CHAPTER-II

PHYSIOGRAPHY
2.1 The Brahmaputra drainage system

The River Brahmaputra with its large number of tributaries and connected water areas is the life-line in the cultural heritage of the people of Assam. It naturally regulates and enriches the life and economy of the inhabitants of the Assam valley. The river has extensive potentialities of inland water transport and communication, water supply, power generation and riverine fisheries. Therefore, before carrying out any investigation on the fish and fisheries potential of the river, a comprehensive study of the physiography was made to plan out the proposed work.

2.1.1 Source of the river

The River Brahmaputra originates from the great glacier lake Manasarovar of the Himalayas at an altitude of 5150 meters and at the latitude and longitude of 30°31' N and 82°10' E respectively. At the source many small tributaries merge with the river from near the Mariam La Pass which separates its base from Manasarovar lake, from which two other great rivers, the Indus and the Sutlej take the source water.
2.1.2 Course of the river

The river under its Tibetan name Tsangpo flows through southern Tibet for about 1100 km eastward almost parallel to the main Himalayan range and meets its first tributary, the Kaja Tsan from the north. The next important southern tributary, the Nyang Chu meets it near Shyatse. The combined waters are further replenished by another major tributary, the Kye Chu from the north. The Srima Chu meets the main channel near Tselha bzong from the north beyond the northern border of Arunachal Pradesh and from this point the river gradually turns towards north-east. At an altitude of about 3000 meters, the river abruptly turns towards the north and traverses through a series of cascades and rapids between the high mountains of Jyala Peri and Namcha Barwa (7750 m) and then turns to the south and south-west and enters the Siany district of Arunachal Pradesh in the name Dihang or Dihang. The Dihang enters Assam on the north-west of Sadiya where it is joined by two more trans-Himalayan tributaries, the Sikong or Bibong and the Jonit. It runs for about 160 km within Arunachal Pradesh, then descends to an altitude of 300 meters. The river rolls down the Assam valley from east to west for a distance of about 720 km in oscillating and variable channel, having its average width of 8 km (Verma, 1931). It is fairly wide in upper Assam but narrows down in its middle at Juhahati.

2.1.3 Tributaries of the river

During the course, the river receives many tributaries
from the north and south. The north bank tributaries have very steep slope being they are mostly hilly, shallow, braided, shifting channels and have coarse sandy beds with heavy silt charges. They usually bring flashy floods from hills with abundance of silt, distributing and depositing in the Brahmaputra bed. The north bank tributaries have north-south course except at the confluence with the Brahmaputra, where the mouths are shifted westward by fractional drag. On the contrary, the south bank tributaries have low gradient, deep meanders, roughly east-west channel and have comparatively low silt charges. These rivers have curved their valleys through deep alluvium and are absolutely rainfed. They form natural freshwater sources by changing courses during rainy season's flashy floods that drag the charge of the course.

The notable north bank tributaries are the Jia Bhal, the Kumati, the Subansiri, the Ranga Noi, the Dikrang of the Lakshimpur district; the Buroi, the Barbang, the Burigong, the Jia Bharali, the Sabharu, the Belsiri, the Panch Noi, the Jia Dhansiri, the Manjaldoi, the Na Noi, the Baroi of the Darrang district; the Barolia, the Puthimari, the Pagladia, the Tihu, the Kaldia, the Pahumara and the Beki of the Kamrup district; the Manas, the Ai, the Champamati, the Saralbhanga, the Sadadhar and the Sankosh of the Goalpara district. The major south bank tributaries are the Noa Dihing, the Dibru and the Duridihing of the Dibrugarh district; the Disang, the Bikhow, the Jhanzi, the Teok, the Shyldoi, the Kakadanga and the Dhansiri of the Dibrugarh district; the Kalong, the Kopili of the Nowgonj, district; the
ijaru, the Kul. i, the Jinjra of the Kamrup district and the Jaijani, the Jinjani of the Souparta district of Assam.

All the western tributaries of the south bank have north and narrow valley plains. The Tista is the important tributary of the Brahmaputra outside Assam valley. Travelling round the spurs of the Baro hills near Sankachar, the river enters Bangladesh and flows for a distance of about 270 km across the alluvial plains of Bangladesh before joining the Bara river at Joalbandu under the name, the Padma.

2.1.4. Slope of the Brahmaputra valley

The valley gently slopes from north-east to south-west from Jadiya (134 m above mean sea level) in the north-east corner of the state to Juwanati (50 m above mean sea level) and thence the slope is east to west directional up to Umabari (36 m above mean sea level), the westernmost corner of the state of Assam. The average east-west slope of the valley is about 0.125 m/km but above Dibrugarh it is about 0.25 m/km. From Dibrugarh to Tezpur it is about 0.095 m/km and after Tezpur downwards in the lower reach it decreases considerably. The river becomes sluggish in the lower reach slope over a low gradient from Tezpur to Umabari and in this portion many islands are formed owing to the deposition of enormous load of sediments carried by tributaries and thrown into the river Brahmaputra. In Dibrugarh, the depth of the river varies from 3.6 m to 5.0 m during the dry season which becomes more than double during monsoon thereby increasing the flow capacity to two times than that of the normal or recession flow. Near Juwanati, where the river channel is hugged by hills
on either side, the depth during low water becomes 18.2 m or so which increases to more than 27.4 m during high floods, thereby increasing the flow capacity of the flush to 2.5 times than the normal dry season.

2.1.5 Discharge and silt load of the river

The maximum discharge of the Brahmaputra at Dhubri is estimated to be in the order of 25 laks cusecs. In the Tibetan reaches, the water of Tsangpo is clear and the percentage of silt carried by the water is not significant. But on entry into India, the silt charge becomes heavy. The silt charge of the northern tributaries are generally much greater than that of the south bank tributaries. It is estimated that the northern tributaries, the Subansiri, the Ranga Noi and the Manas have the average silt yield in the order of 666.7 m³/km² and the silt charge from the south ranges from 95.7 to 666.7 m³/km².

2.1.6 Floods in the river

The topography of the region influences the distribution of rainfall in the basin. The upper reach of the Brahmaputra being surrounded by mountains receives low rainfall and that is why the trans Himalayan region gets less rainfall, only about 250 mm to 500 mm whereas the Brahmaputra plains receive about 2500 mm rainfall from May to September (Dutta, 1983). Consequently, during monsoon months 27% of the Assam valley remains flooded due to heavy rainfall and low carrying capacity of the Brahmaputra and its tributaries. The melting of ice during hot summer also supply enormous waters to the main river as well as to the northern tributaries. Consequently, the main river and
its tributaries are over flooded. The gushing water and its branical to and fro movement not only create local floods but also frequently dig out new courses leaving out gradient curves as lakes and beels. Therefore, most of the northern bank tributaries have a potential tendency of changing their courses and creating new water sources to the advantages of small and medium freshwater species.

2.2 Beels

The salient topographical features of the Brahmaputra valley is interspersing of numerous abandoned riverine water areas which are mostly subjected to annual inundations. These areas constituted the riverine beels above that of tectonic beels most of which are eutrophic and barren of fish population. There are altogether 1392 beels in Assam covering an area of one lakh hectares. Assam has 423 registered beels covering 60,000 ha of which 10,000 ha are in good condition, 15,000 ha in semi-derelict condition and 35,000 ha are in derelict condition. Among the unregistered beels none is in good condition and 10,000 ha and 30,000 ha area are in semi-derelict and derelict conditions.

Beels in Assam are essentially of two types: 1. Lake-like beels and 2. Ox-bow beels. The lake-like beels or lacustrine beels are wide, shallow and have irregular contour and are connected to rivers through channels and receive water therefrom whereas ox-bow beels are relatively narrow, long and have either bent or straight shapes and are formed from isolated loops of meandering mature streams of rivers. These crescent shaped basins are usually deeper than the lake-like beels because they occupy the
old segments of the river. Other than the above mentioned types, there are tectonic beels which have been formed due to earth's crustal instability resulting in the formation of large depressions at the time of severe earthquake.

2.2.1 *Uighali beel*

The Uighali beel situated in the district of Kamrup is an ox-bow type beel with water area of approximately 200 ha at live storage level and it lies 35 km north-west of Guwahati. Its location is on the latitude 26°28'N and longitude 91°30'. The beel is connected with the river Brahmaputra but presently separated by a sluice gate on western side of the beel and a man-made bundh in the eastern side. It is a natural riverine beel which is infested with water hyacinth and found dried up during winter and pre-monsoon months leaving only few pockets of shallow water. The surrounding hills form the main catchment area for this beel.

2.2.2 *Whir beel*

The Whir beel is situated at about 230 km from Guwahati in latitude 26°25'N and longitude 90°30' in the district of Dhubri. The National Highway-31 runs through the beel dividing it into two unequal portions. The beel which have a live connection with the river Brahmaputra covers an area of approximately 689 ha but during the driest season it reduces to 333 ha. The beel is almost free from floating weeds, but the submerged weeds occur in a cyclical manner. The topography of the beel indicates that it was a bed of big river which perhaps due to some natural events changed its course many years back. The surrounding hills form the main catchment area for this beel.