

Role of Brahmaputra Valley in Population Distribution in North Eastern States

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Abstract

Brahmaputra river has ironically been both a 'boon and bane' for the north eastern part of India. Brahmaputra's immense natural potential has provided life and fodder for generations. On the other hand, Brahmaputra's periodic raging form forces a number of families in Brahmaputra basin to change their place of permanent residence almost every year. Taking Brahmaputra Valley as a case, the impact of a river (and its basin) on the neighbouring spatial extent is discussed in this paper. The historic linkage of Brahmaputra with the North East India forms the basis of this paper. The geographic impact of Brahmaputra is also discussed keeping in mind the socio-political factors. This paper also puts focus on the major problems caused by Brahmaputra in the North East India and implication of the same on the demographic profile. The environmental conditions thus created by the river are a concern of utmost interest, especially to the development authorities which bear the responsibility of ensuring a balanced and sustainable growth to its citizens. The paper finally discusses the major factors responsible for the population distribution in north eastern states due to Brahmaputra Valley. These factors are namely natural course, natural disasters, socio-cultural factors, institutional mechanism and land use pressure. The aim of this paper is to understand the factors responsible for population distribution due to the presence of an important source of life . . . WATER.

Keywords: Water, Brahmaputra, North-East India, Population Distribution, Demography and Environment

INTRODUCTION

Water is an important element for sustaining life. Planning and water are invariably related to each other since the ages when mankind had just started to identify their need for a shelter and on a larger scale – a habitat. Early civilizations had used and will continue to use it as a tool for establishing their settlement [5].

History of Brahmaputra Basin

The Brahmaputra also called Tsangpo-Brahmaputra, is a trans-boundary river and one of the major rivers of Asia. While most rivers on the Indian subcontinent have female names, this river has a rare male name, as it means "son of Brahma" in Sanskrit (putra means "son"). The Brahmaputra's upper course was long

unknown, and its identity with the Yarlung Tsangpo was only established by exploration in 1884–86.

In this region one can find 220 languages belonging to three distinct language families – Indo-Aryan, Sino-Tibetan and Austric [8]. Thus, there are a number of languages and dialects making it a diverse regions ranging from physical as well as anthropologically diverse. The northeastern region falls under the Brahmaputra and Barak River basin which is home for more than 166 separate tribes, 160 scheduled tribes and over 400 other tribal and sub-tribal communities and groups, speaking a wide range of languages (Climate Change in India: A 4×4 Assessment, 2010). Amidst the four

countries of Bhutan, Tibet, Myanmar and Bangladesh, this North Eastern part of

India is almost like a transition zone in ethnological parameters.

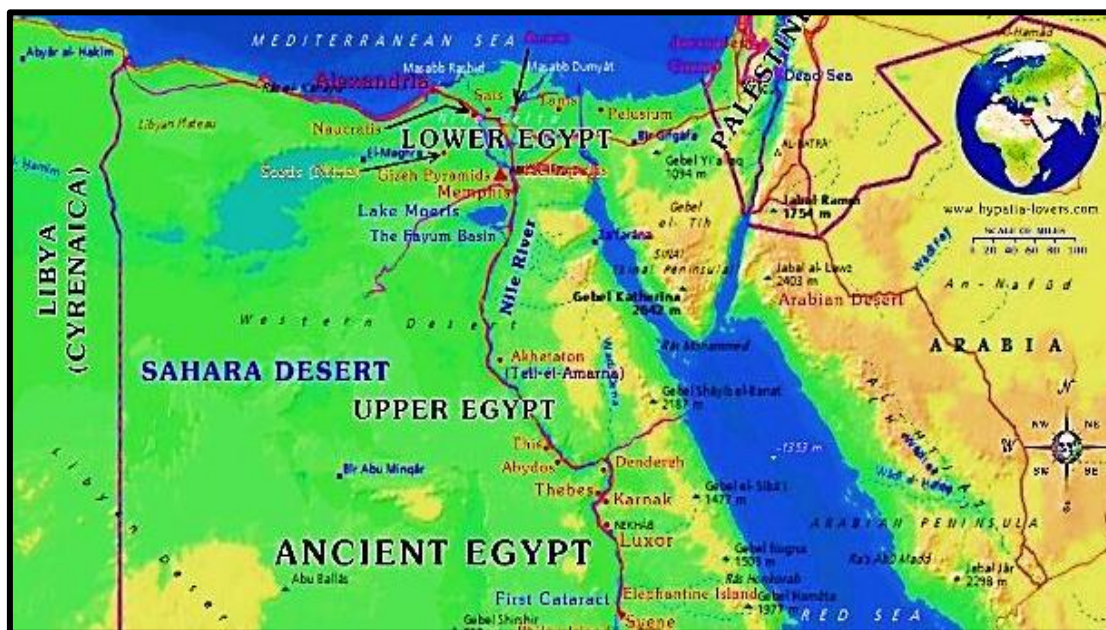


Fig: 1. Egyptian Civilization along River Nile



Fig: 2. City of Kolkata along River Hooghly

Geography of Brahmaputra basin

With its origin in the Chemayungdung glacier, located on the northern side of the Himalayas in Burang County of Tibet as the Yarlung Tsangpo River, Brahmaputra flows across southern Tibet to break through the Himalayas in great gorges (including the Yarlung Tsangpo Grand Canyon) and into Arunachal Pradesh

(India), where it is known as Dihang or Siang. It flows southwest through the Assam Valley as Brahmaputra and south through Bangladesh as the Jamuna. In the vast Ganges Delta, Brahmaputra merges with the Padma (name of the river Ganges in Bangladesh), and finally the former is known as the Meghna emptying into the Bay of Bengal.

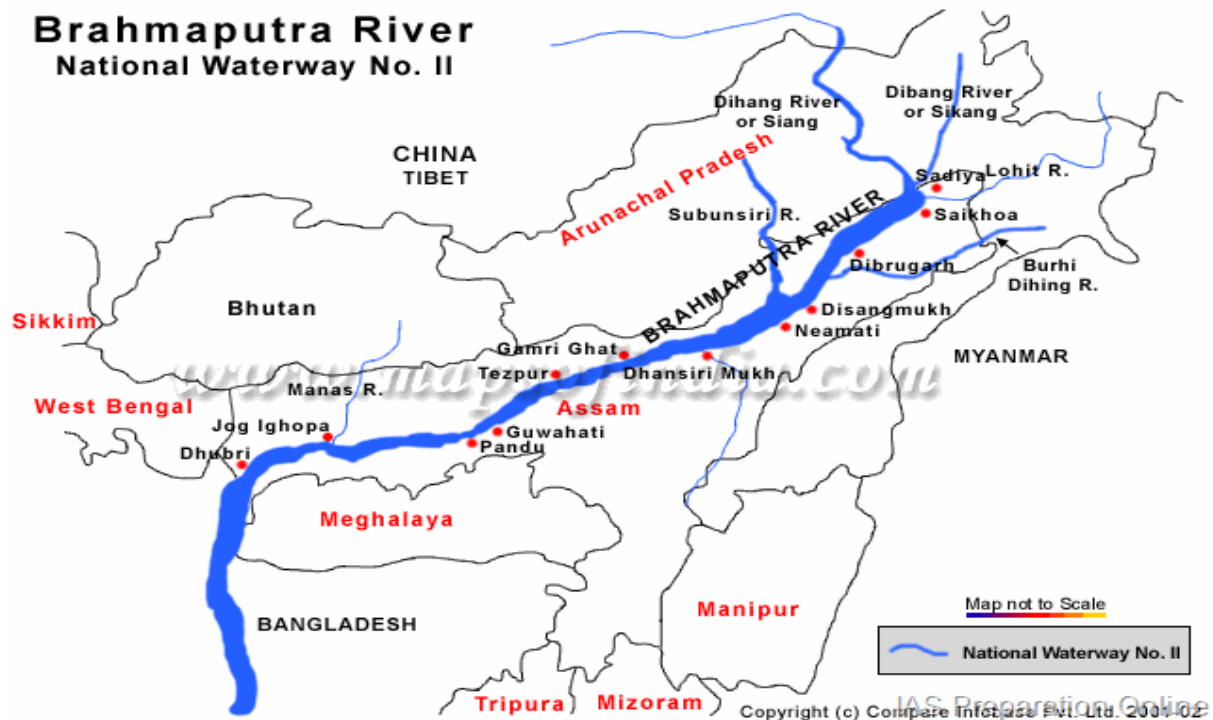


Fig: 3. North-East Indian stretch of River Brahmaputra

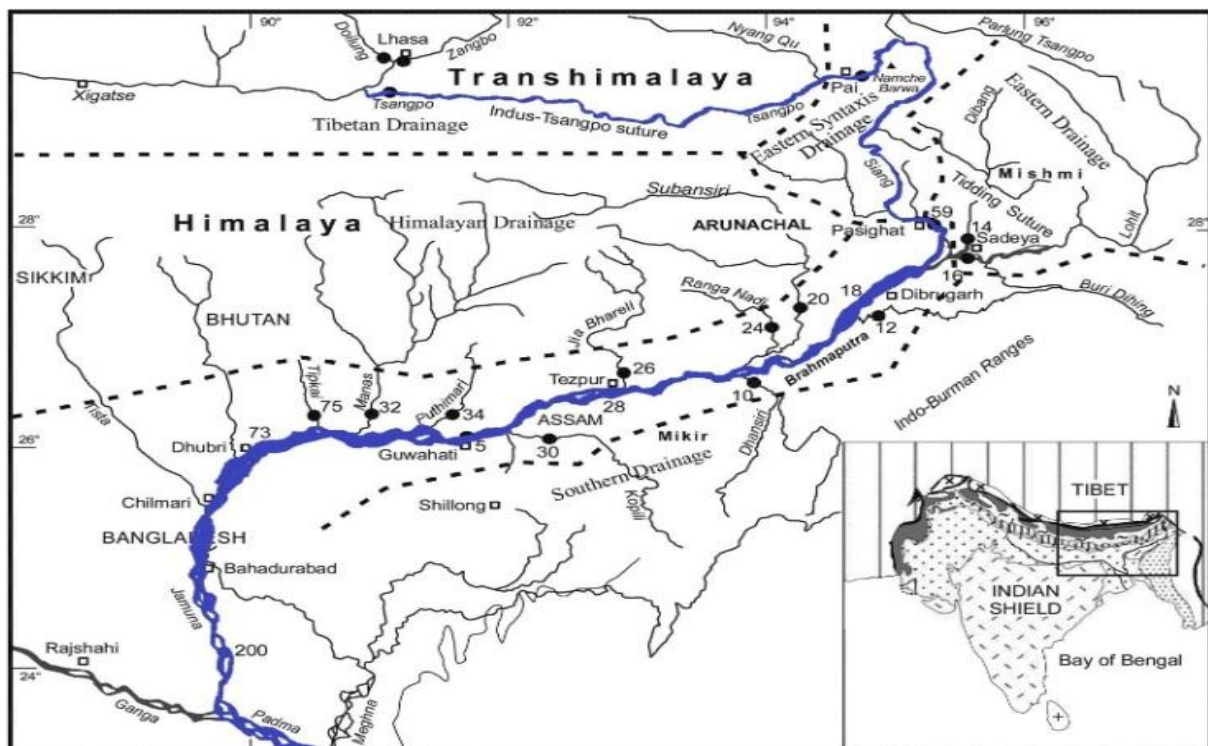


Fig: 4. Tributaries and distributaries of Brahmaputra

Important Features of Brahmaputra Basin

(About 2,900 km) long, the Brahmaputra is an important river for irrigation and transportation. The average depth of the

river Brahmaputra is 38 m and maximum depth is 120 m. Brahmaputra is prone to catastrophic flooding in spring when the Himalayan snows melt. The average

discharge of the river is about 19,300 m³/s, and floods can reach over 100,000 m³/s. Brahmaputra is a mostly navigable river and shows tidal bore as one of its characteristics. Besides being highly prone to channel migration and avulsion, it is a typical braided-type river. The river drains the Himalaya east of the Indo-Nepal border, south-central portion of the Tibetan plateau above the Ganges basin,

south-eastern portion of Tibet, the Patkai-Bum hills, the northern slopes of the Meghalaya hills, the Assam plains, and the northern portion of Bangladesh. The basin, especially south of Tibet, is characterized by high levels of rainfall. Kangchenjunga (8,586 m) is the only peak above 8,000 m, hence is the highest point within the Brahmaputra basin [4].

Table: 1. Salient Features of Brahmaputra Basin

Basin Extent: Longitude	88° 11' to 96° 57' E
Basin Extent: Latitude	24° 44' to 30° 3' N
Length of Brahmaputra River (Km)	916 (in India)
Catchment Area (Sq.km.)	194413
Average Water Resource Potential (MCM)	537240
Utilizable Surface Water Resource (MCM)	24000
Live Storage Capacity of Completed Projects (MCM)	1710
Live Storage Capacity of Projects Under Construction (MCM)	690
Total Live Storage Capacity of Projects (MCM)	2400
No. of Hydrological Observation Stations (CWC)	108
No. of Flood Forecasting Stations (CWC)	27

Constituencies under of Brahmaputra Basin

The basin spreads over 56 districts in 22

parliamentary constituencies (2009). The constituencies comprises of:

Table: 2. Constituencies under Brahmaputra Basin

State	Number of Constituencies
Assam	12
West Bengal	04
Arunachal Pradesh	02
Meghalaya	02
Sikkim	01
Nagaland	01

Drainage Area under Brahmaputra Basin

A total of 194413 sqkm. of drainage area

is distributed among six states of north east India.

Table: 3. Drainage Area under Brahmaputra Basin

State	Drainage Area (in Sqkm.)	Approx. % of State area in Basin
Arunachal Pradesh	81424	100
Assam	70634	90.79
West Bengal	12585	14.18
Meghalaya	11667	52.52
Nagaland	10803	65.71
Sikkim	7300	100
Total	194413	

INFLUENCE OF BRAHMAPUTRA IN NORTH EAST INDIA

Brahmaputra is known as Siang in Arunachal Pradesh (the state which it confronts first after entering Indian) and its known as Dihang subsequently (after hitting the plains). It flows for about 35 km and is joined by the Dibang River and the Lohit River at the head of the Assam Valley. Below the Lohit, the river is called Brahmaputra, enters the state of Assam, and becomes very wide—as wide as 10 km in parts of Assam. In Sonitpur, The Kameng River, popularly known as Jio Bhoreli joins Brahmaputra (Dihang). The Dihang enters Assam after taking a southeast turn. By this time it has transformed into a low-lying basin type. Thereafter, Dihang is joined by Lohit and Dibang (the two mountain streams) when it had turns southwest (immediately after west of Sadiya). Below that confluence, about 1,450 km from the Bay of Bengal, the river becomes known conventionally as the Brahmaputra (“Son of Brahma”).

In Assam, the river is mighty, even in the dry season, and during the rains, its banks are more than 8 km apart. As the river follows its braided 700-km course through the valley, it receives several rapidly rushing Himalayan streams, including the Subansiri, Kameng, Bhareli, Dhansiri, Manas, Champamati, Saralbhang, and Sankosh Rivers. The main tributaries from the hills and from the plateau to the south are the Burhi Dihing, Disang, Dikhu, and Kopili. Between Dibrugarh and Lakhimpur Districts, the river divides into two channels—the northern Kherkutia channel and the southern Brahmaputra channel. The two channels join again about 100 km downstream, forming the Majuli island, which was, until some time back, the largest river island in the world.

The legendary battle of Saraighat was fought on the banks of Brahmaputra. In March 1671, the then warriors, found a mere 1km narrow stretch (bank to bank)

near Hajo (an ancient pilgrimage centre). This is the location where the Shillong Plateau has been dissected by the unruly Brahmaputra. The socio –political relevance of Brahmaputra had got a major boost. With regards to the urban planning relevance of Brahmaputra is concerned, in April 1962, Saraighat became the location where the first of its kind (rail road combination) bridge on Brahmaputra was made open for public use. Saraighat Express still remains a pioneer train in commuting to Assam [1].

MAJOR PROBLEMS CAUSED BY BRAHMAPUTRA IN NORTH EAST INDIA

During the spring season (June–October), floods are a very common occurrence. Deforestation in the Brahmaputra watershed has resulted in 3 major observations; namely, increased siltation levels, flash floods, and soil erosion. The major influence of this is critically observed in two eco-sensitive areas of Kaziranga National Park and Majuli River Island [2]

IMPACT ON DEMOGRAPHY

The pitiable mass, owing to its dependency on agro and water based industries are a major factor. As per the census 2011, the largest percentage of migration has been from Rural to Rural. Besides, a huge number of Bangladeshi Migration has been taking place since decades through many porous boundaries of Northeast and West Bengal as well. Places like Karimganj in Assam have influential percentage of such influx. This unaccounted population is also responsible for the multifold problems in the discussed region [7].

Manipur (Imphal Plain), Tripura (West) and Barak-Brahmaputra plains are the regions with dense population in Brahmaputra valley. The irregularity of the river has a direct impact on the difficult accessibility to the terrain which in turn

affects the unexplored agricultural potential of the region and other allied features including occupancy. The region

as a whole is sparsely populated and shows wide contrasts in its ethnic composition and density pattern.

Table: 4. *Change in Decadal Growth rate in Brahmaputra Basin*

N-E States	Decadal growth rate increment (1991-2001)	Decadal growth rate increment (2001-2011)
Arunachal Pradesh	26	27
Assam	19	17
Meghalaya	30	30
Nagaland	64.5	-0.5
Sikkim	33	13

The average forest cover of North-East India is 69.59 per cent. Highest forest cover is found in the states of Mizoram and Nagaland, which are 86.99 and 85.43 per cent respectively. Assam shows the lowest percentage, which is only 30.20 per cent. Percentage decadal growth of population of the states Assam, Nagaland and Arunachal Pradesh in the year 1991-2001 is 18.85 per cent, 64.41 per cent and 26.21 per cent respectively. The density of Assam increased to 340 people per square km (in 2001) from 286 people per square km (in 1991). The biodiversity of the area is threatened by the population pressure which is also linked to irregularity and abrupt floods. [6].

ENVIRONMENTAL CONDITIONS

Some protected areas of comparatively high forest cover are found. These are the reserve forest, wildlife sanctuaries and national parks etc. One of the dangerous flood prone areas is Kaziranga National Park (south bank of Brahmaputra), which is one of the major components to this region is home to many extinct species.

This area gets flooded almost every year, sometimes several times in a year, and submerging 80 to 90 per cent of the total landmass. Inundation of lowland is caused by high flow of river water in the case of typical floods. The primary reason for floods in Kaziranga is the monsoon meeting of Brahmaputra with small drain channels formed seasonally in the hills of Karbi Anglong.



Fig: 5. *Eroded status of Brahmaputra Basin*

There are a lot of factors responsible for flood in Brahmaputra.

The natural factors responsible for this phenomenon are:

- Heavy monsoonal rains and devastating landslides,
- Easy erodibility of rocks of the

northern mountains,

- Steep slopes and
 - High seismicity.
- The anthropogenic factors responsible for this phenomenon are:
- Large scale deforestation in the hilly catchments,
 - Practice of shifting cultivation, and
 - Human intervention in the river system including encroachment in the floodplains, destructions of natural wetlands and poorly managed embankment system.

The floods of Brahmaputra made a quantum leap, especially after the great 1950 earthquake. The cumulative effect of these factors has aggravated the flood situation on the floodplain of the Brahmaputra as well as important destinations like Kaziranga National Park [3].

CONCLUSION

Summing up, six major reasons can be identified that are responsible for the role of Brahmaputra valley in population distribution in north eastern states. These indicators are elaborated below.

Course of the river and its topography

The course of the river directs the population distribution, the places like Assam where the rivers runs through a relatively gentle slope has more chances of depositing silts and producing more agricultural fields. The steeper areas like Arunachal will have higher slope. Thus the chances of erosion and non-agricultural areas increase. The gentle topography during the course also fosters biodiversity which is an important factor in population distribution.

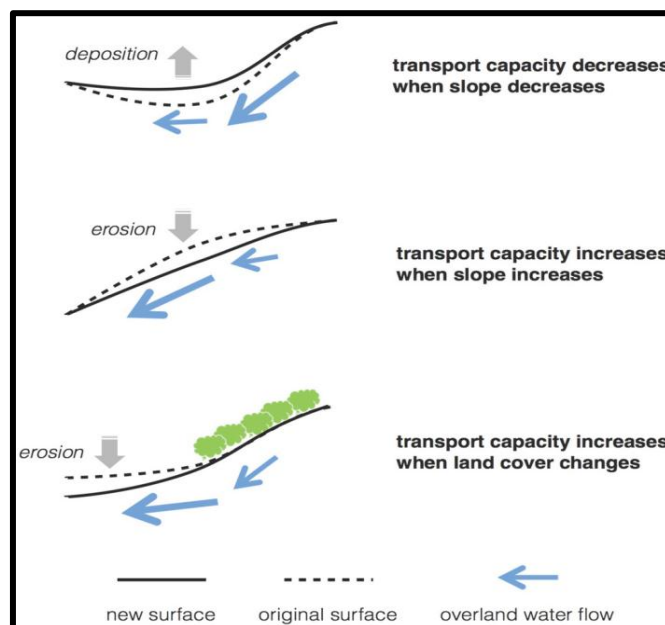


Fig: 6. Capacity-slope relationship for a river

Earthquake of 1857 and 1950

The earthquake of 1857 and 1950 made a radical change in the pattern of the river. Many new tributaries and distributaries were evolved and a new potential for settlements. Majuli was such an important new formation.

Social, cultural and ethnic factors

The North-East India is a place inhabited by a number of race and ethnic groups. Once a substantial member of the group migrates, the whole group tends to shift. The inter-state migration is the major concern for this region.

Flood and Erosion

Floods and erosion occur annually in Brahmaputra Basin. However these two are distinct in the character and approach (towards disaster scenario making). Permanent loss of land and property (causing permanent displacement of people from their origin) are caused due to erosion. The permanent displacement impacts the cultural change in people. On the other hand only periodic submerge of

houses and property is experienced in floods. So, people choose to stay in the dangerous embankments in dilapidated living conditions; making themselves susceptible to disaster. Erosion also leads to migration of rural youths to urban areas in search of jobs. In the last few decades erosion has posed as a greater threat to the people of Assam than floods. The Brahmaputra due to various geographic factors, is susceptible to flood and erosion.

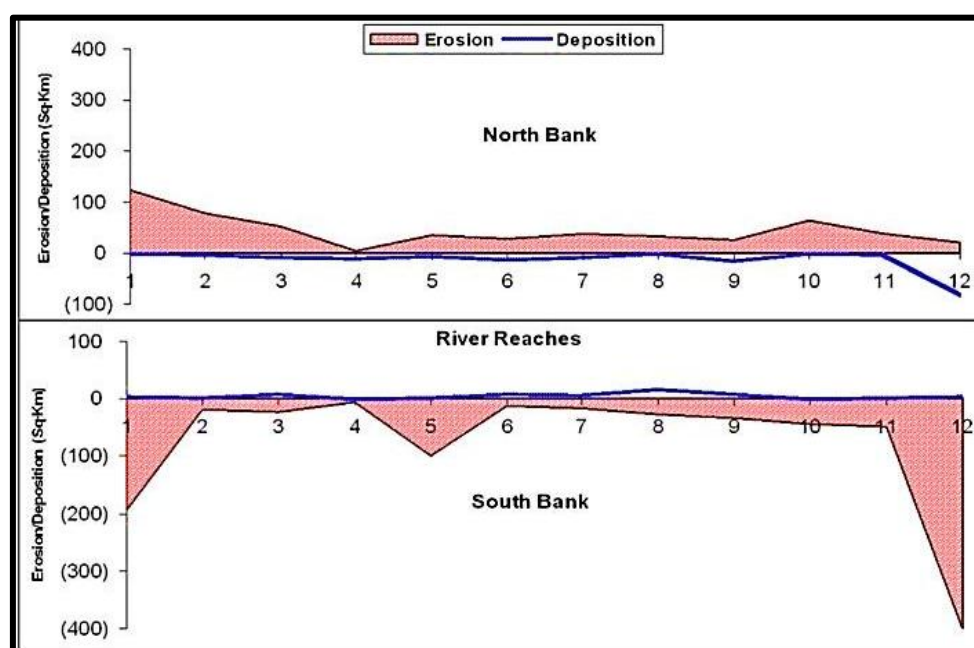


Fig: 7. Erosion and Deposition extents in Square Kilometers for Brahmaputra

The dependence of river for sustaining life makes a vulnerable pattern of settlement along Brahmaputra coast which forces the population to migrate. In earlier decades, due to radical and backward mentalities, the tribes could afford to regulate regular migration. But modernization has invoked the sense of stability which forces them to opt for a stable land like the plains for residing. According to the study by IIT-Roorkee, the erosion prone length of the river is 10% higher along the South Bank of Brahmaputra compared to the same along North Bank. Areas facing erosion is 123% higher in South bank during the last decade (1998-2008) of the study period. The highest erosion area/per km of erosion

prone bank is upstream of Dibrugarh, where the river enters the plains from the hills. This is evidently reflected in the population distribution.

Land Use Pressure

Cities like Guwahati etc. are fast developing. The availability of resources, topography and connectivity to other cities makes the land value along Brahmaputra go high. The rapid force of urbanization is making ribbon development along Brahmaputra which in turn is harming the river by polluting it, stopping free expansion of river and introducing water supply problems, unlike the past.

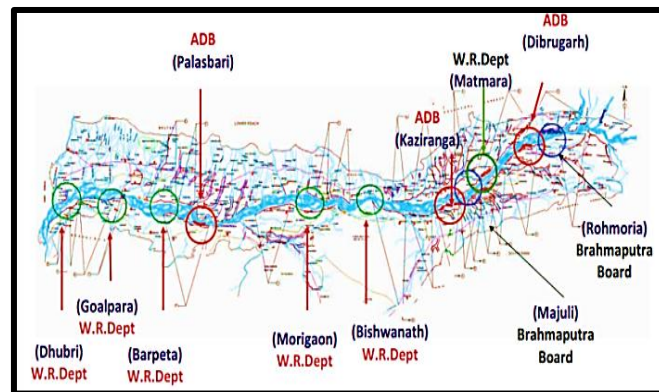


Fig: 8. Priority Riverbank Erosion reaches

Institutional mechanism

The authorities should look into the following features of salient hydraulic and bank material factors responsible for bank erosion of the Brahmaputra system. They are:

- Rate of rise and fall of river water level
- Number and position of major channel active during flood stage
- Angle at which the thalweg approaches the bank line
- Amount of scour and deposition that occurs during flood
- Variability of cohesive soil in bank material composition
- Formation and movement of large bed forms
- Intensity of bank slumping,
- Progression of abandoned river courses to present-day channel.

Recently, it is suggested that a highway protected by concrete mat along the river bank and excavation of the river bed can curb this menace. This project, named the Brahmaputra River Restoration Project, is yet to be implemented by the government. Dr. Bhupen Hazarika who is known as the bard of Brahmaputra, the river's power of destruction was the source which will awaken the people. In his famous song "Bistirnoparore" he asked the river –

*"Sahasrobarishar, unmadonar, avigyotare,
pangumanoboksawalsongramiaruagrogam
ikorinutulakiyo"*

It means, "With your maddening experience of thousand monsoons, why don't you arouse the disabled human beings for struggle and progress". The unwinding resources of Brahmaputra can be used for the upliftment of North Eastern states and also to control the floating migration.

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REFERENCES

1. Ahmed, N. (2015). Encyclopaedia Britannica : Brahmaputra River. Retrieved 11 16, 2015, from <http://www.britannica.com/place/Brahmaputra-River>
2. Department of Water Resources Development and Management, I.-R. (2012). STUDY OF BRAHMAPUTRA RIVER EROSION AND ITS CONTROL. New Delhi: National Disaster Management Authority of India.
3. Hofer, T. (2006). What are the impacts of deforestation in the Himalayas on flooding in the lowlands? Rethinking an old paradigm. Food and Agriculture

- Organization of the United Nations (FAO) .
4. Hussain, N. (2011). Water: The New Dimension in India-China Relations. Centre for Development and Peace Studies.
 5. Mahapatra, G. D., Mishra, P., & Goray, N. (2015). Water : Its journey as an important design tool. Architecture : Time,Space and people .
 6. Ministry of Home Affairs, G. o. (2011). Cenus of India. Retrieved 11 15, 2015, from <http://www.censusindia.gov.in/2011census/dchb/DCHB.html>
 7. Singh, M. A. (2009). A Study on Illegal Immigration into North-East India: The Case of Nagaland (1st ed.). New Delhi: Institute for Defence Studies and Analyses.
 8. WRIS. (2015). WRIS. Retrieved 11 12, 2015, from www.india-wris.nrsc.gov.in/wrpinfo/index.php?title=Brahmaputra

BIOGRAPHIES



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