley significantly has great influences by the fluvial character of the Kapili and Killing river along with the mighty Brahmaputra. At the Eastern boundary of Nagaon district at Dharamtul in the monsoon season the water and the discharge level of the Kapili river reached in danger position. Regardingly at that time due narrow gorge in the Kajalimukh, the cross section point that Kapili river conjunct with the Brahmaputra, the excessive water brake to easy cross the Kapili basin immediately resulted over flow the basin and occurrence of flood in the whole low lying area from Kampur, Raha, Dharamtul, Nelli, Jagiroad to Mayang. Along with the run-off water Kapili river carried huge discharge materials to the low lying areas with high speed. There are various causes for abundant of discharge materials in the fluvial water in the Kapili river, some of probable regions are due to shifting cultivation and high rate of deforestation occurred in the catchment area of N.C.Hills, Karbi-Anglong, Meghalaya plateau. As the fluvial nature of Kapili river is based on rain fall its catchment areas hence the quantity of discharge and the level of water is very high during the rainy season, regardingly during the winter both the discharge and level of water are comparatively change and become minimum.

The hydrological regime of middle Assam Brahmaputra valley is mainly controlled by the fluvial water logo of the mighty Brahmaputra. As per report of the State Disaster Management Authority Assam during the rainy summer the Brahmaputra river as crossed the danger level, all the Western part of the Middle Assam Valley has directly affected by the over flow water and each and every year theas areas are submerged and flooded. From the rainfall and flood occurrences data in the valley for the last two decades it seems that each and every year due to heavy rainfall in the catchment area of the valley and its uplift areas resulted the stream crossed the high flood level ultimately along the low lying areas of the middle Assam Brahmaputra valley the Western part also submerged under the flood.

From the above discussion it will come to light on that the low lying area of middle Assam valley are caused flooded due to three different ways. They are

1. Due to overflow of the mighty Brahmaputra river.
2. Due to massive run off downstream of the Kapili, Kolong, and Killing river.
3. Due to joint action of both the mighty river Brahmaputra and the Kopili river.

iii. Geological and Geomorphological factor :- The constructional features of the earth surface, its composition and structure play an vital role for flood and erosion in Middle Assam Brahmaputra valley. The characteristics features of rocks strata found in the catchment area of N. C. Hills, Karbi-Anglong, and Meghalaya are belongs to seven Geological ages. In the catchment area of the Kapili river i. e. in N. C. Hills, Karbi- Anglong and Meghalaya there are observed some conformities, these conformities shows instability of the valley and ultimately resulted instability of the valley for a very long geological period of time.

According to fluvial concept of Geomorphology landforms are the process of erosion, transportation and deposition or sedimentation. For better fulfillment of these three geomorphological process flood havoc play an important role. Various alluvial landforms as flood plains, river terraces, ox-bow lakes, meanders etc. that

consisted with the main river determined about the magnitude and frequency of the fluvial flood havoc. As a geomorphological process and event flood consequently river bank erosion greatly influence on the catchment area of its original position, its river basin both in the hilly slope and plain valley.

IV. Topographical factor :- Along the other factors topography of the middle Assam Brahmaputra valley play an important role for continuous and destructive flood and erosion disaster in the valley mainly in the low lying areas. According to topographical survey used Digital Terrain Modal (DTM) it shows that the average elevation of North-Western part of the valley is about 48.7 metres above the mean sea level (MSL), in the middle position of the valley, it is about 57.9 meters above the MSL, the Eastern position of the valley shows 67 meters high above the MSL, where the southern most part of the valley areas are occupied the low lying part of hilly terrain which is about 152 meters of its elevation above the MSL.

V. Deforestation as a flood causing Factor :- Natural vegetation is one of the key factor for maintaining the environment in a staple position. The excessive water that has received by plant from soil through its roots, spray out to the environment with its leaves which help to reduce aridity of the environment also it influence in the cycle of rain fall. Regardingly natural vegetation act directly on hydrology also flood havoc situation of an area. The run-off level of a stream is closely relate with its density of natural vegetation in the catchment area, deforestation definitely increased the stream run off in the downstream which will caused flood and erosional occurrences in the rainy season.

After discussed about the causes and consequences of flood havoc most of the scientist argued that due to decreasing of forest cover or deforestation influence on continuous occurrences of flood in the low lying areas. In the upstream of Kapili river in Karbi Anglong mainly bamboo forest are destroyed by the local people only for supplying bamboo to the Jagiroad and Cachar paper industry up to its running position. Similarly forest cover of Meghalaya has continuously destroyed due to Jhum cultivation cultivated by the local people of the areas.

vi. Earthquake is a flood and erosion occurrences factor :-

From the various discussion made by the Prominent Geologist, it is reveals that occurrences of flood and river bank erosion are directly or indirectly influence by earthquake. (Ward, 1978). Among the states of North-East, Assam is situated in a seismically most sensitive catastrophic Zone. The zone lies between two plates as the Himalayan plate in the North and the Indo-Burma the East. Besides the complex geological and tectonic set up of the zone, more instance due to Continental Convergence, the compression of India plate towards the North at a rate 20+03 mm/year, definitely produce massive continuous earthquake in these zone. Another major point is that in India most of the rivers are coming from Himalayan mountain ranges, hence massive earthquake occurred in the zone influence the river system. Sometime earthquake change its basin beds by filling with silt, sometime due to earthquake occurred landslide, which obstruct run-off of the basin and turn change its basin and causing flood and erosion in the low lying area of the river valley.

vii. Antropogenetic factor :-

According to 2011 census out of the total 27 districts (now 34) of Assam 14 nos. of districts reveals highest population growth during the last census decades. Among them Dhubri, reached the first position where the Morigaon stood second, Goalpara, Darrang, Nagaon, Karimganj, Hailakandi, BARPETA, Bongaigaon, Cachar, Dhemaji, Kamrup (M), Karbi-Anglong, and Lakhimpur stand third to all respectively. In respect of growth of population in middle Assam Brahmaputra valley Morigaon and Nagaon districts shows second rank among the districts of Assam. The population composition of the valley consisted mainly with the communities of Hindu, Muslims, all indigenous Tribal groups, Benglis, Biharies, Tea-Garden workers, Maruwaris, Panjabies, Nepalies, etc. In the valley one of the earliest group of people that migrated from Punjab and started to settled permanently in the valley at Barkula has played a major role in the growth and development of the population in the valley. At present Borkola is famous as a Assamese Sikh village in middle Assam Brahmaputra valley.

During the Nineteenth century another wave of population migrated to middle Assam Brahmaputra valley from differ areas of Orrissa, Bihar, Andha Pradesh, etc. as a Tea-Gardens labor that were establish in the Southern boundary of the valley mainly at Nelli, Amsoi areas. Similarly for business purposes Marwari Communities had also migrated to newly established township as Nagaon, Morigaon, Raha, Jagiraod, Dhing, etc. areas of middle Assam Brahmaputra valley. These types of migration towards the valley influence the growth and development of population in the valley.

The most fertile alluvial soil, its vast fallow land of middle Assam Brahmaputra valley attracted to the Muslim people of East Bangle and nearby areas and starts to migrate and settled in the valley. According to record during the period about 1,08,453 of people migrated from East Bangle to the middle Assam Brahmaputra valley and started to settled in the river bank areas of Laokhowa, Dhing, Laharighat, Bokani,

Mayong etc. areas . These wave of migration caused great impact in the growth and development of population in the valley.

viii. Shifting of river as a flood causing factor : Shifting of bank line of a river is a significant factor among the various flood causing fluvial factors in a river valley. A flow vial river always tried to adjust with various endogenic and exogenesis forces, geological, hydrological and other environmental situations that prevalent in the valley. Hence resistance of river bank is always depend upon its volume of run-off water, its forces, also its discharge materials. In the middle Assam Brahmaputra valley shifting of mighty river towards the South bank and its tributaries i.e kalong, kapili and killing in each bank line frequently occurred since the massive earth quake in 1950. During the monsoon with heavy run-off water and massive discharge materials the mighty Brahmaputra river as crossed flat low lying alluvial plain of middle Assam the cutting of its bank line occurred in a great extent.

ix. Erodible Sandy Soft Bank as Flood Causing Factor :- The Brahmaputra valley is the back bone of Assam Economy, the vast area occupied about 720 km in its length and 80 to 90 km width consisted with most fertile alluvial soil. From Sodia to Dhubri the whole Brahmaputra valley is diverse in character in respect of its material consistencies. Except a few areas, the whole bank of the Brahmaputra valley is consisted with loose soft sandy soil in the upper most layer and silty clay in the deeper position. The banks made off with hard rocks are more or less are prevent from bank line erosion, consisting with soft sandy materials are easily erodible and as a result banks are shifted towards the flood plain areas. In the middle Assam Brahmaputra valley from the Hatimuria to Mayong the whole bank has been affected by flood and erosion since last six decades, due to which the bank line shifted towards the South.

X. Construction of Bridge as flood causing factor :-

According to sediment loads and transportation among the various river in the world it reveals that the Brahmaputra river is the fourth largest river in the world in respect of average discharge in the mouth. The speed will be maximum at the catchment area of the river where basin is very slope. While the river entered in to the plains area the kinetic energy of the run-off water growing slowly decrease in compression to hilly slope. Natural flows of the run-off water of the Brahmaputra river in to the middle Assam suddenly face obstacle only because of piers of the 'Kalia Bhumura Setu'. the construction was completed in 1987 that connect Nagaon in the South and Sonitpur district in the North .Due to obstruct of the Kalia Bhumura road bridge the run-off water knock at the Singiri hill in Sonitpur district, just than with maintaining a hypercritical velocity the river flow turn towards the Southern banks. In the middle Assam Brahmaputra valley the river entered with different channels and destructive mode. Hence it is very much realistic and authentic that after the construction of Tezpur Silghat bridge the rate of occurrences and volume of destruction of flood and erosion in Middle Assam Brahmaputra valley is growing with a massive rate.

II. FINDINGS

The above discussion reveals that the physiography of the Middle Assam Brahmaputra valley is diverse in nature. All the Northern boundaries is consisted with low lying lluvial flood plain of the mighty Brahmaputra which lying up to its central position with gentle slope. Due to the uneven physiographic character of the valley with steep slope of the Southern location during the rainy season as massive rain occurred in the catchment areas caused the rapid flows of surface waters in the forms of run off and channel flows in the river basins, ultimately caused the heavy massive fresh flood in the low lying areas of the valley. Again during the rainy season due to heavy rains, hilly terrains are easily eroded and carried the discharge materials along with run off waters. The sedimentation starts as after the basin enters in to the plain of low lying areas. Such types of sedimentation occurred most of the Southern basins of the mighty Brahmaputra. The massive discharge carried by Northern base tributaries of the Brahmaputra river are deposited in the Southern most basin areas, after the sedimentation of such materials base level of the basin become shallow due to which there definitely occurred an obstacle to easy run off the water and caused flood and erosion in the low lying areas.

III. CONCLUSION

The various types of parameters of fluvial river as its length, width, gradient, channel meandering, its water and discharge level all are integrated part which create an action and effect on the channel morphology of the river its run off hydrologic flows and its sediments discharge. All these parameters of a river are mainly responsible for occurred flood and flood like havoc in the basin areas. the middle Assam Brahmaputra valley area is covered by a series of hilly rugged rocks masses. Except the Northern boundaries all the rest of the middle. Assam Brahmaputra valley areas are covered with hills terrain with gentle slope towards the North-Western direction. These are the areas of high run-off and during the summer massive rain water flows towards the low-lying area from its catchment areas. The uneven character of the valley and its North-western sloppiness

is one of the main causes for occurrences of flood in the middle Assam Brahmaputra valley. Another most topographic regions for occurring of flood havoc in the valley is its narrow gorge at Kajalimukh of Hiloikhunda hills.

Geologist make it clear that after huge sedimentation the bed of the Brahmaputra river has come rise up to 3 meters. Due to which the run of water has growing its tendency to spread wider to wider, such type of river activities have been occurred in the middle Assam Brahmaputra valley, since 1960s that was after the great earthquake occurred in 1950s. Before 1960s earthquake the depth of the Brahmaputra was much deeper as the situation occurred due to 1960s earthquake.

The discussion of growth of population in middle Assam Brahmaputra valley has reveals that the growth of population in the hilly flood pond low-lying valley ultimately pressure on its limited land. due to which various related problems likes fragmentation of agricultural land, establishment of built-up area, market place, roads, settlement areas, construction of embankments etc. are arise. Such human interference with land and water bodies ultimately have caused to massive flood and erosion in the valley. The middle Assam Brahmaputra valley is one of the most flood and eosion pond area, each and every year valley has lost hectares of hectares land due to massive flood and bank erosion caused by the mighty Brahmaputra. For control and maintain the flood and erosion in the valley both Central and State Government adopted various anti erosional measures, unfortunately most of them regards as temporary and success.

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