Chapter III

GEOGRAPHICAL ACCOUNT OF THE BRAHMAPUTRA VALLEY, ASSAM

A. Area, Physiography

Assam is situated on the North Eastern corner of the Indian Union between the latitudes of 28°18' and 24°N. Longitudes of 89°46' and 97°4 E (Map No.1). The tropic of cancer passes through the South of Aizwal, the capital of Mizoram and as such, Assam falls within the Sub-tropical Zone, but having been dominated by tropical air masses, the area shows characteristics of tropical climate. The Union territory of Arunachal Pradesh lies in the north and north east corner of Assam. The mighty Dihang takes a sharp southerly course beyond Namcha Barowa, the loftiest peak in Arunachal Pradesh and enters into Assam after crossing a series of interlocking ranges of eastern Himalayas. The river takes the name Brahmaputra on the confluence of the rivers Dibong, and the Lohit near old Sadiya. The Brahmaputra flows south west and west until it reaches the Bangladesh plains lying at the west of Garo hill district of Meghalaya State. Within this part of the plain, innumerable tributaries both from the north and south join the mighty river thereby increasing its gross discharge tremendously. On the east of the State lie the Patkai Hills, the Naga Hills and the eastern Himalayan Arunachal State. All the branches of the sub-Himalayan range form a natural boundary between Assam and Burma. On the south are the States of Mizoram, Manipur and Meghalaya. On the south-west and west lie Bangladesh and Cooch Bihar, which was once a part of Assam but
ASSAM, NAGALAND, MANIPUR, MEGHALAYA and TRIPURA
And Union Territories Of
ARUNACHAL PRADESH And Mizoram

MAP No. I
Establishment of Satra Institution and Namghar (Prayer hall) in the villages was the vehicle for percolating his preaching of devotional songs and literature among the masses. In the original Vaisnava faith of Sankardeva there was no scope for casteism hence its popularity among the people.

Racially, the people of the plains districts belonged mainly to the Aryan and Mongoloid stocks. But fusion of Aryan and non-Aryan blood had taken place since a long time. The Hindus of the upper stratum of society generally observed the principal samskaras enjoined in the sastras, but those of the lower stratum usually confined themselves to the performance of the two principal rites, viz., marriage and obsequial rites prescribed by the smritis (Gait, 1933).

The people of the Brahmaputra valley observe three Bihus, with great enthusiasm. The Bihus are basically agriculture-based festivals of the Assamese people performed at different seasons of the year. The Bohag Bihu also known as the Rongali Bihu is performed with the commencement of the Assamese new year during the spring season (middle of April). It is observed by dancing and singing in open fields as well as in the houses. The villages and towns alike wear a festive look during Rongali Bihu and this makes the beginning of the Assamese new year. The new year is greeted by the Assamese people, irrespective of caste, creed and religion with new clothes woven in their own hand loom. This festival plays a tremendous role in establishing universal brotherhood among fellow people and in encouraging people to go to his agricultural
farm with more vigour, strength and determination. The Kati Bihu falls on the first day of the month of Kartik (middle of September). In the evening of that day bonti (lights) are put near tulasí (*Ocimum sanctum*) plants, paddy fields, farms and orchards. It is also called Kangali Bihu (poor Bihu) as the Assamese people do not go for feasts, new clothes and other enjoyments in this particular Bihu. The idea behind this is that crops are not ready for harvest as this particular time of the year. The Magh Bihu begins on the last day of the month of Pous (middle of January) and continues for seven days. After the harvest, people enjoys this Bihu with great festivity, huts of straw and bamboo are erected here and there. Young men keep whole night awake by singing and dancing. People bathe before sun rise, burn the Meji (bon fire) and worship the god of fire. The women of every house prepare Assamese sweets and cakes. The Bihu is performed with songs and dances, community feasts etc. and merriments continue for seven days. Old men and women utter hymns. Young men go from house to house singing huchori (Bihu song and dance). Friends and relatives are invited and entertained. Feast and merry-making continues for several days in every house. So, this Bihu is known as Bhogali (full of enjoyment) Bihu. The people enjoy this Bihu to its fullest.

Weaving of fine silk and cotton cloths with various floral and other decorative designs is a speciality of Assamese women. Every Assamese house has a loom and a grown up girl must know the art of weaving. If an Assamese grown up girl
does not know the art of weaving then it is considered as a disqualification and that will stand on her way of getting a suitable match for her particularly in case of marriage.
now belongs to West Bengal. With the creation of Meghalaya in 1971, comprising of the Garo hills and the Khasi and Jayantia hills and with the separation of Mizoram, the area of Assam has been considerably reduced but left with more than 92 percent of population of the undivided Assam. To-day Assam is comprised of ten (10) districts, namely, Goalpara, Kamrup, Darrang, Nowgong, Karbi-Anglong, North Cachar Hills, Sibsagar, Lakhimpur, Dibrugarh and Cachar with a total area 78,523 Sq.Km. and a population of 14,611,603 (1971 Census, 17,725,000 projected for 1977-78).

Topographically, the State can be divided into two main divisions - the plains and the hills division.

1. The Plains Division: This division is comprised of seven districts of the Brahmaputra Valley or the Assam Valley and the Barak Valley district of Cachar with a total area of 62,301 Sq.Km.

2. The Hills Division: It consists of the two hilly districts of Karbi-Anglong and the North Cachar Hills with an area of 15,222 Sq.Km.

The most dominating feature in the topography of Assam is the course of the river Brahmaputra. It is one of the largest rivers of India. The Brahmaputra has curved its own valley between the two ranges of hills, the Assam Himalayan in the North and Shillong plateau on the south. With the source at an elevation of 5150 mts. just south of the lake called
Konggyn Tsho of Tibet, the river flows through Tibet as Tsampo from west to east. The river then takes a sharp bend and crosses the Himalayas, entering into Assam through the north-eastern corner, with the name Dihang. Dihang meets with another stream Dibong which is coming from the north. The third stream 'Lohit' from the East joins the two rivers Dihang and Dibong at Brahmakunda and then the combined water flows through Assam from east to west as the mighty Brahmaputra. The valley is 724 Km. in length and on the average 70 to 80 Kms. in breadth. The Brahmaputra receives as many as 35 tributaries and touches every district in the valley. Finally it crosses the Goalpara district, the last western district of the valley and enters into Bangladesh.

The Brahmaputra Valley

The plains of Assam consists of two divisions. The Assam or the Brahmaputra valley consisting of seven districts (Map No. II) and the Barak valley having only one district.

Physiographically the Brahmaputra valley, the most significant part of Assam, is a flat level plain surrounded by the Arunachal hills of the eastern Himalayan ranges on the north, the Patkai and the Naga hills on the east and south-east and the Shillong plateau on the south-east may be termed as a swamp valley having a total area of 57,032 Sq.Kms. The whole valley can be divided again into two parts - the lower Brahmaputra valley comprising of the districts of Goalpara, Kamrup, Nowgong and Darrang, where the plain is interrupted by
isolated groups of low hills and the upper Assam valley where the plain is unbroken, extending from the foot of the Arunachal hills on the north to the Naga hills on the south-east and consisting of the districts of North Lakhimpur, Dibrugarh and Sibsagar. Numerous low hills found lying scattered near Gauhati (Kamrup district), Tezpur (Darrang district), Goalpara and Dhubri areas (Goalpara district), which are in fact outliers of the Shillong (Meghalaya) plateau. The entire valley is flat with gradual slopes and traversed in all directions by numerous riverlets and streams from the neighbouring hills flowing down to the Brahmaputra.

The mighty Brahmaputra with its innumerable tributaries (Buridihing in Dibrugarh district; Disang, Dikhaw, Bhogdoi, Jhanji and Dhansiri in Sibsagar district; Subansiri in Lakhimpur district, Kapili in Nowgong district and Bharali and Barnadi in Darrang district; Pagladia, Buki, Manas, Digaru, Kulsi in Kamrup district; Sankosh, Krishnai, Soralbhanga, Champamati in Goalpara district) from either side make up the total drainage system of the valley. A few tributaries of the north bank are snow fed. The rest of the tributaries are normally rain fed which are responsible for frequent monsoon floods.

Due to sudden change from the lofty hills into small and narrow plains, the tributaries change their courses frequently bringing enormous amount of silt and depositing them on the flat flood plains. This has given rise to numerous permanent and semipermanent marshes (deep marshes, formed by natural depressions on land where water collects and remains
during a part of the year or throughout the year) known as 'heels'. Amongst them Dipul, Dhir, Tamranga and Dhalari in Goalpara; Kapla, Satdala, Rowmari in Kamrup; Kachadhara and Pakaria in Nowgong, Dighali, Rowmari and Borkar in Darrang; Dighali, Bongalmari in Lakhimpur district deserve mention.

Another important feature of the Brahmaputra plain is that it has a very low gradient. The average gradient is approximately 15 cms. per Km. Many a time, the tributaries and the Brahmaputra, change their course devastating the crop fields and settlements. The present Majuli island which is the greatest river island in the world also originated due to such a change in the course of the river Brahmaputra.

The northern margin of the valley is characterised by an abrupt rise into the outer ramparts of the Assam Himalayas while the western side of the valley is open and merges with the flat Ganga-Plains. Thus the Brahmaputra valley may be considered to be the easternmost continuation of the Indo-Gangetic plain.

Depending upon the topography, Physiography, various climatic conditions and the cropping pattern, the Brahmaputra valley itself can be divided into 4 Zones, viz., upper Brahmaputra valley, central Brahmaputra valley, north bank plains and the lower Brahmaputra valley.

**Upper Brahmaputra Valley:** It consists of Dibrugarh and Sibsagar districts, including the Majuli island. The area slopes down gradually from the hills of the Arunachal Pradesh,
Nagaland and Karbi Anglong districts. The upper slopes are very suitable for tea plantation.

**Central Brahmaputra Valley:** In the central Brahmaputra valley region, lies Nowgong district. It is situated on the south bank of the Brahmaputra and on the west of the upper Brahmaputra valley, which alone is considered as a distinct region. The district is encircled by hills of Shillong plateau on the east, west and south; and on the north lies the mighty Brahmaputra. Numerous isolated hillocks found lying scattered and even along the Brahmaputra bank, which are in fact outliers of the Shillong plateau. Thus the northern boundary of the district is for the most part higher than the central plains of the region which has an appearance of being encircled by hills on all sides. Due to this physiographic condition, Nowgong district is frequently inundated by floods during the rainy season. Tall grasses are found to grow abundantly along the bank of the Brahmaputra and especially on the north-eastern part. The world famous Kaziranga wildlife sanctuary constitutes such a part of the Nowgong district whilst the other part is constituted by a part of Sibsagar district.

**North Bank Plain region:** On the northern bank of the river Brahmaputra, there lies a distinct region comprising of Lakhimpur and Darrang districts. Physiographically, this entire region, can be divided into 3 small parallel belts.
The foot hills proper, with alluvial soil structure, is under deep forest. There are small tea estates extending from the Subansiri river to the Barnadi. The central belt is a narrow one having alluvial soil and is suitable mainly for rice cultivation. The low-lying belt which includes the area on the edge of the Brahmaputra, the area between the river Subansiri district is inundated by floods almost every year.

The Lower Brahmaputra Valley region: The lower Brahmaputra valley region consists of Kamrup and Goalpara districts which form the lower Assam plains. There lies the folded ranges of the Himalayas on the north side and Shillong plateau on the south. The entire area on the southern side of the Brahmaputra is belted with spurs of the plateau. As a matter of fact some of the out lines of the plateau are found even on the north bank of Brahmaputra. The northern foot hills are covered by critically dense forests and tall grasses. Valuable timber trees like 'Sal' and 'Teak' grow abundantly on the foot hills of the southern part. The central portion of the lower Brahmaputra valley region is famous for the cultivation of rice.

B. Climate

The climate of the valley is controlled by five dominant factors such as (a) Orography, (b) the alternating pressure cells of north-west India and bay of Bengal, their periodic western oscillation, (c) the predominant maritime tropical air mass, (d) the roving periodic western disturbances
and (e) the local mountain and valley winds. Besides these important factors, latitudinal position, its extensive water bodies, local depression and forests play a remarkable role in shaping the variable weather conditions in the State. The State does not experience either cold waves or sun strokes like many other parts of northern and central India (Borthakur, 1968).

Main seasons of the valley are (a) winter, (b) pre-monsoon, (c) monsoon or summer and (d) retreating monsoon. The winter season is constituted of the months of December, January and February. This is the most pleasant and comfortable season. During winter temperature remains well above $12.8^\circ$C, rainfall does not exceed 7.6 cm. Fogs are common feature in this season. In late winter occasional thunder storms occur. Pre-monsoon season starts from March and continues till early June. Rapid rise in temperature, vanishing fog and occasional thunder showers are features of this season. However, the weather during this season remains windy and rainless for the most part. The wind very often becomes strong during the early hours of the day which raise dust and occasionally dust storms occur, specially in the western part of Assam valley. During this season mornings are cool and pleasant with mild winds but afternoons are hot and irritating. Cloudy and thundery weather associated with continuous rain mark the end of pre-monsoon. The monsoon is the longest season, begins from the month of June and continues till September. The monsoon weather is characterised by cloudy weather and continuous rain with frequent thunder storms. Due to high humidity the weather remains sultry and oppressive. August is the hottest month in
Assam. Retreating monsoon season begins with clearing of the sky at the end of September or early October and continues till onset of winter. With the advancement of the retreating monsoon the temperature falls and the morning mist and fogs appear. Rainfall is negligible during the season. The weather progressively clears up and fair sunny condition prevails. This is one of the most pleasant and delightful period except occasional cloudy and rainy weather in late autumn.

The maximum temperature in the plain districts varies from 30°C to 37°C and the minimum varies from 7°C to 11°C. The driest part of the State is Lumding within Nowgong district, situated at the border of Karbi Anglong and North Cachar hills districts. The annual rainfall in Lumding is about 1000 mm. The annual rainfall in other parts of the Brahmaputra valley varies from 2000 mm to 3000 mm (Barua, 1979).

Average monthly maximum and minimum temperatures and average monthly rainfall of Dhubri (Goalpara district), Gauhati (Kamrup district), Chaparmukh (Nowgong district), Tezpur (Darrang district), North Lakhimour (North Lakhimpur district), Dibrugarh (Dibrugarh district) and Dinhu (North Cachar district) of the Brahmaputra valley, Assam for the year 1977-79 are presented in graph-I and graph-II respectively. (Source: Meteorological department, Borjar (Gauhati), Assam).
Minimum and maximum monthly average temperature of the following districts of the Brahmaputra Valley for the year 1977:

AM, BM and CM stand for Maximum, Average, and Minimum temperatures.

Graph - I
C. Soil

The State of Assam, is a land of hills, valley and rivers. The warm moist climate is responsible for the luxuriant green vegetation found all over the State. This is also an indication of the productivity of the soils of Assam. Barua (1964) classified the Assam soils into three broad groups - (a) new alluvial, (b) old alluvial and (c) red loams or red soil of the hills. Depending on the availability of Nitrogen, Potassium and phosphorus, Bora and Das (1970) classified soils into four categories (Map No. III).

<table>
<thead>
<tr>
<th>Soil class</th>
<th>Nitrogen P.C.</th>
<th>Available P₂O₅ %</th>
<th>Available K₂O %</th>
<th>pH</th>
<th>Textural range</th>
</tr>
</thead>
<tbody>
<tr>
<td>New alluvial</td>
<td>0.079</td>
<td>0.033</td>
<td>0.018</td>
<td>6.2</td>
<td>Sandy loam to Clay loam</td>
</tr>
<tr>
<td>Old alluvial</td>
<td>0.124</td>
<td>0.005</td>
<td>0.019</td>
<td>5.2</td>
<td>-Do-</td>
</tr>
<tr>
<td>Hill-soil</td>
<td>0.217</td>
<td>0.007</td>
<td>0.016</td>
<td>4.9</td>
<td>-Do-</td>
</tr>
</tbody>
</table>

It is seen that the old alluvial and hill-soils of Assam are strongly acidic in reaction, fairly rich in total nitrogen, poor in available phosphorus and moderately rich in potash. According to Acharjee et al. (1969, 70), leaching seems to be the main cause for the strong acidity of the old alluvial and hill-soils. But the new alluvial soils are comparatively less acidic and moderately rich in N, P and K. (Wamanan, 1972).
In the fringes of the Brahmaputra valley, particularly in Kamrup, Nowgong, Lakhimpur and Sibsagar districts there are limited areas with lateritic soil. The new alluvial soils are mostly found in riparian tracts of the valley and are exposed to annual floods. They are suitable for the cultivation of rice, pulses, mustard, potato, seasonal vegetables and certain medicinal plants. The old alluvial soils are found above the annual flood levels. The acidic character of these soils makes them very suitable for tea plantation. The deficiency of Phosphorus and Nitrogen is met by the supply of chemical fertilizers. The acid soils are also suitable for the cultivation of Jute, Sugarcane, various fruits, different types of rice, vegetables and medicinal plants, but are not suitable for cultivation of pulses and mustard. The lateritic soils which occupy small areas in the valley are generally leached soils, poor in plant nutrients and therefore these soils are poor producers of agricultural and medicinal outputs. This type of soil can be used for agricultural purposes only after showers of rain which, however, harden up subsequently making it unsuitable for cultivation. The soils forming the northern fringe of the valley particularly of the district of Kamrup, Goalpara and part of the Darrang district are mostly coarse alluvium formed by the debris deposited from tarai tract having a dense vegetation.

In general, soils of Assam have been formed from two major types of parent material, namely, (a) residual and (b) transported. The former one has been derived in situ from the rocks of Archaeans age which consist mainly of Gneisses,
Schists and Granites and latter are brought in from the Himalayas, Upper Assam and Assam plain by the turbulent rivers flowing down at tremendous speed. The soils that comprise of the valley and the mountain-valley of Assam plateau belong to the second type, while those of the other tracts, i.e., the Assam plateau and its isolated small patches of Goalpara, Kamrup and Darrang districts are mainly of the former type. These soils have been further sub-divided into seven major groups on the basis of natural vegetation:

1. **New Alluvial Soils:**

The recent, riverine alluvial soils are derived mainly from the materials deposited by the river Brahmaputra and its tributaries. These soils are distributed mainly in a strip running almost parallel to the river Brahmaputra in the districts of Goalpara, Kamrup, Nowgong, Darrang, Sibsagar, Dibrugarh and Lakhimpur. The strip, however, covers a wider area on the Northern bank of the river than on the southern side. These soils which constitute the tract are generally open to and disturbed by frequent and recurring flood water.

These are deep to moderately deep soils occurring at fairly high level and with gentle slopes. Sometimes basin like depressions are also found in this area. These are light textured soils throughout the profile. The texture of the upper horizon of these soils is sandy loam to loam, through silty loam. In general, soils of the upper horizon are lighter in texture than the lower horizon. The structure of the soil
occupying these areas are not developed or very poorly developed. The soils of upper horizon is characterised by grey, or dark grey colour, whilst those of the lower horizon are light grey in colour.

They are moderately drained to well drained soils except in the depressions, where drainage is poor. Permeability is moderate to moderately rapid. Concretions are normally absent in these soils, though sometimes they are found in the horizon, which are probably original sediments of flood deposit.

The new alluvial soils are almost neutral to very weakly acidic in reaction and are free from total soluble salts. Occasionally alkaline patches are also met with in the northern bank of the mighty river Brahmaputra.

2. Old Alluvial Soils:

The riverine old alluvial soils owe their origin to the materials deposited by the river Brahmaputra and its tributaries in the long past. This group of soils is mainly found in Dibrugarh, Sibsagar and Nowgong districts.

These are heavy to medium-textured soils throughout the entire profile. The clay content of the soil of the profile normally increases along with the depth of the profile, while lighter textured soils, in the lower horizons, are also not uncommon. Soil texture of the upper horizon vary from loam to clay through silty loam, and clay loam. The structures of the soil vary from moderately developed to well developed and
are subangular blocky to angular blocky. The colour of the soil of the upper horizon varies from brownish grey to greyish brown, while lower horizon soils are light yellow to yellowish brown. Soils are moderately acidic in reaction and free from total soluble salts. These soils are moderately to poorly drained. Permeability of the soils is moderate to poor.

3. **Mountain valley Alluvial Soils:**

This group of soils is generally found in the foot hills of the Himalayan range lying in the districts of Goalpara, Kamrup, Darrang and Lakhimpur, foot hills of Naga hills in Sibsagar district, foot hills in Nowgong district, Meghalaya foot hills lying in the Kamrup district and almost the entire district of Cachar.

These soils are generally found on flat as well as slightly undulating areas, intercepted with small hillocks. These soils are built up mostly by alluvial material washed down from the hills by rains along with some alluvial deposits. External as well as internal drainage is slow in this type of soil. These are mainly very deep and heavy-textured soils. The colour of the surface soils is light yellow to pale brown, compact and very sticky. The texture of the soils becomes heavier with depth. Permeability of these soils ranges from low to very low.
4. **Laterised Red Soils:**

The laterised red soils are found in patches in some parts of Kamrup, Sibsagar, parts of United Mikir hills and parts of the low hilly areas of the Cachar district. This type of soil occur both in the high land areas and in the mountain valleys. The characteristics of this group of soils is similar to that of red loam soils excepting for laterisation which is well marked in the soils of this group. High land laterised red soils are fairly well drained whereas ground water laterites are poorly drained.

5. **Non-laterised Red Soils:**

The non-laterised red soils occur in steep slope ranging from 25% and above. These are moderately deep to very deep soils formed under forest. The red and black soils occur side by side of these soils. Red soils are found at higher elevation, whereas the black soils are found in the lower positions. The occurrence of the dark brown colour in the mountains is due to the deposition of colloidal material turned black due to hydration of iron present in the soil. These soils are strongly acidic in reaction and are free from total soluble salts.

6. **Forest Soils:**

Forest soils are also found in the foot hill areas of Assam Plateau and lower Himalayas. These soils vary in depth particularly in the hilly areas of the State. They are rich
to moderately rich in organic matter content. The drainage condition varies from fair to very poor depending on the local topography. The soils are acidic in reaction.

7. Beel Soils:

Small isolated deep pockets are found in the districts of Kamrup and Goalpara, which generally remain submerged under water during the monsoon season. These areas are utilised for cultivation of Boro paddy during the spring season. Naturally adopted aquatic plant including certain medicinal ones also grow in these Beel areas. The submerged soils in these areas are generally dark grey in colour. They are highly acidic and are rich in organic matters.

Thus, it is seen that the most important characteristic of the soils of Assam is its acidity. Soil test summaries indicate that more than 75 per cent of the soils of Assam are acidic in reaction. Liming is, therefore, beneficial or rather essential.