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Threats to Biodiversity of Brahmaputra River Basin (India)

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Abstract

The Brahmaputra basin is a mighty river that has a greater impact not only on the natural resources but also on the human population and their livelihood. Development of systematic strategies could help sustain as well as protect the river and the various biological resources depended on it for future existence.

Keywords: Biodiversity, Brahmaputra Basin, Threats

Introduction

The Brahmaputra basin, a transboundary river that flows through China (50.5%), India (33.6%), Bangladesh (8.1%) and Bhutan (7.8%) is one of the longest rivers in the world [1]. In the north eastern region of India, this basin is mostly shared by Arunachal Pradesh (41.9%), Assam (36.3%), West Bengal (6.3%), Meghalaya (6.1%), Nagaland (5.6%) and Sikkim (3.8%) [2]. In Tibet it is popularly known as the Yarlung Tsangpo, in Arunachal Pradesh as the Siang or Dihang, and it is known as Brahmaputra in Assam. Subansiri, Dibang and Lohit are 3 major rivers which joins Brahmaputra in Arunachal Pradesh. Bounded by the high Himalayan mountain ranges in the north, the Patkai hills ranges in the east, the lower Assam hill ranges in the south and contiguous with the plains of Bangladesh in the west; it extends over an area of 1,94,413 sq.km which is nearly 5.9 % of the total geographical area of the country. The major part of basin is covered with forest accounting to 55.48% of the total area as per India WRIS data and 5.79% by water bodies [3]. The Brahmaputra basin embodies a wide range of ecosystems from the Himalayan Mountains (at 500-5000 m and above) to the fertile plains of Assam and West Bengal. The basin also includes the flood plains of Assam and Bangladesh. Therefore, the diversity of ecosystems, forests/vegetation, wildlife and all living and non-living components of the nature is incredibly superior.

Biodiversity in Brahmaputra basin

In North-east India, the Brahmaputra basin comes under the Indo-Burma biodiversity hotspot, which is among the 25 mega-biodiversity hotspots as recognized by the IUCN. The profuse diversity of flora and fauna and their enormous variations in both vertical and horizontal distributions is a marked feature of the region. These unique physiographic and climatic characteristics make it the richest reservoir of biodiversity in India. In the north-eastern region of India, the basin has the highest forest cover in the country i.e., 59% (Table 1) [4,5]. All types of vegetation i.e. cultivated plains to grasslands, meadows, marshes, swamps, forests (scrub, mixed deciduous, humid evergreen, temperate and even alpine) is supported by the region. From the north east region about 600 plant species are listed as rare, endangered or threatened; more than 800 orchid spp. are in Appendix –II of CITES and nearly 67 species (32 mammals, 28 birds 6 reptiles and 1 amphibian) are in endangered category [1]. The essence of biodiversity of Northeast India can be well understood from the fact that there are nearly 75 protected areas in the basin (Table 2) [6,7].

In fact, the floodplains of the Brahmaputra have numerous wetlands or beels scattered around that possess massive ecological importance as unique habitats for the magnificent variety of plants and animals [8]. They also function as flood water retention basins and traditional fisheries. In Assam there are over 3500 such wetlands identified out of which nearly 177 are >100 ha in size. In recent times, many of these wetlands are in degraded condition while others are completely destroyed due to siltation, eutrophication and many anthropogenic practices such as encroachment for settlement, construction of roads, railways, embankments etc. [1].

Table 1: Total forest cover in the Brahmaputra Basin (State wise).

S. No.	State	Geographic Area (sq. km.)	Forest Cover Assessment (sq. km.)
1	Arunachal Pradesh	83,743	66,688
2	Assam	78,438	28,327
3	Meghalaya	22,429	17,119
4	Nagaland	16,579	12,486
5	Sikkim	7,096	3,342
6	West Bengal Hills*	3,149	2,368
Total		211,434	130,330

Source: State Forest Report-2019 (*includes only Darjeeling district)

Table 2: Details of the Protected Area Network of North-East States.

S.No.	State/UT	No. of National Parks	No. of Wildlife Sanctuaries
1	Arunachal Pradesh	2	13
2	Assam	5	18
3	Manipur	2	7
4	Meghalaya	2	4
5	Mizoram	2	9
6	Nagaland	1	4
7	Tripura	2	4
Total		16	59

Source: National Wildlife Database, Wildlife Institute of India

Key threats to biodiversity and ecosystem of Brahmaputra basin

Biodiversity helps in maintaining the ecological balance and evolutionary process of the natural resources along with the various spiritual, cultural, aesthetic and recreational values associated with it. Also the well-being and survival of the human population is mostly dependent on the resources available in nature. In fact the diverse biological resources are a part of human's livelihood and have assets upon which families generally depend for their survival. As such biodiversity indicates variation and abundance of species and their habitat that need to be preserved for the existence of all living forms.

The Brahmaputra river basin harbors a rich and unique biodiversity that is facing a huge threat due to the following reason:

Flood and erosion: In the Northeast region, Assam with over 40% of its land surface susceptible to flood damage is one of the most acutely hazard-prone regions. For e.g. Majuli a wetland that is a unique hotspot for flora and fauna and an important cultural heritage site is shrinking at an alarming rate with about 33% of it landmass been lost in the mid of 20th century. Having several wetlands ranging from small 'dobas' or 'dubies' to several beels, this island has a notable contribution towards the state's socio-economy through its fishery potential [9]. As per Water Right Division, 2008 there is a trend of widening of the Brahmaputra in Assam. In 1920s the basin occupied around 4000 sq.km area which has increased to 6000 sq.km by first decade of 20th century. This has caused massive land loss (72.5 to 80 sq.km./year) wiping out nearly 2500 villages and 18 towns including cultural heritage sites and tea gardens affecting lives of almost 5 lakh people. Intense braiding, high water discharge and heavy sediment after 1950s flood have resulted in riverbank erosions along the Brahmaputra River.

Water resources development: One of the major developments taking place in the upper Brahmaputra basin (mainly in Arunachal Pradesh) is the Hydropower development that is causing some serious impacts on the natural settings of the basin such as:

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i. Too less (intermittent flow) or too much (flood) water

ii. Shift in natural flow regime

iii. Highly regulated or managed river flow

iv. Low lean season flow

v. Fragmentation of rivers

Changes in the river flow disrupts the water depended ecosystem and ecosystem services such as food, water, timber, nutrient cycling, cultural etc. and also the aquatic life to a great extent. Additionally, there is a serious threat of forest cover loss due to construction of dams, power houses, residential areas, roads etc. for hydropower development.

Climate change: Climate change poses a serious threat to the people living in the low-lying areas of the Brahmaputra basin. The basin is one of the most vulnerable areas due to combine effects of glacier melt, extreme monsoon rainfall and sea level rise. The assessment report for 2030s published by the Indian Network for Climate Change Assessment (INCCA) has considered NE region amongst four major eco-sensitive target regions, and biodiversity (i.e., natural ecosystems and forests) amongst 4 major targeted sectors in the country [10]. Thus, the Brahmaputra basin will also face climate crisis and that will put stress on the biodiversity of the basin.

Oil exploration: Oil exploration poses a threat to some endangered species that live in the Brahmaputra River. Tectonic work by oil companies could have large impacts on the endangered Ganges river dolphin.

Deforestation: The North east region has witnessed extreme logging since the colonial days for revenue generation [11]. As such the prime vegetation in these areas are severely disturbed or modified by anthropogenic activities. In few cases, seismic activities, frequent landslides and soil erosion are also responsible for deforestation [12].

Conclusion

The issues discussed above are serious and for systematic development of the Brahmaputra basin they all need to be tackled carefully. Although, the governments has always been putting efforts for basin development, biodiversity conservation, protection of ecosystem etc. however the studies suggests that there is still a lot to be done. The basin being a flood-prone region, acts like a barrier to agricultural development which is one of the main reasons of the state's economy backwardness. The Brahmaputra river is one of the largest river systems of the world; still it is one of the most under-investigated/studied and underdeveloped river systems. Recently the central government has taken up some serious steps towards conservation of Ganga river in terms of its cleanliness, better management etc. Similar efforts should be taken up for Brahmaputra basin as well on key issues like floods, sedimentation, water quality, aquatic biodiversity, etc. towards its wholistic development.

The Brahmaputra river basin, is currently undergoing rapid industrial, agricultural and economic development in order to fulfill the needs of its exploding population. Therefore, government should also focus on more rigorous scientific studies for the basin by allocating more financial and physical resources. Specific policies and action plans should also be designed for this unique river system.

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