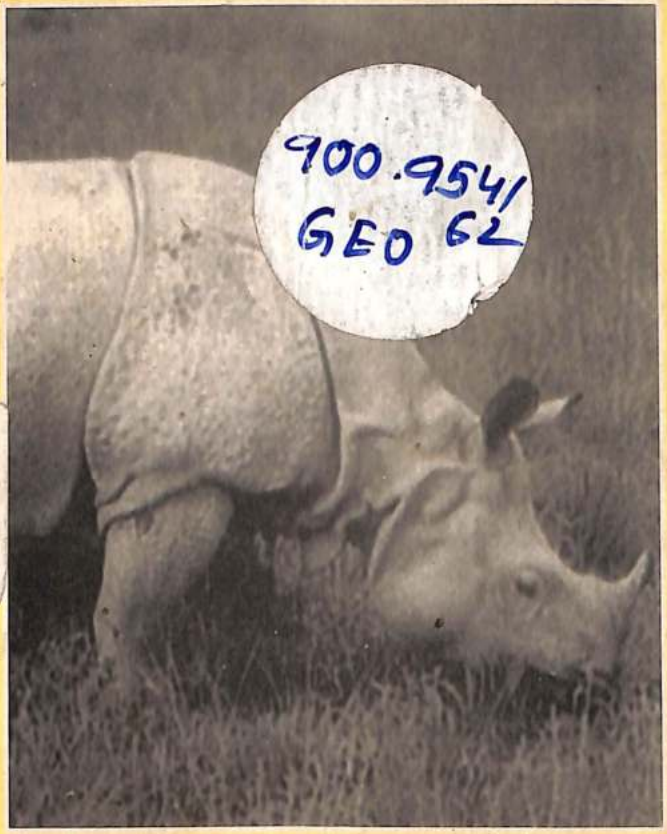
GEOGRAPHY OF ASSAM



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Abani K. Bhagabati
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Dedicated to
Professor S. P. Mandal
and
Late Professor S. D. Roy
of
Darrang College, Tezpur

Preface

The geography community of the north-east, more particularly of the state of Assam has been in urgent need of an exhaustive book on geography of the state since the late seventies of the last century when the highly acclaimed book by Professor H P Das, an eminent scholar in the field, went out of print. During the last quarter of the century, unlike many other parts of the country, Assam witnessed tremendous changes in all aspects of its geography including the most delicate ecological system. The ever-growing population resulting mainly from large scale immigration, the highly distressed water regime, threatened biodiversity, relative stagnation of the economy, growing unemployment and the volatile ethnic and political issues have made the contemporary geography of the state highly diverse and complicated. Serious lack of systematic studies incorporating all important aspects can only reflect the regional realities of such a spatio-socially diverse area like Lake Assam. It is a task really very difficult for a single hand to tackle. We have, therefore, evolved a joint venture in which both young and matured minds could join hands and blend their ideas and expertise to finally arrive at the goal of publication of a new book on geography of the state.

Two different events of unavoidable concern to us, now being really unbearable, prompted us to bring out the book within a short time. While the basic plan for the book was yet to acquire a concrete shape Professor S P Mandal, a reputed geography teacher, retired from his long service as the head of the department of geography, Barpeta College, Barpeta. Subsequently, Professor S D Roy, a devoted teacher and social worker, who was heading the department, suddenly left this world for heavenly abode after a brief illness. Incidentally, both of them were classmates in the Patna University, became colleagues in Barpeta College and immediate neighbour in an urban enclave called Rubber Bagan at Barpeta for more than thirty years. The authors and the editors of this book, most of whom, are either their direct students or colleagues, then considered it to be befitting to dedicate their works in memory of

late Professor Roy and in honour of Professor Mandal. We all are really happy to have Professor Mandal among us still as a great source of inspiration to culture geography in this part of the country.

We have tried our best to make the book complete and do all possible justice to the proposed title. Even then, some of the important issues relating to occupational diversity, unemployment, trade and commerce, insurgency, diffusion of information technology, which have enough geographical relevance, could not be addressed directly. These issues need more interdisciplinary effort for their correct and comprehensive presentation. We are, however, very glad to announce here that most of our contributors are young geography teachers in the colleges of Assam and interestingly, for a few of them this would probably be the first attempt to express their views as responsible authors. We hope, the young authors in future will be more enthusiastically rise to the cause of geography education and research in this otherwise less advanced part of the country.

The editors are greatly indebted to Professor M Taher of the department of geography, Gauhati University who agreed to take the pain of writing the introductory chapter of the book in spite of his old age. Incidentally, all the authors of the book are his direct and ardent students. Let us all take the opportunity to extend our deep sense of gratitude to Professor Taher. Dr. A U Choudhury, a well-known wildlife expert of the region and Dr. S K Phukan, a reputed police officer as well as a serious researcher, a rare combination indeed, deserve our hearty thanks for their valuable and highly relevant contribution. Thanks are also due to all other authors for their active participation in this venture. A special word of thanks goes to P Bhattacharya, cartographer, Department of geography, Gauhati University, for his constant help and assistance.

M. L. Gupta, proprietor of Rajesh Publications, New Delhi willingly came forward to shoulder the responsibility of publishing this book. We are really thankful to him.

Lastly, with all humility and sincerity we invite constructive criticism, advice and suggestions from our learned readers so that necessary improvement may be made in the next edition of the book.

–Editors

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1

Assam : An Introduction

Assam, located in the tropical latitudes (24.3° N and 28° N) and eastern longitudes (89.5° E and 96.1°E), is the most populous state in North-East India. It is surrounded on three sides by hills and mountains. The rivers Brahmaputra and Barak, in the north and south respectively, carve out deep valleys, that represent the major part of the state. Between the two valleys there lies a strip of highland made up by hills and plateaus. The two plains form the easternmost parts of the north Indian plain,which are apparently shut to the south-East Asia by the Patkai Range and its southward extensions. In the north, the Brahmaputra plain rises steeply to the Himalayas, while to the east, the parallel hill ranges of Arunachal, Nagaland and Manipur attain height as one moves eastward, culminating at the Patkai- Manipur-Arakan Yoma hills. Although the hills and mountains mentioned above, appear to provide physical blockade, they are not inaccessible. There are a large number of mountain passes across both the Himalayas and the eastern hills. Situated as such, it is a transitional territory between South Asia and South- East Asia. The transition is reflected not only in the region's flora and fauna, but also in human types, languages and cultures.

Assam is surrounded by seven Indian states and two foreign countries. There are only a few Indian states which have such a strategic location. The state has an area of 78,438 km^2 representing 2.39 per cent of the Indian landmass and a population of 22,414,322 (1991) accounting for 2.64 per cent of the total population of the country.

Historical Evolution

Assam is an ancient land with a long history. The region is referred to as Pragjyotishpura in the earlier epic period. Its capital was also named Pragjyotishpura. The old Sanskrit literature seems to use both Pragjyotishpura and Kamrupa to refer to the same territory. The boundary of the ancient Kamrupa used to fluctuate in different periods. At one stage it extended from Dikkar River (that flowed in the Sadiya region) in the east to the Karatowa River (a river, consisting in the past, of now

aberdeed stones of the South, Mahasenga and Tosali.

Between the fourth and the twelfth centuries A.D. Kamrupa was ruled by the Barmans, Salastambhas and Pala Kings as Kamrupa Kingdom. Bhaskar Varman (594 A.D.–650 A.D.), a contemporary of the great Indian emperor, Harsha Vardhana, was famous king of Kamrupa. It was during his reign that the famous Chinese traveller, Hiuen Tsang, visited Kamrupa (640 A.D.) and wrote in praise of beauty and prosperity of the country. At the beginning of the thirteenth century, Muslim invaders started (1206 A.D.) came in from the west, and the Khens seized control over the middle Brahmaputra Valley (1228 A.D.). With the entry of these two forces into the political scene of the territory, there occurred a series of political changes. The western part of Kamrupa became an independent Khyoki called Kamata, with its capital at Kamatapur (located 10 km north of the present Cooch Bihar town), the middle part of the Brahmaputra Valley came under the sway of the Bhuyan feudal chiefs, while Kachai kings Chandrabanshi set their Kingdoms in the southern and north-eastern parts of the Valley respectively. The Ahoms, meanwhile, established their kingdom over the area between the Burhi Dihing and Dikhow rivers. While they continued their efforts to consolidate and expand their rule, the Koches, in the fifteenth century created a kingdom of their own (in 1489 A.D.) in the western part based on the erstwhile Kamata kingdom. In course of time the Koch Kingdom was divided (1534 A.D.) into two parts, the western part becoming a protectorate of the Mughals and the eastern part becoming vassal of the Ahom king.

The origin of the name 'Assam' (Asom or Axom) is mostly clear. Tabakat-i-Nasiri – I – Shahi written by Minaj Nathan, detailing the geo-political conditions in eastern India during the period, 1161–1424, referred to the Ahom territory as the 'Country of Asam'. It is recorded fact that Sultan Mir Jumla was appointed to command an expeditionary force to conquer Asam i.e. the territory ruled by the Ahoms (Nathan, 1963). Banikanta Kakati points out the Persian historian Shihabuddin Talish, a 'Darbari' Rajasabhakavi in the sixteenth century, referred to the Ahom country (and not the land only) as Asam (Kakati, 1962). Subsequently, in one of his verses composed in the early seventeenth century while referring to the routes and communications of the then Asam, read by Assamese as read the Ahom (Dutta, 1969). Deodhai Chakrabar, in his Biography of Sankardeva, written in the late nineteenth century also referred to the Ahom territory as Asom (Kakati, 1962). Sibsagar in Tai-Ahom

who accompanied Mir Jumla as a scribe in the latter's invasion of the Ahom Kingdom in 1662–63, referred to the land and of Guwahati as the Sarkar of Asom (Talish, 1662). It is dentally that exactly was the name reached by the Ahom king.

These references show that the name 'Asom' or 'Asam' was earlier used to mean the State economy or the land in which the Ahoms initially had nuclear themselves who established their Kingdom in eastern Assam. Subsequently, the term came to be used to mean also the territory ruled. With the fall of the Koch power, when the western part of the Brahmaputra Valley also came increasingly under Ahom administration, the term 'Asom' or 'Asam' received a wide connotation to mean whole of the valley. Later, when the British annexed the territory in 1826 (Fig. 1.1) and constituted it into an administrative division under a Commissioner, they coined the name Assam. Further they added to it the suffixes 'i' 's' pattern and plains, which they subsequently annexed. The

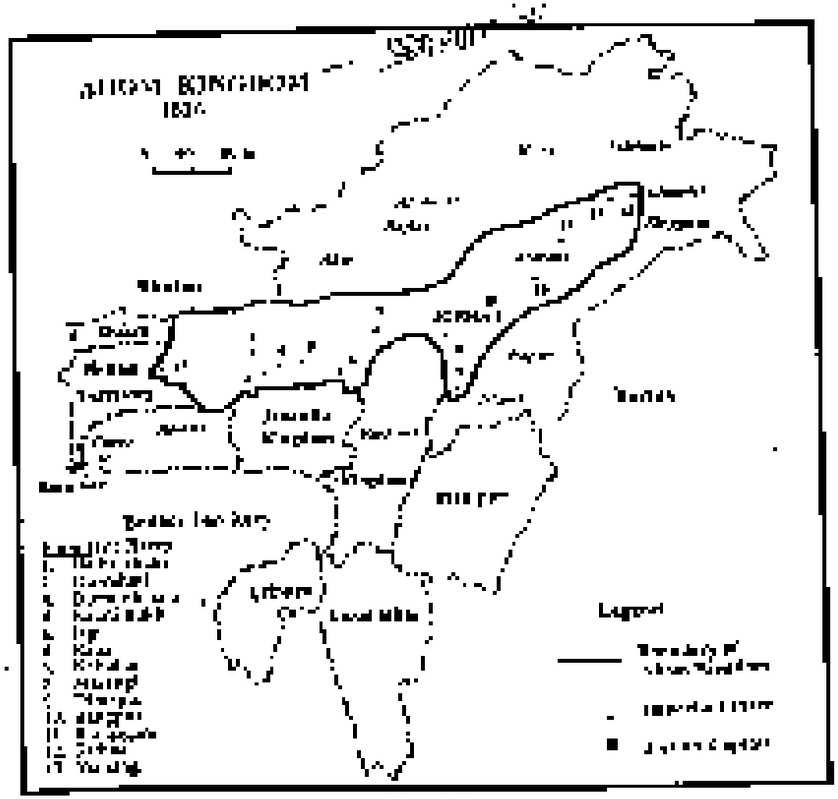

Fig. 1.1

whole territory was constituted a Province on February 6, 1874, as the Province of Assam (Fig. 1.2) under a Chief Commissioner.

The formation of Assam as an administrative province under British Indian history of annexation of equal native kingdoms and principalities in North-East India and their merging into one unit. The undivided Goalpara district (comprising the present districts of Dhubri, Bongaigaon, Goalpara and the southern part of Kokrajhar) and (Karaibari, western part of Garo Hills) came to be controlled by the East India Company following the transfer of 'Dewani' from the Mughal emperor to the former on August 12, 1765. In fact a district named Goalpara was constituted by the British comprising the above mentioned areas, under the Commissioner of Cooch Behar in 1811. The Brahmaputra Valley between the Maree River in the west and Kamena River (on the north bank) and the Buri Dihing River (on the south bank) in the east was annexed by the company following the Treaty of Yandaboo with the invading Burmese army on February 24,

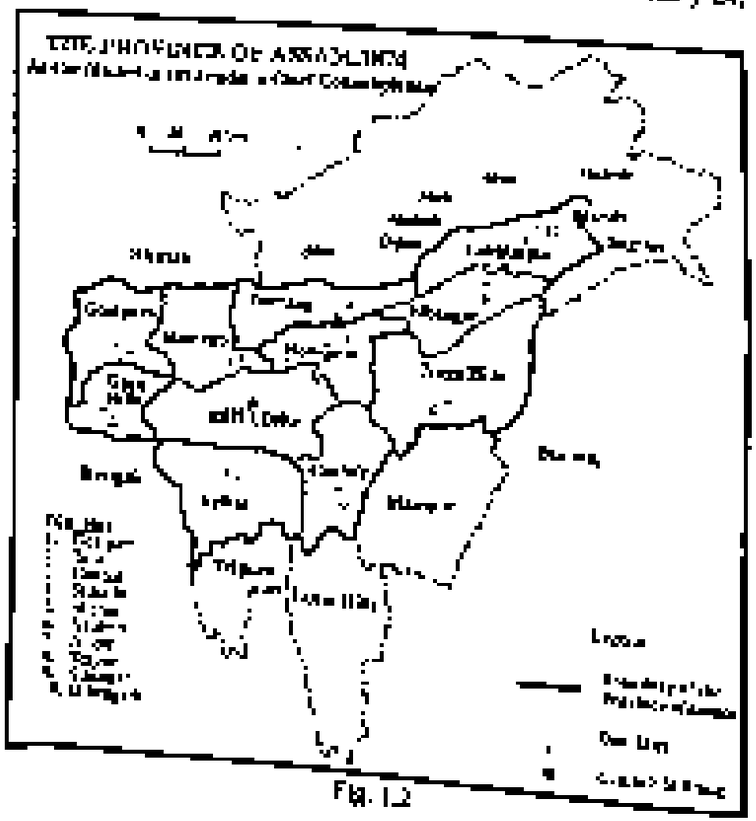

Fig. 1.2

1826. Between 1828 and 1838, the area covering the present districts of Tinkhi, Upper Sibsagar, Jorhat and Gowalpara was allowed to be administered by the Ahom King Purandar Singh. It was finally merged with the British territory in November 1838, on the plea of incompetent but ruthless administration of the King. The area to the east of the Assam territory, i.e. the section comprising present Dhemaji, Dibrugarh and Tinsukia districts (except Sadiya Sub-Division) was taken over from the Matak prince by the British in November 1839, on the plea of the former's inability to pay the annual tribute. The area to the farther east (east of the Matak territory), now owned by Sadiya Sub-Division and foothills of the Lohit district was annexed by the British in 1854 from the Khamti prince due to alleged rebellion of the latter. Subsequently, the area in the southern part of the present Lohit district was also taken over by the British in 1843 from the Singphos on the plea of alleged insolvent nation of the latter, thus completing the annexation of whole of the Brahmaputra Plain and its immediate foothills in the east.

The Plain was then divided into two administrative parts and named them as Upper Assam (east of the Jia Dharali on the north bank and the Dhansiri on the south-bank) and Lower Assam (west of the rivers named up to the Sankosh and Karaibari). The two parts were placed under two Assistant Commissioners. The headquarters of the upper Assam part was Sibsagar (till 1912, when it was shifted to Jorhat), and that of the lower Assam part was Gowahati. By about 1851, the area of the Brahmaputra Valley annexed by the British was divided into four districts, viz. Goalpara, Kamrup, Darrang and Nowgong on the one hand, and the protectorates of Upper Assam, on the other. Subsequently, the protectorates were also taken over as mentioned above, by 1843 and the whole Valley was constituted by a Division, called Assam Division under a Commissioner with its headquarters at Gowahati.

Simultaneous with the annexations in the Brahmaputra Valley there were annexations also in the south. The territory covering the present Cachar-Hailakandi districts and North Cachar Hills, was under the Kachari King, Govind Chandra. He died heirless and his territory was annexed by the British on August 14, 1832. The territory in the Barak Valley thus annexed, was first made a district in the name of Cachar District under the Commissioner of the Brahmaputra Valley ('Assam'), but later on it was transferred to the Dhaka Division of Bengal. The hilly part of the Kachari Kingdom, i.e. the present North Cachar Hills District and a large part of the present Diphu Sub-division, was then under Tularam

Senapati, a rebel Kachari leader, again as a Company's protectorate. This portion (surrounded by the Jamuna river in the north, the Dhansiri in the east, Barail Range in the south and the Diyung and Kapili rivers in the west) was annexed by the British in 1834 on the plea of Tularam's depredation on the former's territory. Tularam was, however, allowed to remain as its feudal lord. After his death in 1844 the land was divided between his two sons. They could not properly administer their respective parts. The East India Company finally took over the region. The northern part inhabited mainly by the Karbi people was joined with Nowgong district, while the present North Cachar Hills was constituted an administrative sub-division and attached to Cachar District.

It is noticed that by about 1828, the East India Company virtually became the master of both the Brahmaputra and the Barak Valleys. They wanted to construct a road linking the two Valleys across the Khasi Hills. The road began to be constructed from Sylhet northward and ultimately reached Nongkhlaw (in West Khasi Hills District), where they wanted to construct a sanatorium also. This step was not kindly taken by the Siem of the area, Tirot Singh, who started a resistance against the British on may 5, 1829. The resistance continued for long six years. Tirot Singh was finally defeated and Khasi Hills was annexed by the British on February 11, 1835.

The Jaintia territory was still a separate kingdom under Ram Singh III, alias Rajendra Singh, albeit as a Company's protectorate. The king abdicated his throne on March 15, 1835 and the territory was annexed by the Company. The Khasi and Jaintia territories were merged into one unit and was constituted a district under the Assam administrative Division in the name 'United Khasi and Jaintia Hills District'.

There was little geo-political change in this part during the period 1843-1865. Then in 1866, the northern part of the present Kokrajhar district (comprising Bijni Duar, Sidli Duar, Chirang Duar, Rifu Duar and Guma Duar areas), which was earlier under the dual control of the Bhutanese King and Koch feudal lords, was annexed by the British and constituted a district, called Eastern Duars under Kuch Bihar Division. The district was, however, dissolved in 1867 and made a part of the then Goalpara district.

In 1866, the present Wokha District of Nagaland was attached to the British territory on the plea of depredation of the Angami Nagas on the British areas. Like other Naga foothill areas, this tract was firstly made a

part of Sibsagar district. But later on, all the areas of the Naga hills, annexed by the British, were constituted into a district called Naga hills District.

While the foothill part of Garo hills bordering the Bengal plain and the Brahmaputra Valley was already under the British, comprising an estate called Karaibari, the interior higher hills, bordering the Khasi Hills in the east, still remained under the tribal chiefs. This interior part was taken over by the British and a new district named Garo Hills District was constituted in 1869. This district also included the western Karaibari area and was placed under the Commission of Kuch Bihar.

While political consolidation continued in the Brahmaputra Valley, the local people kept insisting on introduction of Assamese, their mother-tongue, as the medium of instruction and administration since the late eighteen-thirties in the districts of the Valley. This was agreed to by the British administration in 1871 and Assamese became the medium of instruction in the primary schools, courts and offices of the region. The identity of Axom or Asom or Assam may have received a boost from this politico- social decision also.

On February 6, 1874 the British government constituted a Province under a Chief Commissioner in North-East India and named it Assam, which included their Assam administrative Division (the Brahmaputra Valley) and the hills and plains to the south of it, annexed by the British between 1826 and 1866. The Province initially included ten districts, viz. Goalpara, Kamrup, Darrang, Nowgong, Sibsagar, Lakhimpur, Naga Hills, United Khasi and Jaintia Hills, Garo Hills and Cachar (which included a part of the Barak plain and the present North Cachar Hills District). However, seven months later, on September 12,1874, the Sylhet District of the then Bengal was added to it, raising the number of districts in Assam to eleven.

There was a period of geopolitical lull after the formation of the province of Assam. However, The British administration used to make excursions to the northern mountainous territory allegedly to contain the depredations of the hill and plain tribes like the Mishmi, Khamti, Singpho, Adi, Apatani, Nishi, Hrusso, Aka, etc. In fact, the British government, based in Assam, started marking out Inner Line and Frontier Tracts, from September 30, 1875, partly to regulate the activities of the said tribes and partly to consolidate their administration in Assam.

In 1895 almost whole of Lusai Hills (now Mizoram) was annexed by the British government and in 1898 the region was tagged to Assam as its twelfth district.

With the turn of the century, direct and indirect efforts, aimed ostensibly at attaining independence of India, began to emerge among the educated Indians and the British government started taking counter-measures severely and overly to Zack Goode. As a part of such a design, they divided the Lower Bengal in 1905 and its eastern part, comprising 16 districts, was joined with the 12 districts of Assam to form a new Province named 'Eastern Bengal and Assam' under a Lieutenant Governor. This was done partly perhaps to break down the strength of the united Bengali nationality and partly to divide it on the basis of religion (Eastern part of Bengal had Muslim majority, while the western part had Hindu majority population). However, this arrangement of administration had to be abandoned in 1912 under tremendous public opposition when the province of Eastern Bengal and Assam was dissolved. Assam once again became a separate province under a Chief Commissioner. Meanwhile, minor administrative adjustment were made within Assam. For example, in 1913-14, the Zibrapur area, which was in Sibsagar district, was transferred to Naga Hills district. In 1921, under the Montague-Chelmsford Reform enacted in 1919, Assam was made a full-fledged province under a Governor. There was no geopolitical change thereafter till 1927, when the four plain areas of the then North-East Frontier Tracts, adjoining the Brahmaputra Valley, namely the Balipara area, Jorni area, some portions of Sadiya area and Mangherizi area were merged with Assam and the area of the province remained so till 1947 (Fig. 1.3).

In 1947 when India was partitioned, Sylhet district was separated and tagged to the then East Pakistan, except the Thana areas of Karimganj, Badarpur, Karaberi and Patharkandi, which were merged with the undivided Cachar district.

After independence, there was a long period of administrative reorganisation of the areas of North-East India. On November 17, 1951 the district of United North Cachar and Mikir Hills was created by merging 4421.19 km² of hill area from Nowgong district, 1539 [illegible] km² of hill area from Golaghat Sub-Division of the then Sibsagar district and 4721.23 km² of hill area from Jaintia Sub-Division of United Khasi and Jaintia Hills district. In the following year, an Autonomous Daiddel Hills district Council was set up for the district as per Sixth Schedule of the Constitution. In 1953, Naga Hills district was separated from Assam for

creating a state out of it. On January 2, 1970, United North Cachar and Mikir Hills was divided into two Autonomous district, viz. North Cachar Hills and Mikir Hills (which was renamed Karbi Anglong in 1976). In 1970, Garo Hills and United Khasi and Jaintia Hills were seceded from Assam to form an Autonomous state, which was accorded full-fledged statehood as per North Eastern Areas (Reorganisation) Act 1971 of the Union Government. This Act also took away Lusai Hills from Assam, which was constituted as Union Territory under the name Mizoram. By then, the number of administrative districts in Assam came down to only nine.

However, the exigencies of socio-economic development, under the regime of planning, necessitated the creation of smaller districts. On October 2, 1971, old Lakhimpur district was divided into Dibrugarh and Lakhimpur districts. While the part lying to the south-east of the Brahmaputra was made Dibrugarh district, the socio-economically

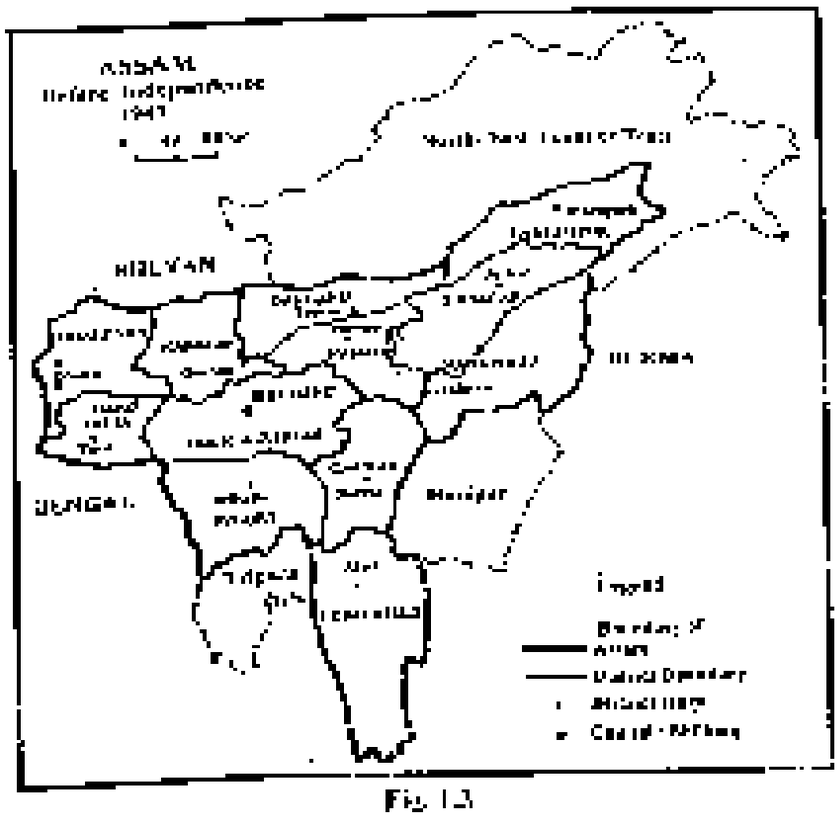

Fig. 1.3

backward north-western part comprising Dhemaji sub-division and Lakhimpur sub-division, was made the district of Lakhimpur. Assam, thus, came to have ten districts from late 1971. Following the above principle, the number of districts was raised to 17 between 1981 and 1987. The districts of Dhubri and Kokrajhar were carved out of the old Goalpara district. Similarly, Barpeta and Nalbari were carved out of the old Kamrup district. Besides, the old Darrang district was divided into Darrang and Sonitpur districts, old Sibsagar into Sibsagar and Jorhat districts and old Cachar into Cachar and Karimganj districts. Thus, during the early nineteen eighties, the number of districts in Assam rose to 17. Again between 1988-89, Golaghat was carved out of Jorhat, Dhemaji out of Lakhimpur, Marigaon out of Nagaon, Tinsukia out of Dibrugarh, Bongaigaon out of Kokrajhar and Goalpara and Hailakandi out of Cachar. Thus by 1989, the number of administrative districts rose to 23 (Fig. 1.4). The aim of creation of smaller districts, as mentioned above, was to bring administration nearer to the people, so that the benefit of socio-economic development can be quickly and directly delivered to them.

A new administrative change was introduced in Assam during the 1990s. The plain tribes having sufficiently large population in each and living more or less in contiguous areas, were granted autonomy, in respect of certain civil administrative aspects, following agitation by such groups as the Bodo, Rabha, Tiwa and Mishing, who are not only socio-economically backward, but also occupy relatively backward areas. The Bodo Autonomous Council was constituted on March 7, 1993, comprising 2570 villages of Kokrajhar, Barpeta, Nalbari and Darrang districts along the Himalayan foothills with headquarters at Kokrajhar. Subsequently, between 1994 and 1997, Rabha-Hasong Autonomous Council was formed over the south-eastern foothills of Goalpara and south-western foothills of Kamrup districts with headquarters at Dudhnoi. Similarly, the Tiwa Autonomous Council was constituted over the south-western part of Marigaon with headquarters at Jagiroad and Mishing Autonomous Council came up over the Mishing dominated villages of Dhemaji and Lakhimpur districts and Majuli sub-division of Jorhat district, with headquarters at Gogamukh (in Dhemaji District).

The above discussion gives an outline as to the process of evolution of Assam into a British Province and finally to an Indian State from the Ahoni Kingdom and its neighbouring principalities-large and small. A close look at the geopolitical events reveals that the period of evolution spread over the nineteenth and twentieth centuries, can be divided into

two periods : Firstly, the period of geopolitical consolidation, from 1826 to 1947 and secondly, the period of geopolitical reorganisation from 1947 onward.

Process of Peopling

Because of its transitional location between South and South-East Asia, Assam has been receiving migrants from the north, east, south and west, across the high Himalayas, over the tangled mass of ridges and valleys of the Patkai Range, Manipur Hills, Lusai Hills and Arakan Yoma and over the plains of the Ganga-Brahmaputra Doab since time immemorial. The state had a population of more than 22 million as per the census of 1991. The natural environment of Assam with fertile river valleys, abundant rainfall, luxuriant vegetation and a rich collection of fauna, had been such that it could attract groups of people to settle. There had been, therefore, streams of migrations into it even during the

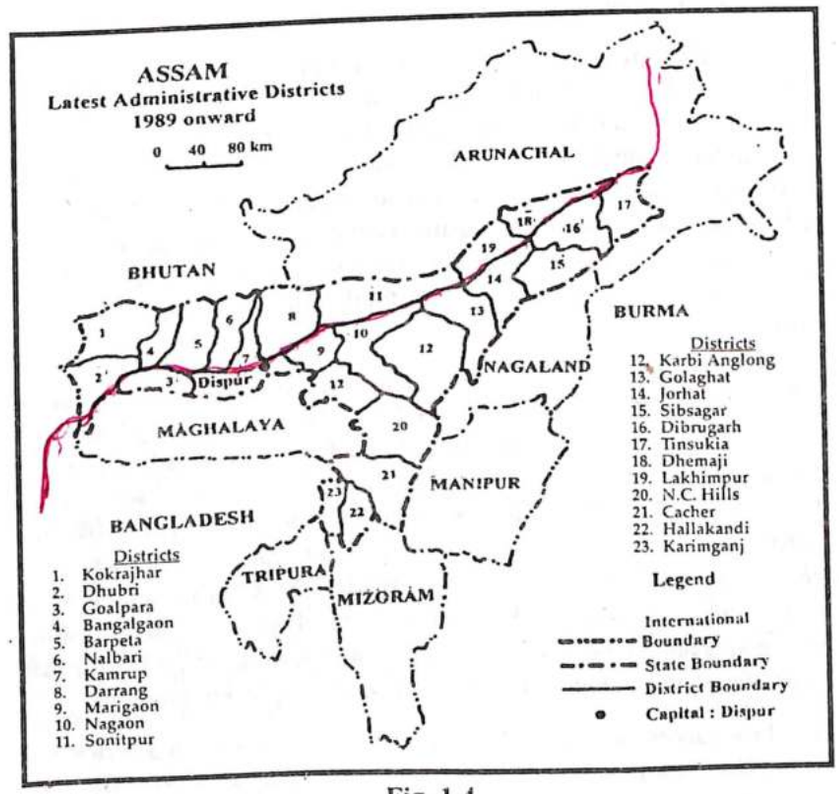

Fig. 1.4

palaeolithic period. An analysis of the sequence of peopling of Assam is difficult to make, firstly because, no systematic and tangible evidence has so far been found as to the human occupation of the land during the prehistoric and protohistoric periods; and secondly, there has been such an intermixture of both blood and cultures of different groups of people in this transitional part, that little can be traced to establish a succession of peopling.

However, a close look at the ethnolinguistic composition of the people of the state reveals that there are people speaking Austro- Asiatic, Tibeto-Chinese and Indo-European languages. An analysis of peopling of Assam on the above ethnolinguistic basis, coupled with whatever scanty palaeolithic, neolithic and historical evidences are available, shows that there are as many as eleven 'waves' and 'streams' of migration into Assam (The term 'wave' is used to mean a migration that occurred once at a particular point of time and the term 'stream' is used to depict a migration of a group of people that continues for long time). The 'waves' and 'streams' of migration are identified as follows:

1. The first group of migrants to settle in this part of the country is perhaps the Austro-Asiatic language speaking people who came here from South-East Asia a few millennia before Christ. They had perhaps earlier lived in the foothills bordering the Brahmaputra Valley and then moved to the hills of Meghalaya, perhaps yielding place to the new migrants of Tibeto-Burman stock. These Austro-Asiatics are now represented by the Mon-Khmer speaking Khasis (both the Khasis proper and Pnars taken together), some of whom also live in Karbi Anglong and North Cachar Hills of Assam.

2. The second group of migrants came to Assam from the north, north-east and east. They are mostly the Tibeto-Burman language speaking people and include such major groups as the Eastern Himalayan (Bhutias, Monpas, etc.), North Assam (Aka, Hrusso, Nishi, Adi, etc.), Bodo, Naga, Kuki-Chin and Kachin. They are racially Mongoloid, and unlike the Austro-Asiatics have set up a stream of migration which has been continuing still today, although in a trickle. Cross border migration of some Tangsas, Nagas and Kuki-Chins from Myanmar is not altogether unknown even today. Assam has a very large number of Tibeto-Burman speaking people comprising both indigenous and recent migrants.

3. From about the fifth century before Christ, there started a trickle of migration of the people speaking Indo-Aryan language from the Gangetic

plain. Their migration has continued ever since. In the past. Indo-Aryan migration was even occasionally sponsored by the local kings and Chieftains of Assam, although in most cases, there were voluntary streams with migrants moving in search of economic opportunity in the Brahmaputra and Barak plains. They are originally of Caucasoid racial descent , who mixed with the subsequent migrants of the same stock and the locals of other stocks and have now formed the majority of the Hindu population of the state. They are also the ones, who spread and built-up the Vedic socio-cultural basis of the state. The spread of the Indo-Aryans into the Barak valley was contemporaneous to that in the Brahmaputra Valley, their settlements being an extension of that in the Gangetic Delta of Bengal.

4. While the migration of the old Indo-Aryan socio-cultural group was still continuing, there started another stream of disguised migration of another group of Indo-Aryans belonging to Islamic faith. Mohammad Bin Bakhtiar Khilji, a Muslim General of Kutubuddin, in about 1205 AD, reached Assam with his force of army in his attempt to go to Tibet. His movements within Assam enraged the local king. He was defeated and some of his captive soldiers were settled in Assam, especially in the area between Hajo and Sipajhar in the Brahmaputra Valley. Subsequent to that, there were several invasions by the Nawabs of Gaur and Dhaka and Sultans and emperors of Delhi. In most of their invasions, whether they won or lost, they had to leave behind some of their men and materials. It is important to note in this connection, that the persons connected with the Muslim invasions of Assam were not only soldiers and generals, there were also artisans, craftsmen, technicians, apart from scribes, linguists and travelogue writers. All these personnel were necessary for the invading party, because invasion of Assam, then a terra incognita, was a long-term project. Muslim captives and left-outs, therefore, consisted of the types of people mentioned above and they were found to be useful by the local kings. They were, therefore, allowed to settle. Thus, there grew up in Assam, a Muslim community, which grew over time with local conversions mostly perhaps through marriages. This disguised migration of the Muslims was feeble and halted and the settlers mostly married locally. Thus, they became a part of the greater Assamese community. The introduction of Muslim element into the Barak Valley was also contemporaneous to that described above, for after the conquest of Bengal by the Muslim in 1203-1204 AD, they reached this valley through the Gaur Kingdom.

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5. About twenty-three years after the first invasion by the Ahoms, there came in another group of refugees from Shan State of northern Myanmar. Under the leadership of a noble and mighty general, Suremphā, in 1228 AD, there came a group of Tai or Shan people belonging to the Yunnese Chinese linguistic community, who were locally known as Ahom in Assam. They established a kingdom in eastern Assam between the rivers Brahmaputra and Dikarai, which grew into a large one, occasionally covering whole of the Brahmaputra valley. The Ahoms married locally, learnt the local language (Assamese) in course of time and adopted Hindu religion and culture. The kingdom they built lasted for long six hundred years from 1228 to 1826. They made positive contributions in consolidating Assam's regional political identity.

6. After the consolidation of administration by the Ahoms in upper Assam and by the Kachas in lower Assam, there prevailed a period of peace and prosperity in the Brahmaputra Valley and the stream of Indo-Aryan migration from Bengal and other parts of the Ganga-Yamuna Valley received a fillip under the sponsorship of these kings for religious and economic reasons. Similarly, the invasion of the Mughals and Burmese also contributed to leave behind some Muslim settlers. Apart from these, there was immigration of small parties from upper Myanmar, which added a new element in the population mosaic of Assam. These Tai-speaking people, in course of time, came to be known as Khamti, Khamyangs, Aitons, Phakes and Turungs. Each of these groups came at different times from different areas across the Patkai. They are Buddhists by religion and speak Tai language but unlike the Ahoms have still retained their migrant character. They are to be found in small pockets in upper Assam only.

7. It was the above six groups of people who inherited Assam until it was taken over by the British. The fact of annexation of Assam brought about not only political change, but also profoundly changed the population structure of the region. The British introduced new administrative and economic rule. They needed English educated personnel to help them in administration. They also needed cheap labour to introduce an all-scale commercial economy in Assam. Further, they needed personnel, namely, peasants, technicians, clerks/babus and artisans for safety and security and for public works and various other services. This started a new stream of migration with the setting in of Bengali, government service-holders and professionals, Marwaris and Punjabis in trade and commerce, labour and artisans, Nepalis with their

cattle. The trend of immigration thus gaining momentum, it did not subside till recently, giving a new dimension to the population base of Assam.

8. Some British explorers and prospectors, who first knew of the presence of natural tea bushes in Assam, started tea plantation in the region once it was annexed by the East India Company. As the local people were found to be unwilling to work on the tea gardens as labourers, the planters recruited indentured labourers from the tribes of Chotanagpur of Central India. These people are called Jharias. Austro-Asiatic speaking Munda group of languages. Most of these belong to small tribes as Munda, Ho, Santal, Savara, Oraon, Gond etc. Thus a new wave of Austro - Asiatic migration started in about 1840 and continued till 1910. Assam today has about two million people of the origin of this group as Immigrants.

9. After the annexation of the Brahmaputra Valley by the British in 1826, they consolidated their rule over almost whole of North-East India, including the hill tribal belt, politically. But inter-tribal feud, political unrest etc. of the old still prevailed in upper Myanmar, across the border of British India. As such, a large number of Kachin, Naga and Kuki-Chin people migrated to the contiguous areas of North-East India across the border. Some of them, especially the migrants of the Kuki-Chin stock, migrated to Assam beyond the hills of Nagaland and Manipur. Some of the Kachins, living in the Changlang region of Tirap district and the various Kuki tribes, who live in North Cachar Hills and Karbi Anglong, are of the origin of these migrants of the nineteenth and early twentieth centuries.

10. Still another stream of immigration started in the last two decades of nineteenth century with the coming in of the landless Muslim peasants from the then eastern Bengal (now Bangladesh), firstly, at the instance of the landlords of the undivided Goalpara district in connivance of the British administrators. The stream became large during the period between 1901 and 1947, the years occupying the active floodplains of the Brahmaputra, where they took to jute, vegetable and Aus rice lowland rice growing. This stream was thought to be one of the largest volumes of immigrants which have affected even the demographic scenario of Assam. It is the belief that the stream of this infiltration continued even after the partition of India. The people of the origin of this group of immigrants now number about 4 million in Assam. They are racially perhaps Austro-Dravidian and speak

a blend of Indo-Aryan Bengali. They descended and fast adopting Assamese language and culture.

II. The partition of India, at the time of Independence, provoked another phase of displacement of millions of Hindu refugees from the then East Pakistan entered India. Assam being contiguous to it, received a large volume of Hindu refugees, most of them in a few decades, numbering about a million. Unlike the Muslim immigrants from East Bengal, who generally went to the flood-plains and took to agriculture, the Hindu refugees of East Pakistan generally settled in and near the towns, service centres and railway junctions and stations and took mostly to tertiary activities.

The eleven waves and streams of immigration, recorded above, are the ones that stand out in temporal perspective. Besides these, there were other minor streams and waves also, as evidenced by the people coming in from all over India and abroad in search of jobs, trade opportunity and for other economic activities. They normally settle in the new coal-industrial stations, and soon, they all or in part get themselves merged with the local population in course of time. Be that as it may, the present population of Assam, who are permanent residents, whether of Indigenous or immigrant origin, are largely the descendants of the eleven mentioned streams and waves of immigrants. Their intermixture, over the years, has contributed to the rich socio-cultural heritage of the region.

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2

Physical Background

Geology

The state of Assam occupies a unique position and/or complex geologic and physiographic make-up of the north-eastern region of India. It is bordered on the north by the Arunachal Himalayas, on the south by the Meghalaya plateau and the hills of Manipur, Mizoram and Tripura, on the east by the Arunachal Himalayas and the Naga-Patkai hill ranges and on the west by the plains of Bangladesh and West Bengal. The state is bounded by highlands of hills and plateaus on the three sides except the western one, where the Brahmaputra valley merges with the Gangetic plain. The geologic formations occurring in Assam belong to the Archaean, Pre-Cambrian, Tertiary and Quaternary periods. As revealed by its geologic history, the Rocks of Assam may be broadly classified into five. These include (i) the Archaean group of rocks (ii) the Pre-Cambrian rocks (iii) the lower Tertiary sediments (iv) the upper Tertiary sediments, and (v) Quaternary alluvial sediments.

The Archaean rocks comprise the metamorphic rock types of gneisses and schists which are traveled by younger acidic and basic intrusives. These rocks are found to occur in the northern and central parts of the Karbi Plateau and the northern foothills of the Meghalaya Plateau along the Assam-Meghalaya border. The isolated monadrocks like nonuns consisting of gneisses and granites scattered along the north and south bank of the Brahmaputra in Goalpara, Kamrup, Darrang, Sonitpur and Nagaon districts also belong to the Archaean group of rocks. The Pre-Cambrian rocks consisting of quartzites and phyllites are confined to small areas over the western bank of the Karbi Plateau and the northern part of the North Cachar hills. The lower Tertiary sediments known as the Jaintia Group composed mainly of sandstone and limestone got deposited during the Eocene period and are found to occur in the Kopili valley, the southern and eastern slopes of the Karbi Plateau and some parts of the North Cachar hills. The upper Tertiary sediments of sandstone, sandy shales and siltstones deposited during the Oligocene-Miocene-Pliocene periods are confined to the southern flank of the Karbi Plateau, the North Cachar hills, the hills

of the Barak valley of Cachar district, the foothills of the Naga Patkai ranges bordering the southern margin of undivided Sivagar and undivided Dibrugarh districts and the narrow belt of the Himalayan foothills along the northern border of Assam. The Quaternary sediments of older and newer alluviums, on the other hand, comprise the recent alluvial deposits of the Brahmaputra and Barak valleys, the red river-bank soils and high level terrace deposits.

Physiography and Relief

The present physiographic configuration of Assam has taken its shape only during the geologically recent times. The geologic and tectonic base of the state has given rise to a variety of landforms under varying climatic conditions and geomorphic processes. The low hill ranges with hot and humid climate and heavy rainfall, concentrated to a few months of the year, experience solifluction, sheet erosion and landslides. The incidence of landslides is high in the Himalayan foothills where heavy rainfall, high seismicity and toe-cutting of hill slopes by the streams are most frequent. Heavy rains often loosen soils and soft Tertiary rocks of the Himalayan foothills as rain water percolates through joints, fractures, foliations and pores of rocks and soils. This eventually leads to heavy slope failure and landslides. Fluvial processes on the other hand are significantly dominant on the valley bottoms and plains where alluvial deposition takes place due to erosion of the higher surfaces by overland floodings in the valleys. The erosional and depositional processes conspicuously intensified by copious rainfall and frequent seismic movements play dominant role in shaping various physiographic units of the state. However, Assam's physiography may be described in terms of the physiographic elements like plains, floodplains, hills, foothills, plateaus and river valleys. Thus, the broad physiographic divisions of Assam can be delineated as (a) the Brahmaputra Valley (b) the Barak Valley (c) the Karbi Plateau and (d) the Darrang and Southern Hills (Fig. 2.1).

The Brahmaputra valley is the major physiographic unit of Assam. It is a narrow valley with an approximate east-west extension of about 720 km and average width of 50 km. The valley is girdled by the Eastern Himalayas on the north and east and the Naga hills, Karbi and Meghalaya Plateaus on the south. It is open in the west merging with the plains of West Bengal and Bangladesh. The 640 km long reach of the Brahmaputra and its 32 major north and south bank tributaries drain the valley which covers about 72 percent of the total area of Assam. The valley as a whole gently slopes from north-east to south-west with an average gradient of 13

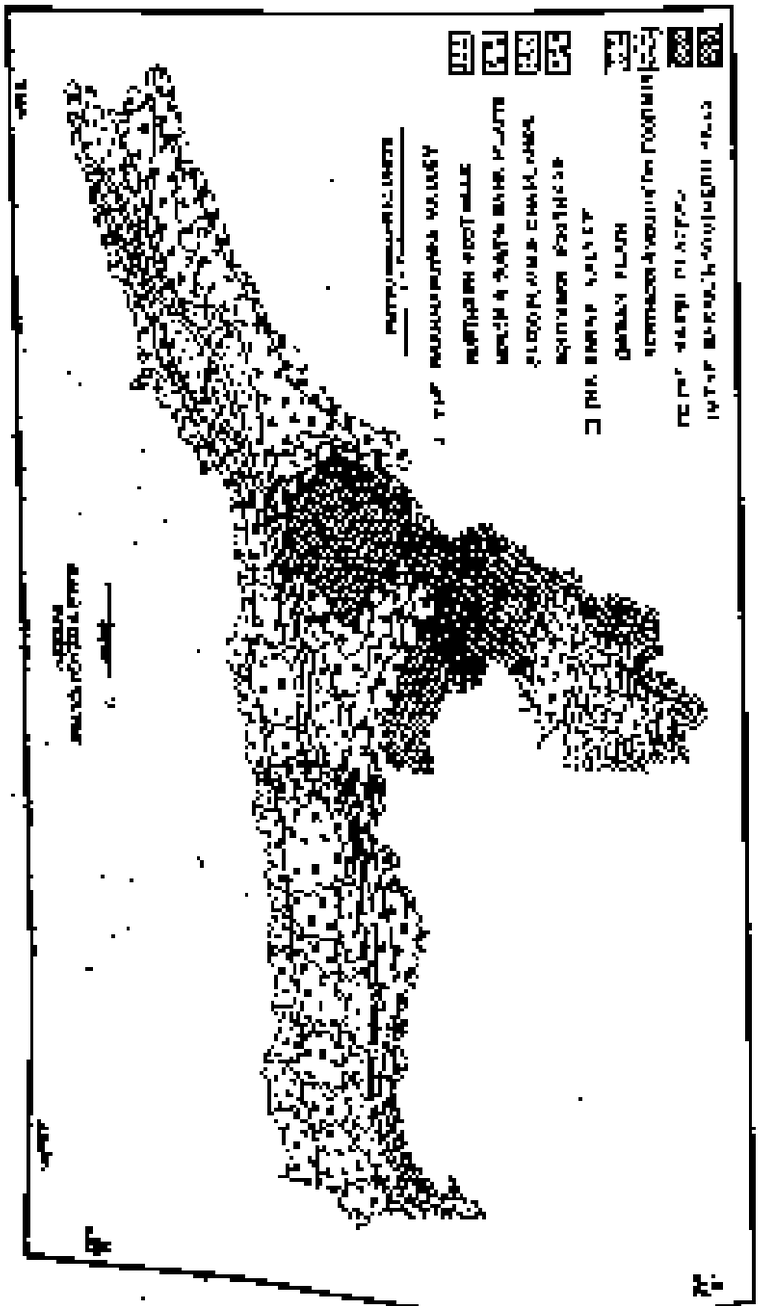

Fig. 2.1

cm per km. In its upper reach near Dibrugarh, the gradient is about 17 cm per km while the same is about 10 cm per km near Guwahati.

Geologically the Brahmaputra is a very young river and its present configuration took shape only during the Pleistocene and Recent times. The valley developed over the foredeep in between the Peninsular mass and the Jethran Geosyncline. The foredeep believed to be under the sea till the Pre-Recent period, received deposits during all the periods of Tertiary and Quaternary Ages. The Tertiary deposits consisting mainly of sandstones, shale, grit, coaly, ferrite and limestone and the Quaternary ones consisting of alluvial sediments comprising pebbles, sand, silt and clay got deposited over the Archaean basement of the trough. The valley deposits of reddish brown sandy clay with some pockets of unassorted pebbles, cobbles, sand and silt have been identified as older alluvium. The sediments comprising clay, sand and silt stopped as newer alluvium overlie the older ones with a thickness of 300-5 ft.

Physiographically the Brahmaputra valley may be divided into two parts near Guwahati (26° 15'N and 91°45'E) the western lower part and the eastern upper part. The eastern part trending ENE-WSW may be of 'Rift valley' origin, bounded by the northern Himalayan thrusts and the southern Naga Hills thrusts. The western lower part trending almost east-west is a 'Lamp valley' or a sag in the crust formed tectonically during Miocene period along with the Gangetic depression in front of the rising Himalayas. These two valleys together formed the foreland mentioned earlier.

The Brahmaputra valley in its east-west direction has four distinct physiographic units, viz. the northern foothills, the north and south bank plains, the Bhangjoi and Charlandy, and the southern foothills. The northern foothills comprise the sub-Himalayan ranges mainly composed of Tertiary sandstones. The narrow zone with elevation ranging between 150-600 m is relatively wider on the western part and tapers eastward in Sonitpur and Lakhimpur districts. The highlands are characterised by southerly dipping piedmont plains formed as a result of coalescence of alluvial bones. It is a zone of unassorted detritus, where a major portion of stream water percolates down and reappears a few kilometers downstream. The southern part of this zone is a plain of tall grasses and damp soil which provides ideal sites for reserved forests and wildlife sanctuaries.

The bottom zone of the valley lying between the northern and southern foothills and the active floodplain is made up of the recent alluvial

sediments carried by the Brahmaputra and its tributaries from the surrounding highlands. This zone consisting of the entire north and south bank plains is a region of intense human activities with high population density, rich agricultural fields and a good network of roads and railways. The north bank plain is relatively wider, being about 80 km in the vicinity of the lower Brahmaputra Valley while it narrows down to an average of about 10 km in the upper Brahmaputra Valley. The south bank plain, on the other hand, is narrower on the average of about 50 km in the districts of Kamrup, Goalpara and Dhubri due to jutting out of hillocks from Meghalaya towards the south bank of the Brahmaputra. The plain then starts widening to the west of Guwahati and merges with the Kopili plain. Thereafter, the plain again gets reduced to a narrow strip in Nagaon and in the western part of Golaghat district due to northward extension of the Karbi Plateau. In the districts of Golaghat (eastern part), Jorhat, Sibsagar, Dibrugarh and Tinsukia the plain is dotted by the rivers like Dhansiri, Dikhow, Borhi Dihing and Tirap have expanded the plain by their backward erosion. Like the north bank basin plain, the south bank basin plain also supports high population concentration, fertile agricultural fields and the network of roads and railways.

The floodplain of the Brahmaputra including its channels inside the river lies between the north and south bank plains. The floodplain is irregular in its outline and narrow due to the occurrence of occasional hillocks and incipient terraces on both the banks of the Brahmaputra. On the north bank the floodplain, outside the tributaries, remains submerged by flood water in Dhemaji and Barpeta districts. The floodplain on the south bank, while occasionally it goes submerged during the rainy season, the extensive areas of Nagaon, Golaghat, Jorhat, Sibsagar, Lakhimpur and Dibrugarh districts. The floodplain zone of the Brahmaputra Valley provides rich and fertile soil and the islands inside the river support innumerable species of birds and wild animals. The topography of the floodplain is broken by the isolated hillocks of Archaean origin found along both the banks of the Brahmaputra. Starting from the extreme west in Nagaon district, the other important hillocks towards west include the Kuruwa Pahar (Dhingtal Kemokhua Hill (338m) of Nagaon district, the Bar Chhaiang Pahar, Lahorighat Chariduar, the Dalimara Kirishal (256m) and Dashla Pahar (210m), Kamakhya Pahar (224 m), Halokanda (13 m), Tuchchaina Jt. (140m), Mayong (200m), Monacha (92 m) of Barpeta district. On the north bank the important hillocks running from the west to east are Dhansiripari hill (140 m) near Tezpur and the Singri hill (172m) of Sonitpur district, the Kurua (203m) at Darrang district, the Dirgheswari (328m), Aggiyarua (205m), Rukhasing (93m) and Hazarika (228m) of Kamrup district, the Mahabhoi (140m), Chakreswar (216m), Bhairab Pahar (496m) and Uttarkamrup Pahar (140m) of Nalbari district and the Chandardinga (215m), Dadhinath (220m) of Barpeta district and the Tukrabanchia (258m) of Darrang district. All these Archaean hillocks are the remnants of the northerly outcrops of the Khasi and Meghalaya plateaus.

The large channel of the Brahmaputra having an average width of 6 km represents a most dynamic fluvial nature and is marked by intense meandering, rapid aggradational and erosional bankline changes. Such a dynamic fluvial regime is highly responsible for the formation of a large number of sandbars on its own bed. The wide alluvial bed is thus dotted with more than 600 small and big sandbars locally called chars or chapories which are the characteristic features of a braided river. These chars with varying sizes and degree of permanency are separated by several distributary channels. During summer most of the chars are submerged by flood water and they change their locations, sizes and other physical parameters. A small number of these chars are more or less permanent in their existence and among them only a few remain visible even during high floods. Some chars, being endowed with fertile alluvial top soil, support a good number of permanent, semi-permanent and also temporary human settlements. The core areas of the permanent chars which are relatively high and least affected by floods, provide sites for permanent settlements. Away from the same with the decrease in height, the effect of flood increases rendering the settlements a semi-permanent character. On the other hand, the fringes of the chars are highly susceptible to erosion and frequent inundation and consequently less attractive for human settlements. It is also to be noted here that Majuli is the largest riverine island of the world, situated between 26°52' and 27°12'N latitudes and 93°48' and 94°35'E longitudes as stressed when the river Brahmaputra in its Upper Assam reach, but unlike the numerous bars and islands formed due to intense braiding processes of the river, Majuli has its own history of genesis. Majuli was the result of a northward migration of the Brahmaputra which is an antecedent. Twin-geomorphic process of the river in Jat. Majuli was an integral part of the Sibsagar district of Assam on its south bank. As revealed from the historical records, southward shifting of the Brahmaputra by way of capturing the lower course of its tributary, the Burai Dihing flowing parallel to the master stream has caused Majuli to emerge as a riverine island during the first half of the 19th century. Currently, it is

an area of 648 sq. km with a population of 1,53,378 (1991 census) inhabiting in 175 villages. The island is also an administrative sub-division of the Jorhat district of Assam. But, in recent years, especially after the great earthquake of 1950, receding floods and severe bank erosion are creating havoc to the island inhabiting and availing large areas. A space-temporal study of the erosional scenario of Majuli reveals that in 1915 the island occupied an area of 1245sq. km and its area was reduced to 925 sq. km. and 793 sq. km in 1981 and 1984 respectively. The area of the island was further reduced to 648 sq. km. in 1995, thereby maintaining an average rate of erosion in the order of 7.4 km²/year (Rao and Das, 1998).

The foothills bordering the northern fringe of the Brahmaputra valley comprise the foothills of the Patkai-Naga region, northern foothills of the Meghalaya and Karbi Plateau and the Barail range. The foothills of the Patkai-Naga range running along the Assam-Arunachal and Nagaland border in the districts of Tinsukia, Dibrugarh, Sibsagar, Jorhat and Golaghat. These foothills with average elevation of 300-900m are composed of Tertiary sediments and characterised by the presence of innumerable shallow flat like Borhi, Dibru, Disang, Dikhow, Jhanji, Bhogdoi and Dhansiri flowing in the Brahmaputra valley. Their bank-to-bank lateral movement in the foothill region partly through horizontal and partly through subsequent depression, have gently sloping built-up plains adjoining the foothills provide favourable sites for large scale tea gardening in the bordering districts. The foothill zone consists of piedmont plains, fluvial ridges and structural valleys with terrace fluvial fills. The foothills of the Karbi Plateau, which belong to Archaean formations, extend along its northern, eastern and western margins with an average elevation of 500 m. The rivers like Dhansiri, Kalang and Kopili cut their narrow meandering valleys and their flow in the plain enlarges into the plateau along the foothills. These plains, in their turn, descend to the Brahmaputra plain through terraces filled with alternate alluvial and detrital soils supporting tea gardens in Golaghat and Nagaon districts. The foothills along the Assam-Meghalaya border form the range of the Garo-Khasi-Jaintia hills. These hills after losing their heights merge with the Brahmaputra plain through some western districts of Kamrup, Goalpara and Dhubri. The rivers like Dilpa, Kulsi, Daka, Dareela, Dudhnai, Krishnai, Gauri and Jaijram flow northward down the plateau and have cut many embayments valleys by elevating and denuding the foothills region. The southern foothill belt of Nagaon, Kamrup, Goalpara and Dhubri districts is characterised by emergence of piedmont benches as a result of lateral erosion by the streams like Kulsi and Krishnai with a series of beels and swamps. The north-western part of the Tertiary Barail range also forms a section of the southern foothill zone of the Brahmaputra valley. The foothills on the south-western face of the Barail range with elevation between 600 m and 1,000 m cover the northern part of the North Cachar hills district and comprise steep slopes and rivers like Dilpa, Jatinga and Kopili. These rivers have dissected and denuded the north facing hill-cliff of the Barail range in the form of innumerable valleys and gentle slopes.

Like the Brahmaputra valley, the Barak valley also forms one of the important physiographic units of Assam. The valley comprising the Barak plain and the northern and southern foothills is the product of the fluvio-geomorphic processes of the river Barak and its tributaries. The Barak river on its journey westward for a distance of 224 km in Assam through the Cachar and along the northern border of the Hailakandi and the Karimganj districts, builds up a fluvial plain, sometimes called Cachar Plain. The plain is flanked by hill ranges in the south—the Meghalaya Plateau and the Barail range of hills. Hills detached from the north, Manipur Plateau and the Barail range of hills, like those of Jatinga, Matijuri, Mahur on the east and the Mizo hills on the south-the western spur of Lushai hills on the east and the Mizo hills on the south-the western spur of Lushai hills on the east and the Mizo hills on the south-the western spur of Lushai hills

westward continuation of the Naga range standing near Tuensang as the Naga hills. The Barail range is a Tertiary mountain range topographically bridging the Archaean Meghalaya Plateau with the Tertiary Naga hills which is the south-western projection of the Himalayas. The Barail range divides the N.C. Hills district into the northern part falling under the Brahmaputra basin and the southern part falling under the Barak basin. The range rising from 100 m in the southern part of the Karbi Plateau region attains a maximum height of 1,960 m in the Thaligurung peak of the N.C. Hills district. The other notable peaks of the Barail range in the district are the Hemeikeng (1,844 m) in the Mahadeo (1,739 m), the Kaupkalia (1,710 m) and the Dakhin (1,650 m) peaks. The southern range of the Barail range is steeper than the northern face due to faulting. The north flowing rivers like the Kopili and Dhansiri and their tributaries have dissected the range by their headward erosion and thus have rendered the northern face to lower elevations with gentle slopes.

The Karbi Plateau physically belongs to the Meghalaya Plateau and is characterised by hillocks, although elevated lands like Karpilli valley and Diyungbra hills of the Karbi Anglong district is approximately 1,200 m. The general trend of the Karbi Anglong district is approximately north-east to south-west. The highest peaks are Singhasan peak (1,359 m), the Rymbai peak and Chenjon Histen (Nilakanta) peak (1,331 m). The Rymbai hills project northward up to the plateau continuation of the Meghalaya Plateau on the other hand, covers the Hamren sub-division of the district. It presents a rugged topography of elevation of 900 m is dissected by tributaries of the Kopili and its main tributary the Kalyani. The highest peak of this region is the 1,219 m high Umlyngar peak. Most of the streams are intermittent in nature. The Karbi Plateau has a straight north-south alignment and is characterised by patterned rivers like Dhansiri, Jamuna, Nambor, Mora, Dilli, Diphlu, Kaliani, Dyung, Mankar, etc. and their tributaries. These rivers often cut-off the plateau into isolated mountain masses. Most of the rivers flow northward to the Brahmaputra plains with steep banks having their 15 m to 250 m above the mean sea level.

Soils

Soil is a vital element of the physical environment. It comprises a complex mixture of mineral (inorganic) and living (organic) matter. Soil is

one of the prime requisites for life. Lying over the rocky crust of the earth in different depths, soil is the most valuable natural resource. Soils and in turn the land throughout the country support all agricultural activities. As generally recognised, the parent material, climate, organisms, topography and the given time all influence soil forming processes. In other words, any given soil can be regarded as the product of the interactions of all these factors, although locally one or more of these may exert a strong influence. As regards the soils of Assam, parent material, topography and climate seem to play vital roles in their formations. Therefore, underlying geological conditions, topographical characteristics and agro-climatic situations affect the types of soils we found in the hills, plateaus and plains. The soils of Assam in general may thus generally be divided into four groups, viz., alluvial soils, hill soils, lateritic soils and peaty soils.

The alluvial soils are extensively distributed over the brahmaputra and Barak plain. Because of fluvial action left by the rivers after leaving the hills and flowing through the plains these soils receive high fertility. There are two types of alluvial soils - the younger alluvium and old alluvium in the Brahmaputra and Barak plains. The younger alluvial soils are found in the north bank and south bank plains including the active floodplains of the Brahmaputra and Barak rivers. This soil characterised by recent alluvium deposits is very deep to very deep and grey to muddy in colour. It is mostly moderately deep to very deep and grey to muddy in colour. It is mostly composed of sandy to silty loam and slightly acidic in reaction. On the river banks it is less acidic, sometimes neutral or slightly alkaline. This soil lacks in profile development and is rich in phosphoric acid, soil lacks in profile development and is rich in phosphoric acid, nitrogen and humus. The old alluvium soil occurs in some patches of Nalbari, Barpeta, Kamrup, Darrang, Sonitpur, Lakhimpur and Dhemaji districts however in the north bank tract soil belt and the southern the old alluvial soils of the Brahmaputra valley. The south-bank districts of the valley it occurs in a narrow belt connected between the sediments of the valley it occurs in a narrow belt connected between the sediments of soils and northern new alluvial soils. In the Kopili basin covering Nagaon district the old alluvium finds wider extension. The Barak plain, on the other hand, has some elongated patches of old alluvium confined between the new alluvial soils of the active floodplain and the hill soils bordering the new alluvial soils of the active floodplain and the hill soils bordering. Munsell. Generally the old alluvial soil is very deep, brownish to yellowish brown with texture of fine loams to coarse loams and is slightly to moderately acidic. Some point-bar patches of old alluvium, however, moderately acidic. Some point-bar patches of old alluvium, however, represent pale brown to reddish brown colour with sandy to moderately acidic character.

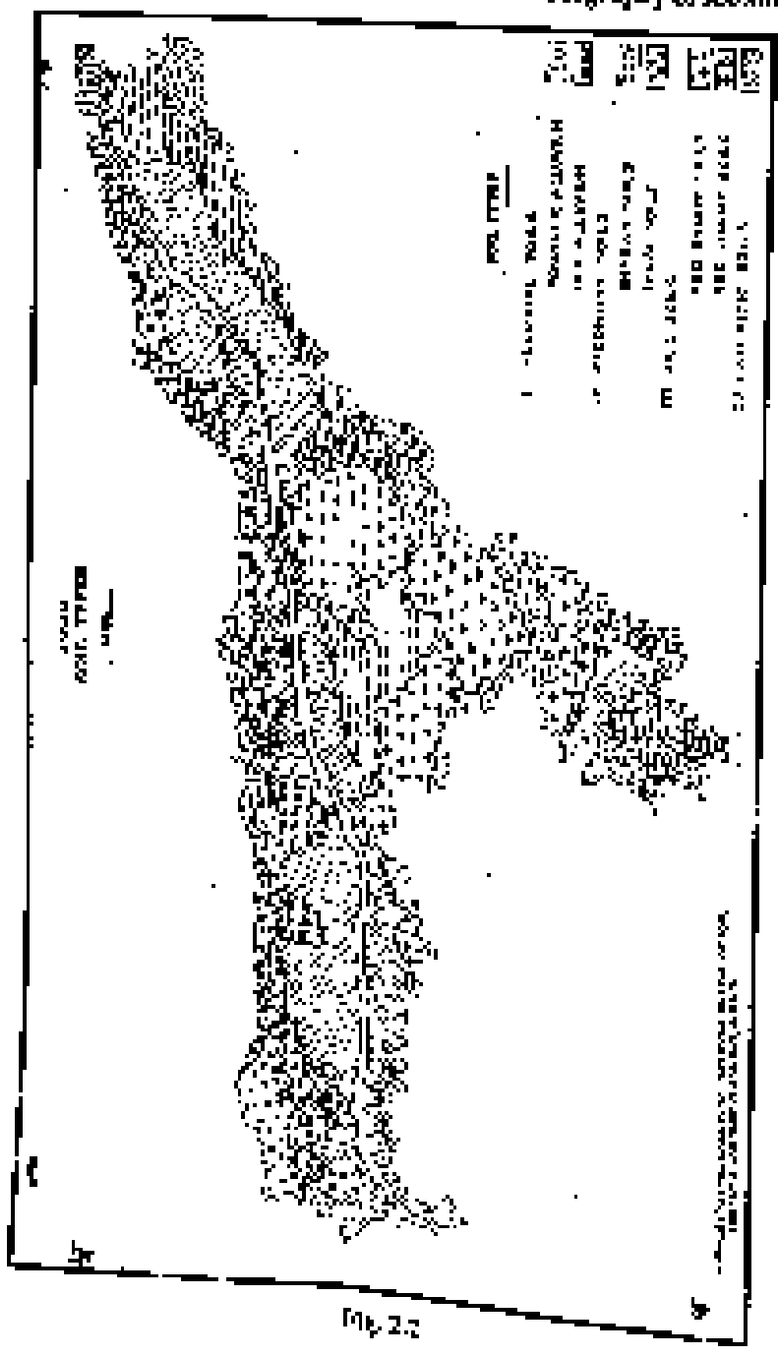

Fig. 2.2

The piedmont soils are confined to the northern narrow zone along the piedmont zone of the Himalayan foothills. These soils comprise the Bhabar soil and the Tarai soil covering respectively the Bhabar and Tarai belt of the Brahmaputra valley. The Bhabar soil occurs in the narrow Bhabar zone along the Assam-Arunachal boundary extending east up to the river Subansiri. This zone consisting of fairly high ground formed as a result of the coalescence of alluvial cones is characterised by unassorted detritus of pebbles, boulders, cobbles, sands and silts. As developed from the Upper Tertiary sediments, this soil is deep to very deep and fine to coarse loamy in texture. The Tarai soil of the Tarai region occurring just south of the Bhabar soils extends up to Dihang river. In some discontinuous narrow patches, this soil varies from sandy to silty loams that remain saturated and support all grasses in a series of swamps.

The hill soils are generally found in the southern hilly terrains of the state. The fertility of these soils differs greatly in different regions. These soils are rich in nitrogen and organic matters. On the basis of the physical texture and chemical composition, the hill soils may be divided into red sandy soils and red loamy soils. The red sandy soils are distributed covering a narrow belt along the Assam - Meghalaya border, the Karbi Plateau, southern parts of Barail ranges of the N. C. Hills district and some parts of the foothills along the eastern border of the Cachar district. These soils mostly derived from the parent material of Archaean origin are very deep, well drained and brownish to yellowish red in colour. These are strongly to moderately acidic with high organic content. The red loamy soils, on the other hand, occur in the narrow southern foothill belt running along the Assam's border with Arunachal and Nagaland and also in the southern fringes of the Karbi Plateau and the Barail hills of N.C. Hills district. A few patches of these soils trending north-south are also found along the Assam-Mizoram border. These soils are deep, dark greyish brown to yellowish red and fine to coarse loamy. Red loamy soils are lightly to moderately acidic and these lack in nitrogen, phosphoric acid, humus and lime.

The laterite soils in the state extensively occur almost entirely over the N. C. Hills district covering some parts of southern Karbi Plateau while few patches are confined to eastern margin of the Dhemaji sub-division of Karbi Anglong district, southern border of Golaghat district and the northern part of the Darak plain along the foothills of the Barail range. These soils are dark and finely textured with heavy loams and deficient in nitrogen, potash, phosphoric acid and lime.

In general the soils of Assam are rich in contents of nitrogen and organic matter. The alluvial soils of the Brahmaputra and Barak valley are highly fertile and suitable for raising cereals, oilseeds, pulses and plantation crops. These soils are very responsive to manuring and irrigation. Acidic alluvial soils of the upper Brahmaputra valley with a good proportion of piedmont texture are mostly suitable for tea plantation while the alluvium of the lower Brahmaputra valley being deficient in phosphoric content is favourable for cultivation. New alluvial soils covering the riverbanks of the Brahmaputra are most suitable for growing oilseeds, pulses and rabi crops. These plains of the inter-hill pockets provide excellent opportunity for cultivating mustard vegetables. Soils occurring in the upper reaches of the hill slopes are favourable for horticultural and plantation crops while the soils of the lower reaches and narrow valleys may be well utilised for paddy and vegetables.

As in the other parts of India the soils of Assam also suffer from a number of soil degradation problems like heavy erosion in the hill slopes, flooding and water logging in the low-lying areas and high acidic nature of the soils. Under heavy precipitation and humid climate loss of top soil through surface wash is the most common type of soil degradation in the entire state. The problem of riparian erosion is severe in the plains during the flood season. It is estimated that nearly 1.2 million hectares of land of the plains districts of the state are vulnerable to top soil loss with varying severity. Terrain deformation through mass movement is another type of soil degradation which is primarily confined to the hill districts of North Cachar and Karbi Anglong covering an area of about 2.5 million hectares. Waterlogging in the high ground water level in and around the developed areas and density roads is also a major factor for soil degradation in the high rainfall regime. In the state about 0.52 million hectares of land losing crop due to the effect of water-logging in the kharif season. Besides, most of the soils of Assam are poor in nutrients which leads to chemical degradation of soils. Soil acidity characterised by low pH value and base saturation affects mostly the hill soils of high rainfall zones of Assam covering an area of 1.12 million hectares.

Climate

The climate of Assam is in the regime of monsoon climate of the sub-tropical belt. It enjoys heavy annual rainfall, often drought, high humidity and relatively low temperature during a year. The state shows marked spatial variation in the climatic pattern primarily because of its location

and physiography, the seasonal changes in the pressure condition over the Bay of Bengal and the north-western Indian subcontinent, the tropical cyclones, air masses of south-west monsoon, flow of local mountain and valley winds and presence of water bodies and rivers. The climate of the Brahmaputra and the Barak valleys is normally characterised by evergreen type. During the summer the places become hot and the air over the hills and mountains remains relatively cool. This local low pressure system develops over the valleys and creates climatic of humid sub-tropical type which is slightly different from the Koppen's Cwg type, i.e. the humid mesothermal Gangetic type.

The Himalayan ranges stand as an in the north and east of the Brahmaputra valley proper. The area from the chilly cold winds of the Tibetan region in winter and receives the warm moist winds blowing from the south west in summer. The cloud brought by the south-west monsoon that passes over the southern slopes of the Meghalaya Plateau also passes over the southern slopes of the Meghalaya Plateau also passes over the southern slopes of the Meghalaya Plateau also

rainfall. Besides, the districts of Tinsukia, Dibrugarh, Sibsagar, Dhemaji, Lakhimpur, Kokrajhar and Dhubri in the Brahmaputra valley and the southern most districts of Cachar, Hailakandi and Karimganj enjoy annual rainfall more than 250 cm on average. On the other hand, Nagaon and Karbi Anglong districts receive relatively low rainfall having the lowest in the Lanka-Lumding area (average annual rainfall of 129 cm) due to its location on the leeward side of the Meghalaya Plateau and the Karbi hills.

Table 2.1
Average annual rainfall in some selected places of Assam

Place	Rainfall (cm)	Place	Rainfall (cm)
1. Dhubri	256	11. North Lakhimpur	335
2. Barpeta	229	12. Dibrugarh	273
3. Nalbari	242	13. Sibsagar	250
4. Patacharkuchi	239	14. Gohpur	237
5. Rangia	190	15. Haflong	227
6. Goalpara	242	16. Jorhat	227
7. Guwahati	166	17. Lumding	129
8. Tezpur	182	18. Sadiya	273
9. Mangaldoi	181	19. Silchar	323
10. Nagaon	203		

Source : Department of Environmental Science, Gauhati University, Guwahati.

Under varying intensities of the weather elements and resultant weather conditions Assam normally experiences four climatic seasons, viz. (i) Pre-Monsoon, (ii) Monsoon (iii) Retreating Monsoon and (iv) Dry Winter.

(i) Pre-Monsoon :The pre-monsoon begins in the early part of March and continues up to the end of May. Temperature starts rising gradually from the beginning of the season onward. Pleasant mornings, hot and trying afternoons and occasional thundershowers are some of the important characteristics of the season. In this season marked atmospheric instability develops and severe thunderstorms occur, sometimes preceded by dust-

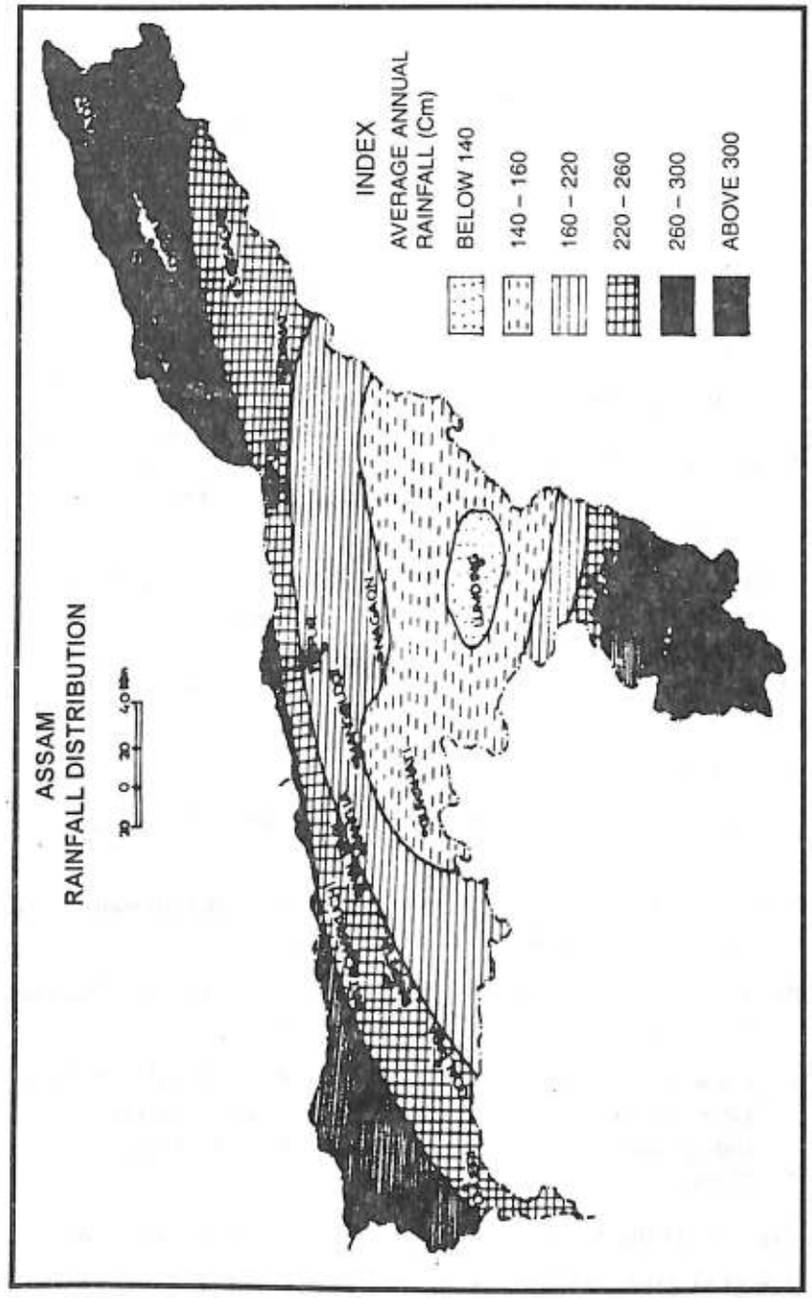

Fig. 2.3

causing squalls. Rainfall increases both in amount and frequency as the season advances which greatly favours the cultivation of tea, jute and sugarcane.

(ii) Monsoon : The monsoon sets in by the last week of May or in early June and it lasts up to September or the first part of October. It is the rainy season when the state receives squalls of continuous and moderate to heavy rains. June, July and August are the rainiest months when more than 70 per cent of the total annual rainfall occurs. This is the most important season during which Jute, the principal crop of the state is cultivated on the mainland, and the rivers of the Brahmaputra and Barak valleys start rising causing extensive floods on the other.

(iii) Recreating Monsoon : The south-west monsoon withdraws sometimes to between the last part of September and first part of October. Consequently, the intensity of rainfall and the number of rainy days go on decreasing. This season continues up to the middle of November, when fogs commonly occur.

(iv) Dry Winter : The winter season begins in the middle of November and continues up to the end of February. This season is characterised by low temperature, regular morning fogs and very little amount of rainfall. December and January are the driest months and generally, January is the coldest month.

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3

Drainage and Flood

Drainage

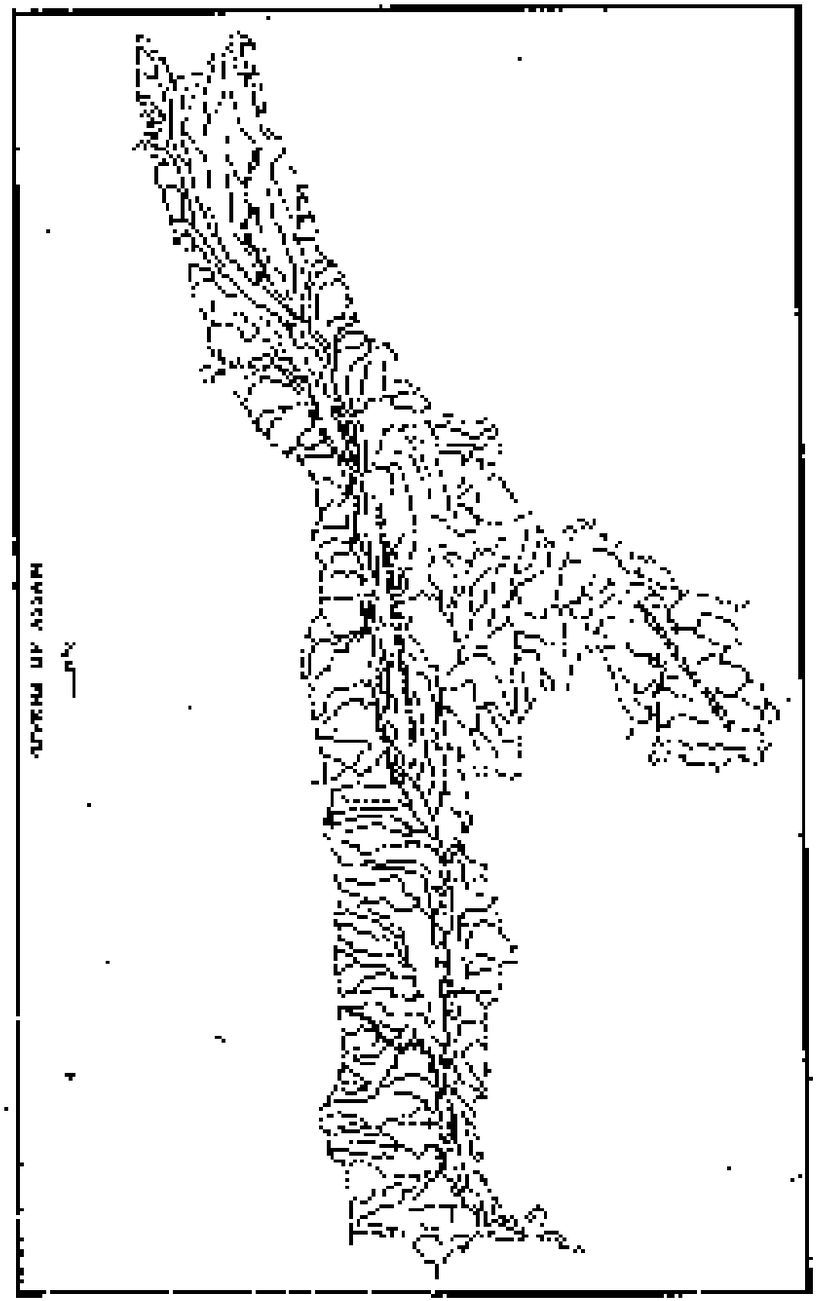

Fig. 3.1

discharge of the river on August 21, 1962 measuring 72,691 m³s⁻¹ has been the highest flood on record. As regards sediment transport, the river is also one of the leading sediment carrying rivers of the world. It is the second river only to the Yellow river of China in the amount of sediment transported per unit of drainage area (Goswami, 1985, 1988). As measured at Pandu, the river carries an average annual suspended load of 402 million metric tons. The high intensity of monsoonal rains, easily erodible rocks, steep slopes and high seismicity contribute a substantial amount of sediment to the Brahmaputra. The river with such a high volume of water discharge and sediment load, represents the most dynamic fluvial regime. Its wide alluvial channel in Assam having an average width of 6.8 km, is dotted with more than 500 small and large sandbars, locally called *chars*. The river is characterised by intense braiding, rapid aggradation and drastic bankline migration. In general, the pattern in the Brahmaputra follows the mechanism of central bar formation. However, bar formation and channel division (braiding) as well as the variability of flow in the river are due to a combination of factors like variability of flow, excessive sediment load, easily available bank materials and aggradation of the channel. As regards bankline migration and channel migration, the river is found to be very unstable as removal of notable locations, such as Nagajuli-Majar, Majuli, Dakhinpat, Bilibari, Kaziranga, Howlighat and Palasbari. The Brahmaputra in general, is migrating southward. The southward migration of the river has engulfed the lower most parts of the south bank tributaries, and their confluences are thus shifting southward. Moreover, most of the tributaries before meeting the Brahmaputra flow sub-parallel for some west of their lower courses because of the plant cover deposition on both of its banks.

The Brahmaputra while down the plains of Assam from east to west for a distance of 670 km upto the Bangladesh border, throughout its course, the river receives innumerable tributaries coming out of the northern, north-eastern and southern hill ranges, forming out of the most impressive fan shaped drainage basin of the world. The mighty river has 33 per cent of its total geographical area on the north bank and the remaining 67 per cent on the south bank. The principal north bank tributaries are the Subansiri, Jia Bhoroli, Pachnoi, Kameng, Dhansiri (North), Kopili, Puthimari, Pagladia, Manas, Champamati, Gaurang, Kalmakhi, Saralbhanga, Aie, Bharali, Subansiri, Ja Bhoroli and Kameng are the trans-Himalayan rivers. The principal south bank tributaries are mainly the Dudhnoi, Dikhow, Dhansiri, Kopili and Krishnai. Locally, Jhanjimukh and Kaliabhomora are prominent. Numerous minor tributaries of the Brahmaputra are presented in Table 3.1

The north and south bank tributaries show marked differences among them in terms of their fluvio-geomorphic characteristics. The wide variations in geology, geomorphology, physiography, relief, precipitation and soils of the northern and southern regions of the Brahmaputra Valley bring about notable differences between these two groups of rivers. The following points of differences may be observed among the north and south bank tributaries of the Brahmaputra.

(a) The northern tributaries have steep channel gradient, but the southern ones have comparatively flatter gradient.

(b) The northern tributaries have shallow braided channels while the southern tributaries have their meandering channels over the plains.

(c) The northern tributaries have very long courses in the hilly terrain and short courses over the plains, whereas the southern tributaries have their long courses over the plains and short courses in the hills.

(d) The northern tributaries generally have coarse sandy beds with unconsolidated gravel beds up to some distance from the foothills. But, the southern tributaries have beds and banks composed of fine alluvial soils.

(e) The northern tributaries carry enormous sediment load as compared to the southern tributaries. On the average, sediment yield of the north bank tributaries is three times higher than that of the south bank tributaries.

(f) The northern tributaries generally have steep banks, but the southern ones have comparatively less bank slopes.

(g) The northern tributaries are characterised by frequent shift of their channels during flood, but the southern tributaries change their courses less frequently. The northern tributaries show peculiar channel shifting pattern. The Subansiri and all other eastern rivers shift their channels westward, while the rivers between the Subansiri and Pagladiya shift eastward. Again from Manas upto the river Sankosh in the west, all the rivers migrate westward.

Like the Brahmaputra, the Barak is also an important river of Assam. The Barak system is the second largest river system in North East India as well as Assam. The river with a total length of 900 km from source to mouth drains an area of 52,000 km². In India, the river traverses a distance of 532 km upto the Indo-Bangla border. Originating at the border of Manipur and Nagaland, the river flows westward for some distance to mark the boundary between the two states. It then suddenly turns southward

Table-5.1

Certain geomorphological and hydrological characteristics of some important north bank and south bank tributaries of the Brahmaputra

Rivers	Catchment area (sq. km.)	Length (km)	Average annual discharge (m³/s)	Average annual suspended load (ha.m.)	Sediment yield (tons/km²/year)
Northern tributaries					
1. Subansiri	28,200	442	755771	992	959
2. Kalyanpur	2,941	150	74309	186	1598
3. Burai	791	64	20806	16	520
4. Bargang	550	42	19106	27	1719
5. Jia Bharali	11,776	247	349487	2018	4721
6. Gabharu	577	61	8450	11	820
7. Jhalpi	751	170	9360	9	477
8. Dhansiri	1,657	123	26577	29	980
9. Noa Nadi	807	74	4456	6	165
10. Nanai	869	105	10251	5	228
11. Daranda	739	112	5756	9	323
12. Pathimari	1787	190	26324	795	2887
13. Pagladiya	1674	197	15301	27	1881
14. Manas-Aie-Beki	41350	275	307947	4166	1581
15. Champamati	2038	115	22544	15	336
16. Gaurang	1379	98	22263	26	506
17. Tipkai	1366	108	61736	31	598
18. Godachar	610	50	7300	0.21	272
Southern tributaries					
1. Budi Dihing	8750	360	141539	270	1129
2. Disang	3950	220	55101	93	622
3. Dikrow	3610	200	41892	34	252
4. Jhanzi	1130	108	8797	16	356
5. Bhogdoi	920	160	6072	15	629
6. Dhansiri	10242	352	68715	147	379
7. Kopi	13556	290	90045	118	270
8. Kulsi	400	93	11643	0.6	135
9. Kaishoal	1615	81	22452	10	121
10. Jinari	594	60	7783	1	90

and flows through Manipur up to patkoi, south of the adjunction of Assam, Manipur and Mizoram. The river here takes a northward turn and flows for about 65 km. Thereafter it runs westward at Jiribam and runs through the Cachar plain sluggishly. Near Karimganj, it bifurcates into the southern branch of Surma and the southern branch of Kushiyara.

In Assam, the Barak has a total length of 525 km and it drains the southern part of the state which includes the districts of Cachar, Karimganj and Hailakandi. It also includes southern portions of the North Cachar Hills. The valley has a width of 15–30 km and it covers an area of 6,962 km², comprising light alluvium, generally of the physiographical unit of the plain, usually known as Cachar plain is a narrow one and slopes gently in the west. Throughout the plain, the river flows sluggishly for a distance of 125 km and exhibits a high to meandering pattern. The meandering channel is characterized by a series of oxbow lakes, cutoffs and swamps. The important tributaries of the Barak are Jiri (Jiri), Madhura, Jatinga and Tarang, while the important South Bank tributaries include Sonai, Ghagra, Sonakhal, Dhaleswari, Sidhi and Longai. The Barak and its tributaries receive most of their floods in the Cachar plain during the summer. The water discharge of 6,331 m³/s occurring on August 2, 1980 has been recorded as the highest flood, so far recorded on the Barak. The floodplain on both the banks is completely overtopped by the flood waters developed between the levees along the river and the gently rising plains on the north and the northern and southern foothills. Floodwater receding into the depressions takes from several days to several months to drain out.

Floods

Floods in Assam have been recurring for centuries past. The plains of Assam have been subject to inundation by the floods of the Brahmaputra and the Barak for various durations at different periods. Although written records of floods in the state do not date back beyond the 19th century, the peculiar climatic and landform characteristics of the plains and the increase in large scale actions of roaming and occasional floodings in the historical past. Historically, the people of Assam are well acquainted with floods and successfully have been coping up the art of living with these to a considerable extent. But in the recent past due to a number of new developmental activities in addition to natural processes, floods in both the Brahmaputra and Barak valleys have become more frequent and severe that they appeared to be totally changing the major characteristics of the flood phenomenon. The nature of floods in terms of frequency of occurrence during a year and the duration of damages caused have been changing frequently. Now, in certain parts of the Brahmaputra and Barak valleys, floods of different order occur at least 3–4 times in a year. The valleys are bounded by high hill ranges and plateaus on the north, east and south have very high flood potential and thus frequently receive the fury of floods (Fig. 3.2).

Though floods have some beneficial effects such as fertile silt deposition on agricultural fields, recharge of soil moisture, increase in fish population and washing effect on dirty environment, they cause substantial damages to standing crops, dwelling houses and developmental infrastructures. Generally, the damages during floods are caused by inundation and associated bank erosion. Presently, Assam accounts for nearly 9 per cent of the total flood-damaged area in India. For flood damage data available for the Brahmaputra valley in recent years, the flood damaged area and number of affected persons are gradually increasing. In the decade covering 1954–96 (Table 3.2), it is due to growing human encroachment into the floodplain and increasing severity of floods. As regards annual floods, the flood of 1988, occurring in four severe waves has been marked as the most devastating one. This flood characterised by high recorded as the maximum water levels throughout the Brahmaputra from Dibrugarh to Dhubri as well as unusual duration and extensive inundation, accounting for 62 per cent of the damages devastations and extensive inundation, accounting for 62 per cent area of the Brahmaputra valley. So far the spatial extent of flood affected area is concerned, normally around 40 per cent of the state's area are affected. The recurring floods of characteristically high magnitude have affected the agriculture heavily, affecting the agriculture lands, seasonal devastating diseases heavily affecting the agriculture lands, crops, cattles and people and above all, the agrarian economy of the state.

Floods in Assam can be attributed to a variety of factors of natural, hydrometeorological and anthropogenic origin. Of the two river systems – the Brahmaputra and Barak, the Brahmaputra system is highly responsible for causing severe devastations. It is so vast and dynamic that the physical and hydrological processes themselves are capable of creating floods in the narrow valley. However, heavy monsoonal rains and devastating landslides coupled with easy erodibility of rocks, steep slopes and high seismicity constitute two major natural causes of Assam floods. The runoff patterns of the Brahmaputra catchment in the Himalayas and the Barak catchment in the hills of Nagaland and Manipur are naturally governed by the quantity and nature of distribution of precipitation. The Barak valley receives on the average an annual rainfall of 250 cm and its hilly catchment receives more than 500 cm. Similarly the Brahmaputra valley receives an

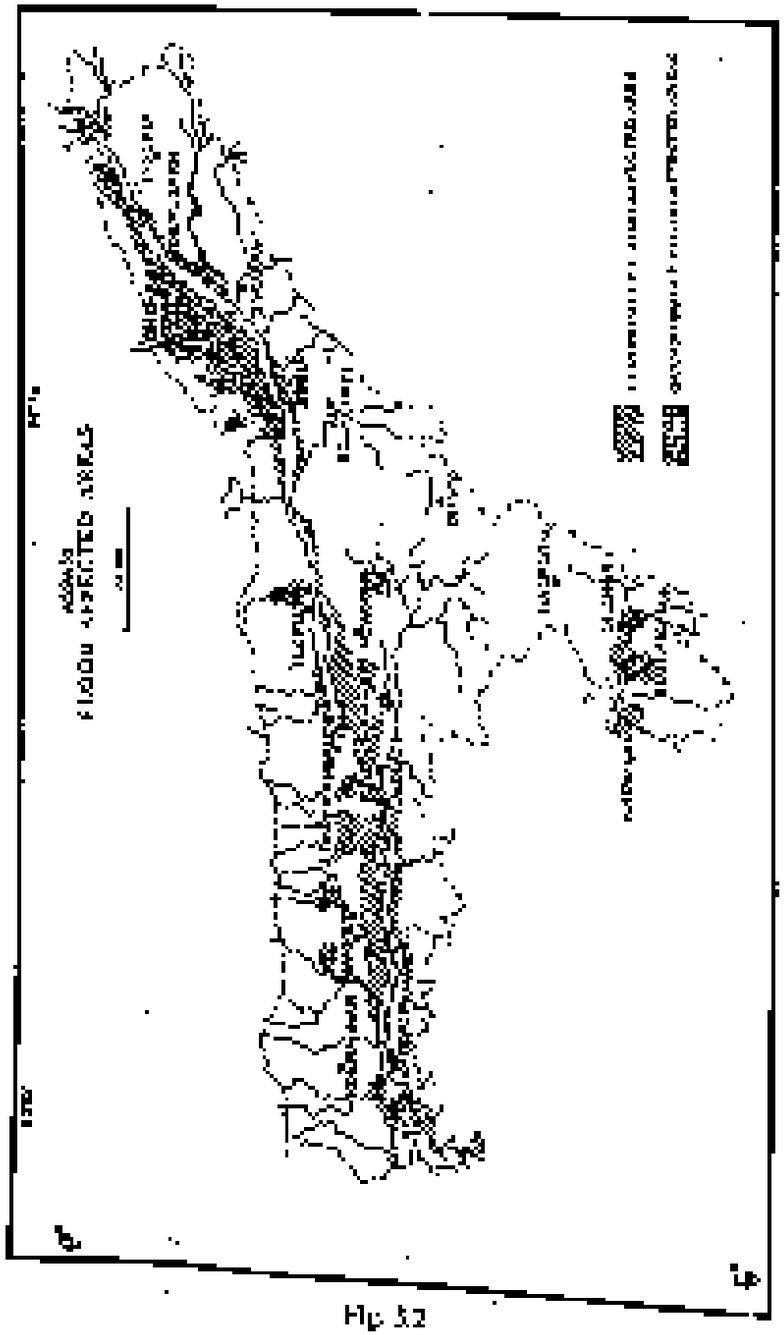

Fig. 3.2

average annual rainfall of 230 cm, while the Himalayan sector of its catchment enjoys annual rainfall in the order of 500 cm. But, interestingly 60-70 per cent of the annual rainfall generally occurs during the summer months of June to September. Since the rainfall normally starts from the month of April, the water holding capacity of the basin gets already lost before the beginning of monsoon rains.

Table 3.3

Flood damages during major floods in the Brahmaputra valley

Years of major floods	No. of flood waves	Area affected (mha)	Cropped area damaged (mha)	Population affected (m)
1954	4	2.90	0.30	1.30
1955	-	1.35	0.01	0.15
1958	-	1.25	0.05	0.40
1962	2	1.59	0.30	3.51
1966	4	1.51	0.05	3.62
1969	-	1.06	0.07	0.89
1972	2	1.01	0.30	2.25
1973	-	2.31	0.17	1.84
1977	3	1.02	N.A.*	4.54
1980	-	1.14	0.25	3.35
1984	4	1.49	0.14	5.61
1987	-	1.62	0.43	N.A.*
1988	4	2.82	0.17	8.31
1993	-	1.25	0.22	5.30
1996	-	1.33	0.28	4.12
1998	3	0.97	0.29	4.69

*N.A. Stands for not available

As soon as the monsoon starts, most of the rain water rises into the streams causing high stage in the Bank and the Brahmaputra and their tributaries. Particularly the Brahmaputra river, carrying high volume of water and sediment load, when additionally charged with heavy concentration of rain during monsoon, obviously becomes capable of creating large levable flash floods.

Seismic and geologic factors combined with the hydrometeorologics factors also aggravate the flood situation of Assam. The earthquakes of 1897 and 1950 of 8.7 and 8.6 magnitudes in the Richter scale respectively,

and Nagaon districts. Majuli is a unique riverine island in the Brahmaputra river in Jorhat district. The swamps and marshy areas in the Barak basin in Cachar district are mostly seasonal wetlands while the rivers, streams and numerous ponds are perennial wetlands. Besides, numerous man-made wetlands like tanks, reservoirs, oxbow lakes, etc. are also found in the state. The Brahmaputra and its tributaries, the Barak river and its tributaries, and the numerous beels in the Brahmaputra valley are the important wetlands in the state. Most of the wetlands in the state are rich in biodiversity and are important habitats for many species of migratory birds. Besides, they also help in flood control, groundwater recharge, water purification, etc. Some of the important wetlands in the state are discussed below.

Deepor Beel

Deepor Beel is a freshwater lake situated in the south-western part of Guwahati city in Kamrup district. It is the largest wetland in the Brahmaputra valley. It is a natural depression to the south of the Brahmaputra river and is connected to the Brahmaputra river by the Khanajan channel. The Deepor Beel is also connected to the Rani-Garbhanga reserve forest in the south-west by the Bornoi channel. The Deepor Beel is a shallow freshwater lake with a maximum depth of 2.5 m during the monsoon season. The lake is surrounded by a low-lying area which is also a wetland. The Deepor Beel is a Ramsar site and is also a designated Important Bird Area (IBA). The lake is home to a large number of migratory birds, including the endangered Greater Adjutant Stork. The lake is also home to a number of resident birds, including the Lesser Adjutant Stork, the Black-necked Stork, the Oriental Darter, the Spot-billed Pelican, the Asian Openbill, the Painted Stork, the Woolly-necked Stork, the Little Cormorant, the Indian Cormorant, the Great Cormorant, the Little Egret, the Great Egret, the Intermediate Egret, the Cattle Egret, the Indian Pond Heron, the Black-crowned Night Heron, the Yellow Bittern, the Black Bittern, the Purple Heron, the Grey Heron, the Purple Swamphen, the White-breasted Waterhen, the Common Moorhen, the Common Coot, the Sarus Crane, the Black-headed Ibis, the Red-naped Ibis, the Asian Woolly-necked Stork, the Lesser Whistling Duck, the Indian Spot-billed Duck, the Gadwall, the Common Teal, the Northern Pintail, the Garganey, the Northern Shoveler, the Red-crested Pochard, the Common Pochard, the Ferruginous Duck, the Tufted Duck, the Common Goldeneye, the Smew, the Common Merganser, the Red-breasted Merganser, the Goosander, the Osprey, the Black Kite, the White-eyed Buzzard, the Brahminy Kite, the Pallas's Fish Eagle, the White-tailed Eagle, the Steppe Eagle, the Greater Spotted Eagle, the Lesser Spotted Eagle, the Imperial Eagle, the Booted Eagle, the Short-toed Snake Eagle, the Crested Serpent Eagle, the Oriental Honey Buzzard, the Black Kite, the Red Kite, the Black-shouldered Kite, the Pallid Harrier, the Montagu's Harrier, the Hen Harrier, the Pied Harrier, the Eastern Marsh Harrier, the Western Marsh Harrier, the Northern Harrier, the Eurasian Sparrowhawk, the Shikra, the Besra, the Crested Goshawk, the Eurasian Goshawk, the Northern Goshawk, the Common Buzzard, the Long-legged Buzzard, the Rough-legged Buzzard, the Upland Buzzard, the Eastern Buzzard, the Western Buzzard, the Northern Buzzard, the Southern

Sivsagar	16	49	19	8	-	20	169	2115
Dibrugarh	17	16	25	12	-	2	86	2582.5
Tinsukia	1	27	77	18	-	-	24	2732.5
Karbi Anglong	6	37	21	3	-	20	77	897
N.C. Hills	-	-	6	-	-	-	10	3572.5
Cachar	57	29	231	79	-	3	340	7158
Karimganj	7	9	56	-	-	-	47	949
Karimganj	6	1	53	16	-	-	70	5719.5
Assam	690	861	1086	712	10	215	3474	30,229.4

Source: Assam Remote Sensing Application Centre, Guwahati

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4

Forests

Introduction

Forests are associations of plants, predominantly trees. They constitute one of the major forms of natural landscape. Originally, forests covered about 40 per cent of the land area of the earth. But man has been exploiting the forest resources at such a high rate that they now cover only about 17 per cent. However, the forests constitute one of the man's extensively as well as most generously used resources of the earth.

Forests are important renewable natural resources. They contain multiple benefits and play an important role in the economic development. Forests help augment natural water supply, preserve wildlife, control floods and prevent soil erosion, besides providing valuable raw materials for a number of industries. They have a moderating influence on climate and provide recreational facilities to human society.

Forest Resources of Assam

Nature has endowed Assam with a rich potential for the development of forest. The forest areas of the state are the meeting grounds of Indo-Tibetan and Burmese Kind and Fauna. The luxuriant evergreen and deciduous forests of the state abound in variety of valuable timber species. There is also diffusion of a considerable number of species that must have evolved in the region which has been well demonstrated in the forest types. In certain parts of the state exclusive hardwood forests also exist. Assam occupies a significant place in the wildlife map of the country for hornbill and rare birds and animal species. In the other parts of the world with comparable climate, geomorphological and adaptive condition, such diversity of flora and fauna exists can be due to the limited topographical area of the state of Assam. Of the total geographical area of the state (78,523 sq. km) the forest under forest is only 22 per cent, which is far below the minimum norm of 33.3 per cent prescribed by the national forest policy. Table 4.1 gives the total area under forest in the state during 1974-94.

Table 4.1
Forest area in Assam (in sq. km)

Year	Area	P.C. of total area
1974-75	28,624.00	36.82
1975-79	28,608.00	36.42
1982-83	27,337.00	34.81
1987-88	21,513.20	27.39
1989-90	21,522.60	27.40
1991-92	21,684.52	27.61
1993-94	20,175.83	23.24

Source: Economic Survey, Government of Assam

From this table it is evident that the total area under forest declined by about 6,748 sq. km during the period 1974-94. The government, however, planned for further expansion of reserved forest in order to increase the forest area in the state. Table 4.2 shows the reserved forest and proposed reserved forest area since 1989-90.

Table 4.2
Reserved forest and proposed reserved forest area in Assam
(in sq. km)

Class of forest	1989-90	1990-91	1991-92	1992-93	1993-94
1. Reserved forest	17427.47	17412.97	17582.54	17567.51	18742.23
2. Proposed reserved forest	4095.13	3969.27	3920.52	3920.62	3923.62
3. Total (excluding unclassified forest)	21522.60	21412.24	21684.52	21488.13	22175.85

Source: Statistical Handbook of Assam 1993, Office of the Principal Chief Conservator of Forest, Assam.

Table 4.2 shows that in the year 1994 Assam had around 18.7 thousand sq. km of reserved forest, while the proposed reserved forest

reclassified 3.9 thousand sq.km. It has been seen that the total area under forest has increased from 31.3 thousand sq.km in 1989-90 to 32.1 thousand sq.km in 1993-94. But the proposed reserve forest area has decreased from 4.0 thousand sq.km in 1989-90 to 3.9 thousand sq.km in 1990-91. From 1991 onward the proposed reserved forest area showed slight increase in area. It may be noted that the area under unclassed forest has been increasing in the State. Whereas the area under unclassed forest has been declining since 1911 (as a ratio to percentage of total dept is decreasing, perhaps due to fire assemble, in 1972 the forest area constituted 26.87 per cent of the State's total area which in 1980-82 decreased to 25.34 per cent. At present it has further decreased to 21.7 per cent (according to NRSA survey). On the other hand, the hilly area of Assam has 19365.14 sq.km forest area, while the plain region has 11823.47 sq.km. The per capita forest in Assam was only 0.05127 sq.km. (0.13 hectare) in 1991-92.

The following table shows the district-wise distribution of forest area in Assam.

Table 4.3

District-wise distribution of forest area in Assam (area in hectare)
(Based on satellite imagery, 1990)

District	Geographical area	Forest land	%
Barpeta	3257[illegible]0	2[illegible]411	7.41
Cachar	3[illegible]135	5354	17.00
Darrang	2[illegible]9329	14[illegible]95	37.82
Dhemaji	3467[illegible]0	23215	6.7[illegible]
Dhubri	[illegible]14[illegible]17	46502	14.91
Dibrugarh	2[illegible]45[illegible]	16525	16.05
Goalpara	1[illegible]4[illegible]67	45[illegible]71	16.05
Golaghat	2[illegible]9[illegible]5	32[illegible]5	3.05
Hailakandi	1[illegible]84[illegible]07	3[illegible]5[illegible]	9.03
Jorhat	1[illegible]52[illegible]42	30[illegible]9	8.09
Kamrup	2[illegible]1[illegible]3[illegible]0	39[illegible]64	18.1[illegible]
Karbi Anglong	4[illegible]71[illegible]86	87[illegible]94	6.[illegible]5
Karimganj	[illegible]932[illegible]0	[illegible]19[illegible]69	34.77
Kokrajhar	1[illegible]8[illegible]430	[illegible]01[illegible]8[illegible]	11.64
Lakhimpur	2[illegible]71[illegible]50	[illegible]4[illegible]32[illegible]	25.19
	2[illegible]90[illegible]29	[illegible]55[illegible]79	31.[illegible]
		[illegible]516	3.[illegible]8

Marigaon	1[illegible]1[illegible]96	3[illegible]4[illegible]82	3[illegible].[illegible]
Nalbari	2[illegible]0[illegible]4[illegible]84	[illegible]2[illegible][illegible]18	6.19
N.C. Hills	4[illegible]9[illegible]0[illegible]0	1[illegible]87[illegible]0[illegible]	38.55
Nagaon	[illegible]1[illegible]19[illegible]09	1[illegible]4[illegible]64	7.96
Sibsagar	2[illegible]4[illegible]1[illegible]20[illegible]	2[illegible]8[illegible]67	11.[illegible]
Sonitpur	[illegible]3[illegible]3[illegible]0[illegible]8	[illegible]0[illegible]861	20.53
Tinsukia	3[illegible]5[illegible]0[illegible]20	3[illegible]0[illegible]06	11.11

Source: Assam's Land Resources - A State-level-based ARSAC Survey, published by Assam Science Society, 1997.

The highest concentration of forests in the state occurs in Karbi Anglong (430[illegible]86 ha i.e. 42.04 per cent) and N.C. Hills (187070 ha. 28.55 per cent) and the lowest concentration occurs in Bongaigaon district (only 5[illegible]4 sq.km). However, there is slight difference in the total forest cover between conventional data and remote sensing data. Conventional data shows 22 per cent forest but satellite survey shows 21.7 per cent forest cover in the state. The forests in the plain districts come under management of the State Forest Department, while the District Councils manage the forests in the hill districts.

Forest Types

Forests in Assam can be classified into three types : evergreen, semi-evergreen, deciduous and degraded forests. The evergreen forests occur in the areas of heavy rainfall. The evergreen and semi-evergreen forests are found in the districts of Lakhimpur, Dibrugarh, Sibsagar, Golaghat, Jorhat, Karbi Anglong, N.C. Hills, Cachar, Nagaon, Kokrajhar, Dhubri, Darrang, and Sonitpur. On the other hand, deciduous forests are found in the districts of Darrang, Dhubri, Kokrajhar, Goalpara, Kamrup, Karbi Anglong, Nalbari, Nagaon, Sibsagar, Dibrugarh and Sonitpur. Apart from Darjeeling, Dhubri districts all the above districts have degraded forests.

Evergreen and semi-evergreen forests cover 2495 sq.km. or 8 per cent of the area. Deciduous forest and scrubs cover 14388 sq.km. Moreover, plantation of trees has also increased the amount of the forest area in Assam. Except Cachar, Dhubri, Golaghat, Jorhat, Lakhimpur, Nalbari and N.C. Hills, all other districts have planted forests in increasing the forest area.

The semi-evergreen type of forests occur in Nagaon district. In Cachar and Karimganj districts also there are areas of semi-evergreen forests with various kinds of bamboos. The deciduous forest occurs mainly in lower

Assam districts of Kamrup and Goalpara. The most important hard wood tree of this forest is Sal (Shorea robusta). Assam has also some amount of coniferous trees.

Flora and Fauna

There are different varieties of flora and fauna in the forests of the state Assam is very rich in biodiversity. As for example, each part of region possesses 10-15 varieties of species in the basin of land, but some areas of tropical and sub tropical and possesses about 200 varieties of species. The north eastern region including Assam has 4000-7000 plant species identified so far. Favourable geographical location and ideal climatic conditions have made Assam very rich in biodiversity.

Plant species of Assam are concentrated mainly in the tropical evergreen and semi evergreen forests, grasslands, wet deciduous and riverside forest. There are at least 15 species of Angiosperms in Assam. Some of these, for example, Rhododendron dalhousiae is found only in Assam. The important varieties of trees available in the forests of the state are Sal (Shorea robusta), Mekai (Shorea assamica), Nageswari (Mesua ferrea), Titachapa (Michelia champaca), Soalu (Cassia fistula), Gandhenari (Clerodendron colebrookianum), Agar (Aquilaria agallocha), Bollanda (Dysoxylum binectariferum), Simul (Bombax ceiba), Klein (Sterculia villosa), Bonsum (Duabanga grandiflora), Amari (Amoora wallichii). Various types of bamboo, cane palms, tall grasses and other herbaceous and shrubby vegetations are found in the forests of Assam.

Besides the varieties of trees, there are a large number of orchids in the forests of Assam. Depending upon the nature and habit of the orchids, they grow on the branches of trees, on rocks and also on the ground. They are classified as terrestrials, epiphytes and saprophytes. There are more than 100 varieties of orchids available in Assam.

The two hills districts of the state with highest concentration of forest have different varieties of timber-yielding trees. The main tree species found in the North Cachar Hills district are Makari Sal, Piuma, Phoebe, Bel (Bellocki, Sam, Gamari, Phulkuri, Mal, Ahoi, Kurai, Koloi, Bola, Ajhar, Amari etc. Besides, some species of bamboo are also found in the forests of this district. In Karbi Anglong district, Sal, Korai, Jamun, Ajhar, Sam, Gamari, Amari, Piuma, Dhalu, Simul, Kanchan etc. are available. The wild life diversity in the state has been enumerated on the basis of the forest systems.

The mammals of Assam have affinity to the Indo-Chinese group. There are 14 species of monkeys in Assam which consist the 16% of the world. Among these, Hoolock Gibbon, Assamese Macaque, Pigtailed Macaque, Golden Langur, Harvman Langur, Spectacled monkeys, Capped Langur are the main types. Rare Golden Langur is found only in the western Assam along the Bhutan border etc. etc. Phayre's leaf monkey is confined to the forest of Cachar. Pigtailed and Stumptailed Macaques as well as Hoolock Gibbons are confined to the forests on the south of the Brahmaputra only. There are 19 cat families in Assam. India has 27 cat families. Quite a good number of tigers are found in the region. Manas tiger reserve is a famous Sanctuary.

Among the deer, Sambar and Barking deer are still common and found all throughout the area. Hog deer's present distribution is mainly confined to the grasslands of the Dehing-Patkai valley. Swamp deer is rare and found mainly in the reserved sanctuaries of the Brahmaputra plains and hilly terai become extinct in Cachar. Spotted deer is very rare and is confined to the moist deciduous forest of western Assam, north of the Brahmaputra river particularly in Manas Reserve. Asiatic water buffalo is also found in the reserves of the Brahmaputra valley. Elephant is found in great number in the state though its habitat is rapidly shrinking. Greater one horned rhinoceros has its last stronghold in the State. A good number of rhinoceros are found in Kaziranga, Manas, Orang, Laokhowa and Pobitora sanctuaries.

Out of the 1,500 species of birds in India (pre-continent), Assam alone possesses about 950 species. Residential as well as migratory birds in a large number of rare and endangered birds including waterfowls are found in the state. Birds include winter visitors to the state from far away places like Siberia, Manchuria, Tibet, etc.

Crocodiles, snakes, tortoises and monitor lizards are their various species represent the reptiles of the region. Crocodiles are now found mainly in the Brahmaputra river, but they have become extremely rare.

The following are some of the important parks and sanctuaries found in Assam :

Kaziranga National Park

This park is located in Golaghat district between the Brahmaputra on the north and Karbi hills on the south. It covers an area of 820 sq. km.

This park is famous for its tall elephants. Table 4.4 shows the number of important animals found in the park.

Table 4.4

Statement of some species of animals in Kaziranga National Park since 1966

Animal	1966	1972	1978	1984	1991	1993
Rhinoceros	366	458	939	1080	1129	1163
Elephant	49	422	772	528	815	811
Wild Buffalo	431	585	920	674	1092	1034
Bison	7	18	45	30	9	-
Swamp Deer	213	516	697	726	635	427
Sambar	120	192	215	338	55	34
Hog Deer	1311	4551	4659	987	2011	2043
Wild Boar	159	522	751	1615	555	1411
Tiger	70	92	70	32	50	

Source : CCF, Wildlife, Assam

Manas National Park

Manas National Park (Tiger project) is situated at the foothill of Bhutan covering parts of the districts of Barpeta and Kokrajhar. It has a total area of 430 sq.km. The important species of the nature park are tiger, pale leopard, hoolock gibbon, golden cat, clouded leopard, flying squirrel, leopard cat, hog deer, wild boar, sambar, barking deer, capped langur, Assamese macaque, rhesus macaque, slow loris, common otter, Himalayan black bear, sloth bear, Indian fox, jungle cat, Bengal florican, Indian elephant, crocodile, python, soft-shell turtle, gharial etc.

Orang National Park

It is situated in the river basins of Dhansiri and Sonitpur. The total area of the sanctuary is 79 sq.km. The important animals are rhinoceros, tiger, elephant, wild buffalo, panther, wild boar, sambar, swamp deer, hog deer, barking deer, capped langur, etc.

Dibru Chaikhowa Sanctuary

This sanctuary is located in Dibrugarh district of Assam. It was declared in 1986. It has an area of 340 sq.km. Important birds and animals are white-winged wood duck, pelican, tiger, sambar, hoolock and wild horse.

Nameri Wildlife Sanctuary

It is situated on the north bank of Bhairabi river along the Arunachal border of Sonitpur district. It was declared a wildlife sanctuary in 1985. The area of the sanctuary is 137 sq. km. The important animals of this sanctuary are elephant, bison, sambar, barking deer, capped langur and clouded leopard.

Garbhanga Wildlife Sanctuary

It is situated in Guwahati district. It has an area of 4.9 sq.km. The important animals are barking deer, sambar, wild bear, hoolock, python, tiger, leopard, civet cat and a variety of resident and migratory birds.

Deepor Beel Birds Sanctuary

This wetland sanctuary is located on the south bank of the river Brahmaputra, a few km west of the Guwahati City. The area of the sanctuary is 4 sq. km. Around 100 varieties of birds are found here.

Bornadi Wildlife Sanctuary

It is situated in Barpeta district covering 26 sq.km of area. It was declared in 1986. Some important animals found in this sanctuary are Pygmy hog, elephant, tiger, leopard, wild bear, capped langur, etc.

Pabitora Wildlife Sanctuary

It is situated in Morigaon district with an area of 38 sq.km. It is mainly famous for rhinoceros. It also consists of rhinoceros in the world's wild buffalo and some exotic, native and migratory birds.

Lakhimpur Wildlife Sanctuary

This sanctuary is situated in the north eastern part of Nagaon district. The total area of the sanctuary is 30 sq.km. It was declared a sanctuary in 1979. Rhinoceros, wild buffalo and tiger are the main animals of this sanctuary.

Social Forestry

The social forestry programme was launched in Assam in 1980-81. The programme was designed initially to plant all barren government and community land and also 'on farm' forestry in the already stocked areas. In addition to these, efforts have been made to meet the demand of fuelwood, fodder and small timber from the degraded forests and wastelands. Production of fuelwood has been taken up on government wastelands, roadside land, community land

like village grazing reserves, confusion of grazing and institutional land.

The social forestry programme was launched in the state keeping in mind the following objectives:

(1) to meet the requirement of leaf-fodder, fuel wood and other forest products including small timber of the local people,

(2) to help the effort of individuals producing fuel wood, fodder and other forest products;

(3) to extend forest to all categories of land without affecting the ownership and also to bring a sense of responsibility for protection, maintenance and care of forest;

(4) to provide employment and economic upliftment of the present and future generations particularly in the rural sector, and

(5) to ensure maintenance of ecological balance.

Moreover, plantation of avenues in the cities, towns and important rural centres has been taken up as a step for demonstration and to improve the bio-aesthetic impact. Highway banks on the national highways and parks in schedule caste and scheduled tribe inhabited areas were made for the purpose of recreation. At present, there are as many as 32 such parks in the state. These parks are maintained for the benefit of the people. During the seventh plan period, the schemes undertaken in the state were (a) social forestry – general scheme (b) social forestry under tribal sub-plan, (c) social forestry under scheduled caste component plan scheme, (d) fuel and timber plantation scheme, and (e) decentralised peoples nursery scheme.

The social forestry proposed to plant 38,278 hectares of land during the seventh five year plan and 25,000 hectares of land during the fifth five year plan. The total plantation area under social forestry wing is shown in Table 4.5.

Forest Produce and Revenue

There are both minor and major forest products in the state. Among the major forest products, men for may be made of timber and fuel. Every year a huge quantity of these products are extracted from the state's forests to cater to the various needs. Besides the major products, there are varieties of minor products from the forest areas such as gravel or stones, sand, earth and clay, bamboo, cane, thatch, agar, wood, medicinal plants, ivory, rhine, lac, potato, honey, fruit, etc. Table 4.6 shows the magnitude

of the out turn of timber and fuel wood products in the state during the period 1988-92.

Table 4.5

Plantation area under social forestry

Year	Plantation area in hectare
1981-82	3570
1982-83	6030
1983-84	7800
1984-85	3914
1985-86	9266
1986-87	10491
1987-88	5997
1988-89	2733
1989-90	3057
1990-91	5692
1991-92	5417
1992-93	6439
1993-94	5204
1994-95	5656
1995-96	5900

Source : Chief Conservator of Forests (Social Forestry), Assam

Table 4.6

Out-turn of timber and fuel wood in Assam

Year	Industrial timber (in cubic metre)	Fuel wood (stock cubic metre)
1988-89	7,86,656.28	30,061.45
1989-90	61,389.18	37,025.17
1990-91	65,374.23	35,300.10
1991-92	75,865.31	44,896.29
1992-93	45,545.11	43,994.20
1993-94	47,058.93	29,980.35

Source : Statistical Handbook, Government of Assam.

The annual revenue yield from the major forest products is substantial. The contributions of forest to the revenue of the state have been given in Table 4.7.

Table 4.7

Revenue earned by the Forest Department, Assam

(Rs. in lakh)

Year	Revenue budgeted	Revenue earned
1993-94	3300.00	3290.05
1994-95	3100.00	1892.40
1995-96	4302.30	1726.50

Source: Provided : DF, Assam

The status of other forest products in 1993-94 is given below :

Table 4.8

Forest products (1993-94)

1.	Gravel	[illegible]
2.	Sand	8608.17.00 m³
3.	Cantonment clay	8129.8.45 m³
4.	Bamboo	71934 nos.
5.	Thatches	2079.00 nos.
6.	Patidal	11700.850 nos.
7.	Cane	175814 bunches
8.	Tokai leaf	Nil
		791.50 Nos.

Source: Provided : Chief Conservator of Forests, Assam

Forest-Based Industries

A large proportion of the forest potentiality of the state is presently being utilised by a number of forest based industries located in various parts of the state. These are plywood factories, match factories, timber treatment and seasoning plants, bamboo & cane based, paper mills and saw mills which are based on the forest resources of the state. The first plywood factory in India was set up in Assam, after the First World War. These industries are now mostly utilising the forest resources of the state and are helping in generation of considerable employment. The number of various forest-based industries and their capacity in the state of various years is given in Table 4.9.

Table 4.9

Employment in and production of forest-based industries in Assam, 1991

Factory	Number	Employment	Production
Saw mill	534	7022	262 lakh sq.m.
Plywood factory	59	6213	425 lakh sq.m.
Match factory	4	1050	52.5 lakh gross boxes
Paper mill	2	1867	48.1 tonnes

Source : Economic Survey of Assam, 1994

The saw mills of the state besides meeting the demand for construction materials also cater to the requirements of Railway Sleepers. The plywood factories manufacture mainly tea chest and commercial as well as decorative plywood. At present, there are three paper mills in Assam namely the Hindustan Paper Mill at Jagiroad, the Panigaon Paper Mill at Cachar and the Ashok Paper Mill at Jorhat. (which are not functioning for last few years).

Degradation of Forest

As naturally we focused on the eastern areas of the country about fifty years back, for instance, most Kalyan would be shadowed if he happens to visit the same area again. He would find most areas are human settlements or encountered thick forest dotted here. The depletion of the forest wealth is continuing at an alarming rate. It is regrettable that the beauty of nature is coming at an alarming rate. It is regrettable that the beauty of forest resources bestowed upon the state is not utilised rationally. The forest resources has not in forest cover are similar. The increasing depletion pressure of the forest in forest cover are similar. The increasing depletion of the importance resources has disrupted the ecological balance leading to [illegible] in the form of unusual floods and periodic droughts in [illegible] in the state.

However, there is no reliable data available on the extent and the rate of depletion of forest cover annually or over any period of time. The state Government has not undertaken any detailed survey in this regard. The Government has not undertaken any detailed survey in this regard. The Upper Indian Working group on development of the north eastern region during the 7th five year plan, published by the North Eastern Council says that among the multiplicity of factors responsible for the rapid depletion of forest cover in the north east, the two prominent are (i) reckless felling of forest trees and (ii) extensive jhum cultivation. An idea about exploitation of forest and (ii) extensive jhum cultivation. An idea about the extent of the damage done to the forest ecosystem can be obtained from

From the last three during 1972-1, to 1980-82 there had been a loss of 157.38 sq km of active area in the case of Assam. Recent satellite survey conducted by NRSA shows the deplorable condition of several protected forest areas. For example, the Nambor (Garo) reserve forest has merely 3.61 per cent live tree cover. Dipang reserve forest has only 2.5 per cent, Diphu reserve forest has barely 5.5 per cent and Garbhanga reserve forest is almost fully degraded.

Recently it has been estimated that Assam has 9187 sq km of forest land under unclassified category (both plains and hills) which is not permanently destined for the forestry purposes and are subjected to jhum cultivation and other non-forestry uses. The area affected by shifting cultivation accounts for about 9 per cent of the state's total area. The two hills districts namely Karbi Anglong and NC Hills have 47.37 per cent and 39.5 per cent of their respective total land under shifting cultivation.

Out of 652 plant species recorded in Red Data Books of Indian plants, 179 plant species in Assam have been considered to be threatened or endangered. A number of factors, both deliberate and continuous removal and destruction which result from erratic overcutting. In many areas, specially in the hilly areas, the removal of forests has aggravated soil erosion through gully and sheet wash. This in turn, results in sediment deposition in the river beds and has caused fluctuation in the water quality in the rainy season.

Encroachment of forest land

Encroachment of forest land is one of the long-standing problems that badly affects resources of the state. Due to rapid growth of population there has been an increasing pressure of man and land on forest lands. Apart from this, the illegal migration of Bangladeshis is putting the forests, especially the reserved forests, under great threat. Similarly, the state's border areas are under the occupation of the neighbouring states. It is reported that Nagaland has occupied about 14,478.95 hectares of forest land, especially in the Tizit and Tuli hills reserved forest of Jaintia district. It has also occupied 2500 hectares of forest land of Kapili reserved forest in Sibsagar district.

There are 21 reserved forests in the Garo Hills of northern Assam, namely Dumburi, Sarihpara, Lakhipara, and Chokpot along the Assam-Arunachal Pradesh border. The total area of reserved forests there covers 10,24,047 hectares and of this more than 2,304 hectares of land are reported to have been encroached upon by Arunachal Pradesh. Major encroachments are also found in the Garo Hills district of Meghalaya. Some forest areas along the Meghalaya-Assam border are also being occupied by Meghalaya.

There had been tremendous depletion of forest cover from 1951 to 1995 in the northern Assam mainly because of defective government policy. The state government issued licence for cutting forest of 21 m³ in 1991-92, 6606 m³ in 1992-93, 2878 m³ in 1993-94 and 3283 m³ in 1994-95. But the actual amount is likely to be more than this official record. In the case actual amount is likely to be more than this official record. In the whole of Assam, out of 22,173.85 sq km area under forest (including hill districts), almost 11 per cent is under human encroachment and another 4 per cent forest land is under the forest villages. Table 4.10 shows the pattern of encroachments during 1991.

Table 4.10

Community-wise number of encroachers, 1991

Sl. No.	Caste/Community	Number
1.	Scheduled caste	9037
2.	Scheduled tribe	35085
3.	Nepali	6810
4.	Other backward caste	3412
5.	Fisher workers	4211
6.	Nagas	3642
7.	Others	11872

Source : Principal Chief Conservator of Forest, Assam

During the 7th plan efforts were, however, made to evict the illegal encroachers from the forests. There was a proposal in eight districts to remove the illegal settlers and reclaim the forest land and to raise plantation in such reclaimed lands. But in practice, it could not be implemented due to some unknown reasons.

Conclusion

Forest can play an important role in the economy of the state. There are a number of industries which have been set up to utilise the forest resources of the state. There is also much scope for setting up a number of minor forest-based industries. There should, however, be a proper plan for exploitation and utilisation of the forest resources. Unplanned felling of trees and exploitation of forest resources will lead to severe consequences

in the economy and environment of the state.

People's participation in connection with the protection of forest and wildlife is highly essential. In the present day situation, constant people's participation and their active involvement is vital for the success of any such programme. A vital factor in the socio-economic welfare of the tribal and rural people is the development of minor forest products. This will not only help to generate self-employment among them but also contribute substantially to the revenue of the state government.

There is a great demand for fuel wood and timber in the rural areas, and unless this is met there will be immense pressure on the commercial plantations as well as the reserved forests. So non-plantation in rural areas for fuel is most important.

Government should take firm steps to stop encroachments in the reserved forests and sanctuaries. For this purpose forest protection laws should be enforced and the strength of the protection force should be increased as required. Steps should be taken to make people aware of the need to plant and protect trees and thus to save mankind from diversions environmental pollution. Keeping in mind the growing tendency of the people in general to destroy forests, intelligently to meet their immediate requirements, relevant awareness campaign should be extended to every nook and corner of the state. Further, some new diversion schemes should be introduced to motivate the people for planning and preservation of trees.

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5

Biodiversity

Introduction

Assam is a part of a global biodiversity hotspot (Myers, 1988; 1991). It also forms part of two Endemic Bird Areas, viz. Eastern Himalaya and Assam Plains (Collar et al., 1994). Located in the north-eastern part of India (24°8' 27°9' N, 89°42'-96°0' E), it covers an area of 78,300 km² and is divided into 23 districts. The present state excludes areas such as Naga Hills (present Nagaland state), Khasi Hills, Garo Hills and Lushai Hills (all in present Meghalaya state), Mizo Hills (present Mizoram state) and NEFA (present Arunachal Pradesh state) which were also relevant to the various works on forests and wildlife in the past as part of Assam. The state broadly the major parts are plains with the Brahmaputra valley plain river in the north, the valley of the Barak River. The main hilly areas cover North Cachar Hills (N.C. Hills), parts of Cachar and Karbi Anglong (Sarma, 1985). The Rani Range, which covers parts of Cachar and N.C. Hills is the highest hill range in Assam with its highest peak at 1960 m elevation. The whole of Karbi Anglong and parts of Western N.C. Hills are part of an Archaean plateau.

The climate of Assam is tropical 'monsoon' type with a hot wet summer and a cool dry winter. While rainfall is more than 6000 mm in certain parts of the area, parts of Cachar (Dullavcherra) receive only 2000 mm. The temperature generally ranges from 7°C (in winter in Dibrugarh) to 35°C in summer (Cachar).

Habitat Diversity

Assam has widely different habitats. The tropical wet evergreen forest occurs mainly in the eastern and southern parts covering parts of Tinsukia, Dibrugarh, Sibsagar, Jorhat, N.C. Hills, Cachar and Haflong districts. Small pockets also occur in the Himalayan foothills, especially in Lakhimpur, Dhemaji and Sonitpur districts. Some important tree species found in such forests are hollong (*Dipterocarpus turbinatus*), Gurjan (*D. retusus*), Mekai (*Shorea assamica*), Sorea (*Shorea*

polysperma), Nahar (*Mesua ferrea*) and Sitekoroi (*Kayea assamica*). Champion & Seth (1968) classified these forests as 'Assam Valley tropical evergreen forest (2B/C1)' 'Upper Assam Valley tropical evergreen forest (1B/C2)' and 'Cachar tropical evergreen (1B/C3)'.

The tropical wet evergreen forest occurs along the Brahmaputra in the districts of Kokrajhar, Bongaigaon, Barpeta, Darrang and Sibsagar districts. In the south bank, Jeypur, such forests are found in Jorhat, Golaghat, Nagaon, Morigaon, Karbi Anglong and in the low hills of northern Barak valley. Small patches also occur in Sonitpur, Lakhimpur and southern Kamrup. Champion & Seth (1968) classified such habitats as 'Assam Valley tropical semi evergreen forest (2B/C1)' and 'Cachar semi-evergreen forest (2B/C3)'.

Large part of the lower Brahmaputra valley and parts of Karbi Anglong and N.C. Hills are covered by tropical moist deciduous forest. A speciality of this type of forest is the domination of the Sal tree (*Shorea robusta*). Champion & Seth (1968) had described these forests as 'Eastern hill sal forest (3C/C3b)', 'Eastern Bhabar sal forest (3C/C1b)', and 'Kamrup sal (3C/C3b(ii))'.

Along the banks of most of the larger hilly rivers and streams occur the riverine or dipterocarp hilly forests. A few large trees with a large number of climbers, both evergreen and deciduous with grass as the ground characterise this type of forest. The Sissoo (*Dalbergia sissoo*) and Khair (*Acacia catechu*) are the characteristic trees of such type. On the shoals and shingles (sandy islets and banks) of the Brahmaputra and its larger tributaries, pure like Jhau (*Tamarix dioica*) stands occur abundantly.

Throughout the Brahmaputra and the Barak valleys there are a large number of *beels* (ox bow lakes) and *haors* (wetland complex in Barak Valley) with swamps and marshes in the fringe areas. During summer all such areas remain under flood water. In areas where flood is prolonged the tree growth is less, but in areas where it is for a short period, trees like Hijal (*Barringtonia acutangula*) grows.

In the floodplain zone of the Brahmaputra and the foothill belt along the foot of the Himalayas is found wet savannah grassland with occasional grass marshes and *jheels* (swamps or lakes). Some such grassland pockets are found in Sonitpur, Lakhimpur, Darrang, Kokrajhar, Dhemaji and in Dhemaji-Subansiri. The main species of grasses found in such grasslands are Khagori (*Saccharum narenga*), Nal (*Arundo*

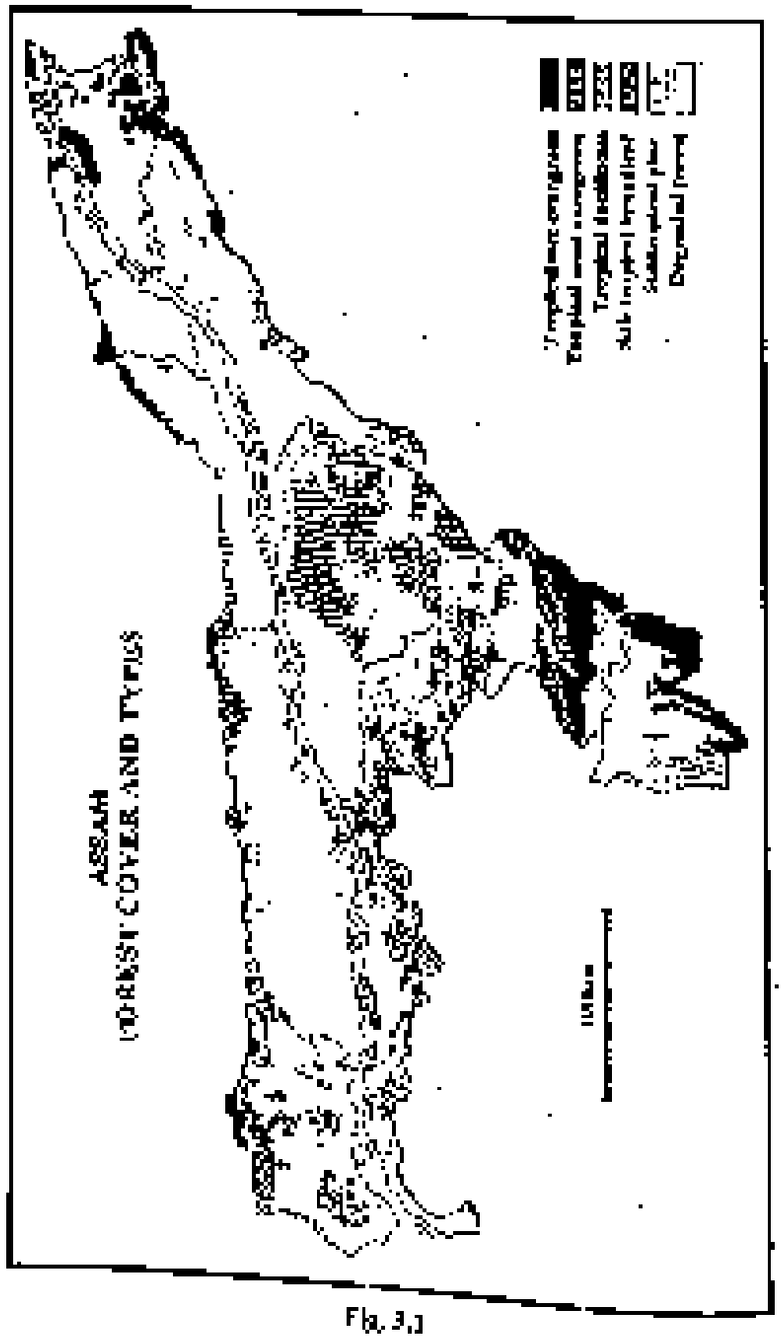

Fig. 3.1

Assam. Elsewhere in India (Goswami, personal communication) it is rather deep rooted and is found in Meghalaya, Bhutan (Sharma and Sharma, 1990), Kaziranga and Kaziranga (Choudhury, 1996). Some trees like Hoogeni (*Dipterocarpus*), Sasoi (*Shorea assamica*) and Simalu (Silk cotton) (*Bombax ceiba*) are found scattered in all grasslands (Choudhury, 1996).

In the higher altitudes of the Barails, built in N. C. Hills and Cachar a type of evergreen forest occurs with trees not very high, which is called the sub tropical, broadleaf hill forest. The jhum cultivation has greatly affected this type of vegetation. The higher areas of Barail subdivision of Karbi Anglong, subtropical pine forest occurs with *Pinus kesiya* as the characteristic species.

Species Diversity : Animals

Biotically speaking, Assam forms part of the Indo-Malayan (Oriental) Realm within the Oriental Zoogeographic Region (now often called the Indomalayan Realm). However, if we look into microlevel details, then the area south of the Brahmaputra River seems to be part of Indochinese Subregion while the Indian Subregion lies towards north of the river. The main vastness of foothills of the northern part of the Himalayan Subregion. In fact, Assam is located at the transitional zone between the Indian and the Indochinese Subregions where many local species have their eastern most limit of distribution (e.g., Chital or spotted deer *Axis axis*) while many Indochinese species have their western most limit of distribution (e.g., Tree shrew *Tupaia belangeri*) (Choudhury, 1997a; Corbet & Hill, 1992).

Mammals: A total of 290 forms including species and subspecies have been recorded or are likely to be found in Assam (Choudhury, 1997a). The total number of species listed so far is 191, which includes extinct as well as semi-wild (farm) free living feral forms. However, occurrence of 18 species (21, including subspecies) is not beyond doubt. Presence of such diverse mammalian species in relatively small area is quite significant (c. 6% of the total mammalian species found in India). This is one of the highest diversity of mammals in any of the Indian states/Andamans. Kerala has, however, more species in having 200+ (Choudhury, 1997a).

Large rivers often function as effective barriers in the distribution of mammals. In Assam, the Brahmaputra River, having a minimum width of 1.5 km (at places more than 5 km) has played a key role in determining

for distribution patterns of many mammalian species. The distribution of primates is a glaring example (Choudhury, 1999). The river has been an effective barrier to the movement and dispersal of the Pygmy gibbon, Shamplaikal mixed-species Pigtailed macaque, Stumptailed macaque and Hoolock gibbon. Similarly, the Golden langur is confined to the western areas of the north bank of the Brahmaputra River, whereas many smaller rivers such as the Manas and the Santosh have proved to be very effective physical barriers in controlling the distribution of the species.

Assam holds the entire known world population of the pygmy hog, about 70% of the world population of the Indian rhinoceros and wild water buffalo, sizeable population of Asian elephant, tiger, and the entire population of the golden langur in India. The endangered and protected species are listed in Table 5.1.

Birds: About 958 species and 3 subspecies of birds have been recorded in Assam or likely to occur in Assam. This includes 808 species. Single 286 are water dispersal from the northern boundary (Choudhury, 1995, 1999c). This richness and diversity in bird species is due to its location in the transitional zone between various zoogeographic subregions. This is the highest diversity of birds in any of the Indian states. Associated Threatened with more than 1%. Of the 51 species of birds found in Assam, 12 species threatened and 11 near-threatened species.

The following table shows more than five threatened and near-threatened species each:

Passeriformes (4), Falconiformes (1), Anseriformes (), Gruiformes and Charadriiformes 8. Two orders of birds that have the highest percentage of threatened and near-threatened species are Pelecaniformes (43 %), Ciconiiformes (37 %), Bucerotiformes (22 %), Gruiformes (20 %), and Anseriformes (25 %).

Some globally endangered species such as the Greater Adjutant Stork, White-winged Wood Duck, Swamp Partridge or Swamp Francolin and (Choudhury, 1996; Rasmussen et al, 1991; Saikia, 1998). The endangered and protected species are listed in Table 5.2.

Reptiles: At least 187 species have been recorded or are likely to be found in Assam. This includes two species of crocodiles, 21 turtles and tortoises, 46 lizards and 118 of snakes (excluding three species of marine) (A. Choudhury, unpublished data). There is possibility of a few new

forms as reptiles are still relatively poorly covered by research in Assam. Like the mammals and birds, presence of such a diverse reptilian species in a relatively small area is quite significant. This is among the richest diversity in any of the Indian states. Appendix I lists all the turtles and tortoises and some noteworthy other reptiles recorded in Assam.

Threats to Biodiversity

Habitat Destruction: Destruction of natural habitat for commercial felling, encroachment for cultivation and habitation, jhum or shifting cultivation of the hill tribes, and various development activities has become the major factors threat to biodiversity not only in Assam, but throughout the world. Construction of roads and railways through forests and massive unplanned bamboo harvesting for two large paper mills (Jagiroad and Nowgong), all mining and exploration in upper Assam, shift cultivation practices and coal mining, to name some of such activities. Table 5.3 shows the loss of forest cover in different years. It seems that between 1972-75 and 1993-94, Assam has lost 3, 142 km² of dense forest (with 60% crown cover). The percentage of dense forest cover has from 9.8% in 1972-75 to 19.8% in 1993-94 (assessment year 1997) (National Remote Sensing Agency Cell, 1997).

Since the latter half of last century more than 2000 km² of prime habitat, mostly tropical rain forest, have been cleared for tea plantations (Table 5.4). In the hilly areas of the state, the area under jhum is more than 2600 km². In the Dhansiri-Lanka R.F. of Dimapur district, only 12 km² of a total area of 24 km² is now left. In the Barpeta R.F., Sonitpur district, 200 km² out of 438 km² is under encroachment and Forest Villages. There are four such cases in Golaghat R.F. of the same district, and Gelu R.F. (Dhansiri reserve east

due to this (Choudhury, 1996c).

Uncontrolled grazing by domestic cattle is also a major problem especially in the grasslands. Since most of the grasslands are confined to a few pockets of protected areas, the pressure is severe. For example, in Dibru-Saikhowa National Park, about 600 cattle and domestic buffaloes graze (Choudhury, 1996).

The most severe cause of habitat destruction is, however, the very rapid growth of human population. Every year more than four lakhs of new faces are being added to the already overburdened population of Assam. As a very high percentage of this population lives in rural areas, 87% with farming as the main occupation, the large scale destruction of natural habitats like forest, grassland and wetlands seem inevitable.

Poaching: After habitat destruction, poaching of biological resources, both for commercial purpose as well as for the pot is the major threat to biodiversity. Species such as the elephant, rhino, tiger and Himalayan black bear are poached for international trade, while deer, pig, various small mammals, birds and reptiles are mostly for domestic consumption. The most pursued species in Assam is the rhinoceros whose horn is in great demand in south east Asia and Far East for medicinal value which in Vietnam for use in dagger-handles. The tusks are also mostly in very much demand in local demands. Liver for bone and skin, and black bear for gall bladder (all for supposed medicinal value). The poaching figures for the rhino and elephant are given in Table 5.4. Poaching has played the key role in decimating the elephant population in parts of North Cachar Hills, Assam-Meghalaya border and the southern Assam districts of Cachar, Karimganj and Kamrup. While most were shot with guns and rifles, a few were killed by traditional methods such as pit method and removing a metal pin from the ear. There also instances of poaching by electrocution and poison-mixed poaching gets unnoticed. Between 1980 and 1996, at least 595 rhinos were poached in Kaziranga alone (in the entire Assam, 870 fell during the same period (as per the official records).

Insurgency and Political Problems: Of late, the biodiversity has been greatly affected by problems arising out of insurgency in Assam. This factor is responsible for virtual elimination of the rhino and tusker in Manas National Park. Besides creating an atmosphere of lawlessness, the insurgency has made available more sophisticated firearms to the poachers who are increasing the poaching

(while the insurgents themselves are not directly resorting to poaching they have been in connivance with professional poachers/traders who are hired by some groups for money to buy sophisticated weapons. Lawless situation has helped the poachers and others to carry out their activities with little or no resistance from the authorities. They took full advantage of the unrest in Manas between 1989-93.

The problem has also to some extent the areas lying towards east and west of Manas i.e. Dhansiri Sanctuary, Sonai-Rupai Sanctuary and the reserved forests around Nameri National Park, and the forests of Kachugaon, Hollongapar and Ajie Valley divisions in Karbi Anglong and North Cachar Hills, besides the local habitat of Karbi and Dimasa tribes. The Nagas from Nagaland and Manipur are also active.

In Lakhimpur Sonitpur districts all the rhinos fell to poachers in the early 1990s due to a student agitation arising out of AASU (All Assam Students Union) movement on foreigners.

Diseases: Problems such as disease (bacterial diseases such as anthrax, rinderpest, and occasionally affect wild animals (mostly go unreported), pollution of water bodies by pesticides like Dieldrin, Thiodan and DDT, accidental poisoning by fishing and by industrial effluents (oil refineries, oil installations, etc.), power lines passing through forest also cause accidental deaths of animals, especially elephants by electrocution, high floods in the ranges and other protected areas on the floodplains during monsoon are also not the least problem for the rhino. While quite a few animals perish every year, but occasional high floods take heavy toll. Between June and September, 1998, as many as 29 rhinos were lost. Between June and September, 1998, as many as 29 rhinos were drowned in Kaziranga while more than a thousand big deer lost their lives.

Biodiversity Conservation

Measures taken : Legal Protection: With the habitat and the species are given different types of protection under various Acts and Rules the notable being The Forest Conservation Act, 1980 and the Wildlife (Protection) Act, 1972. Both provide for stringent protection measures. Most people are aware of the legal status of some major species such as the tiger, elephant and rhinoceros in case of others. They are also aware of the status of protected areas, deserved forests, etc however, it is an environment which is not appropriate in view of the places seen for a few well protected areas.

Habitat Protection: Sixteen protected areas in Assam have been notified for biodiversity conservation (Table 5.5). These include five national parks and 11 wildlife sanctuaries. Some noteworthy are Kaziranga, Manas, Nameri, Dibru-Saikhowa and Orang. However, the protected area network covers a very insignificant 3.2% (2488 km²) of the total geographical area of the state. Moreover, in some sanctuaries, the ordinance is inadequate. Again in some key areas such as Dibru-Saikhowa National Park, only about 25 guards are available to patrol an area of 340 km².

NGO Activities: Many NGOs (non-governmental organisations) such as the Rhino Foundation for Nature in NE India, WWF-India, Assam Science Society, Nature's Bookup, Aranyak, Green Hour, Megamix, etc., are also supplementing governmental efforts in saving the biodiversity.

Measures Proposed

1. *Creation of new Protected Areas:* With only 1.2% of the habitat under protected area network, there is an urgent need to bring more areas under the system, at least not less than 6%. Some potential areas are, northern and eastern Karbi Anglong, Dimasiri RF, Sipu-Kochugaon-Chirang RFs, Upper Dihing - Dhak-Jaypur RFs, Lumding East RFs, Inverline RF, Kaukhal RF, Barni RF and North Cachar RF.
2. *Extension of existing protected areas:* Especially Kaziranga, Gamrapani, Dibru-Saikhowa and Barnadi.
3. *Translocation of Rhinos to Lakhnoon, Bertoi, Bagori, Manas and other areas:* This will be required in near future.
4. *Check on poaching.*
5. *Control of jhum cultivation.*
6. *Check on encroachment and erection of constructions.*
7. *Run on commercial felling in the remaining prime natural habitats.*
8. *Other measures:* Check on grazing, effective protection and management of existing protected areas, conservation education, concrete measures to reduce depredation, expeditious payment of compensation for loss of life and property, large-scale installation of biogas, further research and monitoring and treatment of polluted waterbodies.

Table 5.4
Endangered Mammals of Assam

1. Chinese Pangolin *Manis pentadactyla* ☐
2. Indian Pangolin *Manis crassicaudata* ☐
3. Slow Loris *Nycticebus coucang* ☐
4. Pig-tailed Macaque *Macaca nemestrina* ☆
5. Assamese Macaque *Macaca assamensis* ☆
6. Stump-tailed Macaque *Macaca arctoides* ☆
7. Phayre's Leaf Monkey, Spectacled Monkey *Presbytis Phayrei* ☐
8. Capped Langur *Presbytis pileatus* ☐☆☐
9. Golden Langur *Presbytis geei* ☐☐
10. Hoolock Gibbon, White-Browed Gibbon *Hylobates hoolock* ☐☐
11. Dhole, Indian Wild Dog, Red Dog *Cuon alpinus* ☆
12. Himalayan Black Bear, Asiatic Black Bear *Ursus thibetanus* ☐☆
13. Sun Bear, Malayan Bear *Ursus malayanus* ☐☐
14. Sloth Bear *Ursus ursinus* ☆☐
15. Black-Sinned Weasel *Mustela strigidorsa* ☆
16. Ratel, Honey Badger *Mellivora capensis* ☐
17. Hog Badger *Arctonyx collaris* ☐
18. Common Otter, Eurasian Otter *Lutra lutra* ☐
19. Smooth Indian Otter, Smooth Coated Otter *Lutrogale perspicillata* ☆
20. Oriental Small Clawed Otter Clawless Otter *Aonyx cinerea* ☐
21. Spotted Linsang *Prionodon pardicolor* ☐☐
22. Dimorone, Hoor-Cat *Arctictis binturong* ☐
23. Leopard Cat *Felis bengalensis* ☐☐
24. Fishing Cat *Felis viverrinus* ☐
25. Golden Cat *Felis temminckii* ☐☐
26. Marbled Cat *Felis marmorata* ☐☐
27. Clouded Leopard *Neofelis nebulosa* ☐☆☐
28. Leopard, Panther *Panthera pardus* ☐☐
29. Tiger, Indian Tiger, Royal Bengal Tiger, Bengal Tiger *Panthera tigris* ☐☆☐
30. Gangetic Dolphin, Susu *Platanista gangetica* ☐☆☐
31. Indian Elephant, Asian Elephant *Elephas maximus* ☐☆☐
32. Indian Rhinoceros, Greater One-horned Rhinoceros *Rhinoceros unicornis* ☐☆☐
33. Javan Rhinoceros, Lesser One-horned Rhinoceros *Rhinoceros sondaicus* Extinct ☐☆
34. Sumatran Rhinoceros, Asian Two-horned Rhinoceros *Dicerorhinus sumatrensis* Extinct ☐☐

35. Sygny Bay Pigmy Hog *Bos sylvestris* □ Cr ⊙
36. Swamp Deer, Barasingha *Cervus dimensis* □ ⊙
37. Gaur, Indian Bison *Bos gaurus* □ ⊙
38. Wild Water Buffalo, Asiatic Wild Buffalo *Bubalus arnee* ⊙
39. Good *Nasuaribetes gorai* □ ⊙
40. Serow *Capricornis sumatrensis* □ ⊙ *Subspecies kermadecius* ⊙ *rubidus* □ ⊙
41. Irrawaddy Squirrel, Himalayan Hoary-Bellied Squirrel *Callosciurus pygerythrus* ☆
42. Particoloured Flying Squirrel *Hylopetes alboniger* ⊙
43. Crestless Himalayan Porcupine, Chinese Porcupine *Hystrix brachyurus*
44. Hispid Hare *Caprolagus hispidus* □ ⊙

Source: Choudhury (1992 a) □ = species included in Appendix I of CITES

⊙ = species treated as Endangered by IUCN.

☆ = species treated as Vulnerable by IUCN; Cr = species treated as Critical by IUCN.

⊙ = species included in Schedule I of The Wildlife (Protection) Act, 1972 of India

Table 5.2
Endangered Birds of Assam

Family PELICANIDAE : *Pelicans*

1. Spot-Billed or Grey Pelican *Pelecanus philippensis* □
2. Dalmatian Pelican *Pelecanus crispus* □

Family ANHINGUIDE : Darter

3. Darter or Snake-Bird *Anhinga melanogaster syn rufa* ⊙

Family ARDEIDAE : Herons, Egrets, Bitterns

4. Great White-Bellied or Imperial Heron *Ardea insignis sumatrensis* □

Family CICONIIDAE : Storks

5. Painted Stork *Mycteria leucocephala* ⊙
6. Openbill Stork, Asian Openbill *Anastomus oscitans* ⊙
7. Oriental White Stork *Ciconia boyciana* □ ⊙
8. Greater Adjutant *Leptoptilus dubius* □
9. Lesser Adjutant *Leptoptilus javanicus* □

Family THRESKIORNITHIDAE : Ibises, Spoonbill

10. White or Black-Headed Ibis *Threskiornis aethiopica syn melanocephalus* ⊙
11. Black Ibis *Pseudibis papillosa* ⊙
12. Eurasian Spoonbill *Platalea leucorodia* ⊙

Family ANATIDAE : Ducks, Geese

13. Red-Breasted Goose *Branta ruficollis* □
14. Lesser White-Fronted or Dwarf Goose *Anser erythropus* □
15. Long-Whistling Teal or Pulvous Tree Duck *Dendrocygna bicolor* ⊙
16. Marbled Teal *Marmaronetta angustirostris* □
17. Baikal Teal *Anas formosa* □
18. Pink-Headed Duck *Rhodonessa caryophyllacea* □ ⊙
19. Ferruginous Duck or White-Eyed Pochard *Aythya nyroca* □
20. Baer's Pochard *Aythya baeri* □
21. Mandarin Duck *Aix galericulata* ⊙
22. White-Winged Wood Duck *Cairina scutulata* □ ⊙

Family ACCIPITRIDAE : Hawks, Eagles, Vultures, etc.

23. Blyth's or Jerdon's Haza *Accipiter fasciatus* □ ⊙
24. Black or Black-Crested Haza *Accipiter leuphotus* ⊙
25. Northern Goshawk *Accipiter gentilis* ⊙
26. Shikra *Accipiter badius* ⊙
27. Crested Goshawk *Accipiter trivirgatus* ⊙
28. Eurasian Sparrow-Hawk *Accipiter nisus* ⊙
29. Besra Sparrow-Hawk *Accipiter virgatus* ⊙
30. Japanese Sparrow-Hawk *Accipiter gularis* ⊙
31. Imperial Eagle *Aquila heliaca* □
32. Greater Spotted Eagle *Aquila clanga* □
33. White-Tailed Sea Eagle *Haliaeetus albicilla* ⊙
34. Pallas's Fish Eagle *Haliaeetus leucoryphus* □
35. Grey-Headed Fish Eagle *Ichthyophaga ichthyaetus* ⊙
36. Himalayan Grey Headed or Lesser Fish Eagle *Ichthyophaga nana* Syn. *Humilis*
37. King, Black or Red-Headed Vulture *Sarcogyps calvus* ⊙
38. Cinereous Vulture *Aegypius monachus* ⊙
39. Long-Billed Vulture *Gyps indicus* ⊙
40. White-Backed or White-Rumped Vulture *Gyps bengalensis* ⊙
41. Lammergeier or Bearded Vulture *Gypaetus barbatus* ⊙
42. Pale or Pallid Harrier *Circus macrurus* ⊙
43. Osprey *Pandion Dubiatus* ⊙

Family FALCONIDAE : Falcons
44. White-legged or Pied Falconet *Microhierax melanoleucus* ⊙
45. Peregrine Falcon *Falco peregrinus peregrinator* ⊙
46. Shaheen Falcon *Falco peregrinus peregrinator* ⊙
47. Red-headed or Red-necked Merlin *Falco chicquera* ⊙⊙
48. Lesser Kestrel *Falco naumanni* ☐

Family PHASIANIDAE: Pheasants, Partridges, Quails, Etc.
49. Swamp Partridge, Swamp Francolin or Kyah *Francolinus gularis* ☐
50. Manipur Bush Quail *Perdicula manipuensis* ☐
51. White-cheeked Hill Partridge *Arborophila atrogularis* ⊙
52. Red-breasted Hill Partridge *Arborophila mandellii* ☐
53. Bamboo Partridge *Pantherticola fischeri* ⊙
54. Blyth's Tragopan *Tragopan blythii* ☐⊙
55. Mrs Hume's Bound-Hackle or Tailed Pheasant *Symmetrica humiae* ☐⊙
56. Peacock Pheasant *Polyplectron bicalcaratum* ⊙
57. Indian or Common Peafowl *Pavo cristatus* ⊙
58. Green or Burmese Peafowl *Pavo muticus* ☐

Family GRUIDAE : Cranes
59. Hooded Crane *Grus monacha* ⊙⊙

Family HELIORNITHIDAE: Finfoots
60. Masked Finfoot *Heliopsis personata* ☐

Family OTIDIDAE: Bustards
61. Bengal Florican *Bonticulopsis* (Syn. *Eupodotis*) *bengalensis* ☐⊙

Family CHARADRIIDAE : Plovers
62. Grey-headed Lapwing *Vanellus cinereus* ⊙
63. Long-billed Ringed Plover *Charadrius placidus* ⊙

Family SCOLOPACIDAE: Curlews, Sandpipers, Snipe
64. Spotted or Nordmann's Greenshank or Armstrong's Sandpiper *Tringa guttifer* ☐
65. Snipe-billed Godwit or Asian Dowitcher *Limnodromus semipalmatus* ⊙
66. Wood Snipe *Gallinago nemoricola* ☐
67. Spoon-billed Sandpiper *Eurynorhynchus pygmeus* ☐

Family LARIDAE: Gulls, Terns
68. Black-bellied Tern *Sterna acuticauda* ☐

69. Indian Skimmer or Scissorbill *Rynchops albicollis* ☐

Family COLUMBIDAE: Pigeons, Doves
70. Purple Wood or Pale-capped Pigeon *Columba punicea* ☐

Family STRIGIDAE: Owls
Subfamily STRIGINAE : Owls
71. Forest or Spot-bellied Eagle Owl *Bubo nipalensis* ⊙
72. Tawny Fish Owl *Ketupa flavipes* ⊙

Family PODARGIDAE : Frogmouths
73. Hodgson's Frogmouth *Batrachostomus hodgsoni* ⊙

Family APODIDAE : Swifts
74. Dark-backed or Khasi Hills Swift *Apus acuticauda* ☐

Family ALCEDINIDAE : Kingfishers
75. Blyth's or Great Blue Kingfisher *Alcedo hercules* ☐
76. Brown-Winged Stork-billed Kingfisher *Halcyon* (Syn. *Pelargopsis*) *amauropteria* ⊙

Family BUCEROTIDAE : Hornbills
77. Brown, Brown-hooded or White-throated Brown Hornbill *Anorrhinus* (Syn. *Ptilolaemus*) *tickelli* ⊙⊙
78. Rufous-Necked Hornbill *Aceros nipalensis* ☐⊙
79. Wreathed Hornbill *Aceros* (Syn. *Rhyticeros*) *undulatus* ⊙
80. Indian or Oriental Pied Hornbill *Anthracoceros albirostris* Syn. *malabaricus* ⊙
81. Great Pied Hornbill *Buceros bicornis* ⊙

Family INDICATORIDAE : Honeyguides
82. Orange-rumped Honeyguide *Indicator xanthonotus* ⊙

Family PITTIDAE : Pitts
83. Blue-naped Pitta *Pitta nipalensis* ⊙

Family DICRURIDAE : Drongos
84. Hair-crested or Spangled Drongo *Dicrurus hottentotus* ⊙
Family STURNIDAE : Starlings, Mynas
85. Spotted-winged Stare *Sarcogrotta spilopterus* ⊙

86. Collared Myna *Acridotheres albocinctus* ◐

Family MUSCICAPIDAE: Babblers, Quail-thrushes, Thrushes, Chats
Sub-family TIMALIINAE: Babblers
87. Marsh Spotted Babbler *Pellorneum palustre* □
88. Slender-Billed Scimitar-Babbler *Xiphirhynchus superciliaris* ◐
89. Long-Billed Wren-Babbler *Rimator malacoptilus* ◐
90. Long-Tailed or Tawny-Breasted Wren-Babbler *Spelaeornis longicaudatus* □
91. Spotted Wren-Babbler *Spelaeornis formosus* ◐
92. Wedge-Billed Wren-Babbler *Sphenocichla humei* ◐
93. Austen's Spotted or Spot-Throated Babbler *Scaphidyas ripleyi* □
94. Jerdon's or Hoary-Throated Babbler *Chrysomma altirostre* □
95. Black-Browed or Rufous-Backed Parrot-bill *Paradoxornis atrosuperciliaris* ◐
96. Greater Red-Headed Parrot-bill *Paradoxornis ruficeps* ◐
97. Black-Throated or Black-Breasted Parrot-bill *Paradoxornis flavirostris* □
98. Slender-Billed Babbler *Turdoides longirostris* ◐
99. Chestnut-Headed Laughing-Thrush *Garrulax erythrocephalus* ◐
100. Yellow-Throated Laughing-Thrush *Garrulax galbanus* ◐
101. Yellow-Breasted or Rufous-Vented Laughing-Thrush *Garrulax gularis* ◐
102. Spotted-Breasted Laughing-Thrush *Garrulax merulinus* ◐
103. Manipur Streaked or Striped Laughing-Thrush *Garrulax virgatus* ◐
104. Rufous-Backed or Black-Headed Shrike-Babbler *Pteruthius rufiventer* □
105. Black-Crowned Yellow-Cheeked or Rufous-Fronted Tit-Babbler *Alcippe poioicephala* ◐
106. Red-Tailed Tit-Babbler *Alcippe castaneceps* ◐
107. Grey-Sided Laughing-Thrush *Garrulax caerulatus* ◐

Sub-family MUSCICAPINAE: Flycatchers
108. Brown-Breasted Flycatcher *Muscicapa muttui* ◐

Sub-family SYLVIINAE: Warblers
109. Hodgson's Green Warbler or Grey-Crowned Prinia *Prinia cinereocapilla* ◐
110. Long-Tailed Grass Warbler or Rufous-Vented Prinia *Prinia burnesii* □
111. Bristled Grass Warbler or Bristled (Striated) Grassbird *Chaetornis striatus* □
112. Black-Breasted Parrotbill or Black-Throated Tit *Paradoxornis flavirostris* ◐
113. Broad-Billed Warbler *Acrocephalus (Syn. Tickellia) hodgsoni* ◐

Sub-family TURDINAE: Thrushes, Chats
114. Rusty-Tailed Flycatcher *Muscicapa ruficauda* □
115. Firethroat *Calliope (Syn. Luscinia) pectardens* ◐
116. Rufous Bellied or Rufous-Breasted Bush Robin *Erithacus (Syn. Tarsiger) hyperythrus* ◐
117. Purple *Cinnyris asiaticus* ◐
118. Green *Cinnyris zeylonicus* ◐
119. Rufous-Throated Wren-Babbler *Spelaeornis caudatus* □
120. Large Scimitar Babbler *Erythrogenys gravivox* ◐
121. Jerdon's Babbler *Chrysomma altirostre jerdoni* ◐
122. Pied Grosbeak *Zoothera wardii* ◐
123. Large Scimitar Babbler *Erythrogenys gravivox* ◐
124. Black-Breasted Thrush *Turdus dissimilis* ◐
125. Grey Thrush *Turdus cardis* □

Family SITTIDAE: Nuthatches, Creepers
127. Beautiful Nuthatch *Sitta formosa* □

Family PLOCEIDAE: Weaver Birds
Sub-family PLOCEINAE: Weaver Birds, Sparrows
128. Finn's Baya *Ploceus megarhynchus* □

Source: Choudhury (1999, in press), Daimari et al. (1994)
◐ species as included as Threatened in *Birds to watch 2*
□ species treated as Near-Threatened in *Birds to watch 2*
Species included in Schedule I of The Wild Life (Protection) Act

Table 5.2
Area under forest in Assam from 1972-75 and 1997 based on visual interpretation of Landsat data.

Period/ Year	Total forest area in km²	% Forest area in km²	Total dense forest area in km²	% dense forest area in km²	Remarks
1972-75	21,055	26.8	18 860	23.6	Source: National Remote Sensing Agency (NRSA)
1986-92	9 730	12.4	15,025	19.0	Source: National Remote Sensing Agency (NRSA)

1991 (1987-89)	24,251	31.5	5,812	20.2	Source: The State of Forest Report 1991. Based on data of 1987-89
1993 (1989-91)	24,508	31.9	15,998	20.4	Source: The State of Forest Report, 1993. Based on data of 1989-91
1995 (1991-92)	15,051	20.6	5,004	20.0	Source: The State of Forest Report 1995. Based on data of 1991-92
1997 (1993-94)	15,824	20.3	15,948	19.3	Source: The State of Forest Report 1997. Based on data of 1993-94
Total loss	927 (since 1987-89)	1.5	3,140 (since 1972-79)	4.0	There appears to be apparent disagreement in the methodology in between NRSA and the State of Forest Report

Table 5.4
Number of known Rhinoceros and Elephants poached in Assam from 1979-1999 (till April)

Year	Number of Rhinos poached	Number of Elephants poached
1979	15	NA
1980	18	NA
1981	38	NA
1982	44	NA
1983	97	NA
1984	45	NA
1985	36	NA
1986	53	NA
1987	43	NA

1988	44	14
1989	67	10+
1990	45	1+
1991	39	6+
1992	67	4+
1993	70	10
1994	27	3+
1995	41	13
1996	40	9
1997	29	0
1998	23	4+
1999 (till April)	6	1
Total	898	89

Source: Rhino Forest Department of Assam: Elephant - Choudhury (1999, unpub)

The figures of elephants should be treated as minimum known cases. The '0' or NA (not available) should not necessarily be treated as nil.

Table 5.5
Protected areas in Assam

National Park

1. Dibru-Saikhowa (Dibrugarh & Tinsukia districts)		240.00 km²
2. Kaziranga (Golaghat, Nagaon & Sonitpur districts)	-	849.59 km²
3. Manas (Barpeta & Dongaigaon districts)	-	500.00 km²
4. Nameri (Sonitpur district)	-	200.00 km²
5. Orang (Darrang & Sonitpur districts)	-	78.81 km²
		1968.6 km²

Wildlife Sanctuary

1. Pandeibam-Bilmash (Dhemaji & Lakhimpur districts)	-	1[illegible].25 km²
2. Pamoli (Darrang district)	-	26.22 km²
3. Burnachapori (Sonitpur district)	-	[illegible].06 km²
4. Chakrashila (Dhubri district)	-	45.57 km²
5. Dipar Beel (Kamrup district)	-	[illegible] km²
6. Garamoni (Kothi Anglong district)	-	[illegible] km²
7. Gibbon (Jorhat district)	-	[illegible] km²
8. Lakhowa (Nagaon district)	-	[illegible] km²

No.		Geography of Assam
9	Pabitora (Morigaon district)	- 38.43 km²
10	Pane-Dining (Nibasgar district)	- 33.93 km²
11	Sonai Rupai (Sonitpur district)	- 220.0 km²
		521.84 km²
		2459.74 km²
		13.2% of the total geographical area

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Appendix 1

Some noteworthy Reptiles of Assam (all species of Crocodylia and Testudines, and some others)

Order Crocodylia CROCODILES

CROCODYLIDAE

1. *Crocodylus palustris* (Lesson, 1831) Marsh Crocodile

GAVIALIDAE

2. *Gavialis gangeticus* (Gmelin, 1789) Gharial, Gavial

Order Testudines TURTLES & TORTOISES

BATAGURIDAE

3. *Chara ambulatoria* (Gmelin, 1801) *a. C. a. kamaroma* (Rummler & Fritz, 1991)	Malayan box turtle
4. *Cyclemys dentata* (Gray, 1831)	Asian leaf turtle
5. *Geoclemys hamiltonii* (Gray, 1831)	Spotted pond turtle
6. *Hardella thurjii* (Gray, 1831) *a. H. t. thurjii* (Gray, 1831)	Crowned river turtle
7. *Kachuga dhongoka* (Gray, 1834)	Three striped roofed turtle
8. *Kachuga kachuga* (Gray, 1831)	Red-crowned roofed turtle
9. *Kachuga sindhii* (Gray, 1863) *a. K. s. sindhii* (Gray, 1863)	Brown roofed turtle
10. *Kachuga sylhetensis* (Jerdon, 1870)	Assam roofed turtle
11. *Kachuga tecta* (Gray, 1831)	Indian roofed turtle
12. *Kachuga tentoria* (Gray, 1834) *a. K. t. flavomarginata* (Cuvier, 1864)	Indian tent turtle
13. *Melanochelys tricarinata* (Blyth, 1856)	Tricarinate hill turtle
14. *Melanochelys trijuga* (Schweigger, 1812) *a. M. t. indispensabilis* (Annandale, 1913)	Indian black turtle
15. *Morenia petersi* (Anderson, 1879)	Indian eyed turtle
16. *Pangshura mouhoti* (Gray, 1862)	Keeled box turtle

TESTUDINIDAE

17. *Indotestudo elongata* (Blyth, 1853)	Elongated tortoise
18. *Manouria emys* (Schlegel & Muller, 1840) *a. M. e. emys* (Schlegel & Muller, 1840) *b. M. e. phayrei* (Blyth, 1853)	Brown hill tortoise Asian brown tortoise

TRIONYCHIDAE

19. *Aspideretes gangeticus* (Cuvier, 1825)	Gangetic softshell, Indian softshell turtle
20. *Aspideretes hurum* (Gray, 1831)	Indian peacock

	softshell turtle
21. *Aspiciendra sagittata* (Anderson, 1875)	Black softshell turtle
22. *Chitra indica* (Gray, 1831)	Narrow-headed softshell turtle
23. *Lissemys punctata* (Lacepede, 1788)	Indian flapshell turtle
a. *L. p. andersoni* Webb, 1960	
Order: Lacertilia LIZARDS	
GEKKONIDAE	
24. *Gekko gecko* (Linnaeus, 1758)	Tuckto gecko-Common Indian skshell
a. *G. g. gecko* (Linnaeus, 1758)	
b. *G. g. vulcani* (Mertens, 1955)	
25. *Gonyola* (*Gitta khasiensis* (Jerdon, 1870)	Assam rock gecko
a. *G. k. khasiensis* (Jerdon, 1870)	
26. *Hemidactylus bowkii* (Gray, 1845)	Spotted house gecko
27. *Hemidactylus flaviviridis* Ruppell, 1849	Yellow-bellied house gecko
28. *Hemidactylus frenatus* (Dumeril & Bibron, 1836)	Tickley house gecko
29. *Hemidactylus gamelii* (Dumeril & Bibron, 1836)	Assam greyish-brown gecko
30. *Hemidactylus karenensis* (Theobald, 1968)	Cachar greyish brown gecko
AGAMIDAE	
31. *Calotes bhutanensis* (Biswas, 1975)	Bhutanese calotes
32. *Calotes mystaceus* (Gray, 1845)	Light-olive Assam garden lizard
a. *C. m. ultimissima* (Schmidt, 1927)	
33. *Calotes mystaceus* (Gray, 1845)	Assam garden lizard
34. *Calotes versicolor* (Daudin, 1802)	Indian garden lizard
a. *C. v. versicolor* (Daudin, 1802)	
35. *Draco blanfordii* Boulenger, 1885	Assam flying dragon
a. *D. n. nomifer* (Alcock, 1895)	
SCINCIDAE	
36. *Lygosoma albopunctata* (Gray, 1846)	Brown dwarf skink
37. *Mabuya carinata* (Schneider, 1801)	Common Indian skink
a. *M. c. carinata* (Schneider, 1801)	
38. *Mabuya multifasciata* (Kuhl, 1820)	Assam olive brown skink
39. *Mabuya unaffinis* (Doehlinger, 1887)	Cachar olive brown skink

LACERTIDAE	
40. *Tropidophorus hanghinensis* (Jerdon, 1870)	Long headed reddish lizard
ANGUIDAE	
41. *Ophisaurus gracilis* (Gray, 1845)	Indian glass snake
VARANIDAE	
42. *Varanus bengalensis* (Daudin, 1802)	Common monitor, Bengal monitor, Indian monitor
43. *Varanus flavescens* (Gardwicke & Gray, 1827)	Indian yellow monitor
44. *Varanus salvator* (Laurenti, 1768)	Indian water monitor
a. *V. s. Salvator* (Laurenti, 1768)	
Order: SERPENTES SNAKES	
Infra order SOCLECOPHIDIA	
Family: TYPHLOPIDAE	
Subfamily: TYPHLOPINAE	
45. *Rampholypidops brahminus* (Daudin, 1803)	Common worm snake
46. *Typhlops bothriorhynchus* (Cuvier, 1864)	Assam worm snake
Family: BOIDAE	
Subfamily: PHYTHONINAE	
47. *Python molurus* (Linnaeus, 1758)	Rock python
a. *P. molurus molurus* (Linnaeus, 1758)	
b. *P. Molurus bivittatus* (Kuhl, 1820)	
48. *Python reticulatus* (Schneider, 1801)	Reticulated python
Infra order: CALNOPHIDIA	
Family: COLUBRIDAE	
Subfamily: DIPSADINAE	
49. *Parvus mendicans* (Cantor, 1839)	Assam mail-eater
Subfamily: XENODERMINAE	
50. *Sodomsara khasiana* (Jerdon, 1870)	Khasi Hills earth snake
Subfamily: LYCODONTINAE	
51. *Ignatius vulnus* (Linnaeus, 1758)	Common wolf snake

52. *Oligodon arnensis* (Shaw, 1802)	Common kukri snake
53. *Oligodon venustus* (Günther, 1864)	Assam oriental wolf snake
Subfamily: SIBYNOPHIINAE	
54. *Sibynophis sagittarius* (Cuvier, 1829)	Collared black-headed snake
Subfamily: NATRICIDAE	
55. *Amphiesma stolata* (Linnaeus, 1758)	Striped keelback
56. *Amphiesma vibakari* (Duméril, 1861)	Olive keelback watersnake
57. *Rhabdophis subminiatus* (Schlegel, 1837)	Red-necked keelback
58. *Rhabdophis piscator* (Schneider, 1799)	Checkered keelback watersnake
Subfamily: COLUBRINAE	
59. *Ahaetulla nasuta* (Lacepède, 1789)	Common vine snake
60. *Elaphe frenata* (Gray, 1853)	Assam trinket snake
61. *Elaphe helena* (Daudin, 1803)	Common trinket snake
62. *Ptyas fusca* (Gunther, 1858)	Rat snake or Dhaman
Subfamily: PSEUDOXENINAE	
63. *Pseudoxenodon macrops* (Blyth, 1847)	Beregal cat snake
64. *Pseudoxenodon stejnegeri* (Barbour, 1908)	Assam cat snake
Subfamily: XENOCHROPHIDINAE	
65. *Xenochrophis piscator* (Schneider, 1799)	Common checkered water snake
Subfamily: DASYPELTINAE	
66. *Oligodon taeniolatus* (Reinhardt, 1863)	Indian egg-eater
Family ELAPIDAE	
Subfamily: ELAPINAE	
67. *Bungarus caeruleus* (Schneider, 1801)	Common krait
68. *Bungarus fasciatus* (Schneider, 1801)	Banded krait
69. *Bungarus niger* (Wall, 1908)	Black krait
70. *Calliophis macclellandi* (Reinhardt, 1844)	Mac Clelland's coral snake
71. *Naja kaouthia* (Lesson, 1831)	Monocellate cobra
72. *Naja naja* (Linnaeus, 1758)	Common or Spectacled cobra

73. *Ophiophagus hannah* (Cantor, 1836)	King cobra or Hamadryad
Family: VIPERIDAE	
Subfamily: VIPERINAE	
74. *Daboia russelii* (Shaw & Nodder, 1797)	Russell's viper
Subfamily: CROTALINAE	
75. *Trimeresurus erythrurus* (Cuvier, 1829)	Green pit viper

Source: Arnold (1967), A Checklist (unpub), Das (1978), Deoras (1970), Pillmore (1965), Glennie (1987), Ogle (1971), Hoge & Romano-Hoge (1981), King & Burke (1989), Krupp (1981), Murthy (1987), Nicholas (1981), Sharma (1978), Smith (1931, 1933, 1943), Stevenson (1969), Uetz & Reed (1969), Wall (1923), Wallace (1935), Whitaker (1978).

6

Immigration

Introduction

Human migration is a world wide phenomenon. Its nature, type and causes vary through time and over space. The study of migration is of particular interest to geographers because of its inherent spatial character. Migration can not be considered merely shift of people from one place of residence to another, it is their interaction in the understanding of continuously changing space-context and areal relationships of an area phenomenon and the factors associated with it. Railway migration is a complex social phenomenon. Never before, all types of migration are always understood by a simultaneous operation of push and pull factors, the former operating in the area of out-migration and the latter in the area of reception. Whenever migration takes place in whatever form, it generates threefold impact : (i) on the area experiencing in-migration ; (ii) on the area experiencing out-migration and (iii) on the migrants themselves. Once an immigration-prone region becomes a net in-migrant area, its rapid growth by excessive immigration accentuates its population problems and political life of the receiving area becomes apparent and conspicuous.

Immigration in the Assam vis-a-vis North East India has received attention of scholars from various disciplines in the recent years because a significant part of the country is prone to immigration into the region is markedly different. Although all the north-eastern states have felt the influences of immigration, the magnitude of the problem is negligible in all the states as compared to Assam. The process of immigration into undivided Assam which started during the British times has attained such a magnitude during the Post-Independence period that it has witnessed many of the known instances of intensity and migration of population in the contemporary period. Massive and relentless influx of population into Assam from Bangladesh, West and other states of India in recent times has not only adversely influenced the demographic, economic and socio-cultural profiles but also has become one of the main reasons of social tension and ethnic unrest in the whole north-eastern region. During

the Post-Independence period illegal immigration into Assam has increased alarmingly and has changed the entire migration scenario threatening the identity of the indigenous people. Thus, an attempt has been made to explore the heterogeneities of the process of immigration into Assam and to examine its impact on the demographic, economic and socio-cultural characteristics and also on the political life of the people of Assam.

Data on Immigration

The study of a complex human phenomenon like migration requires numerous scanning of data to be derived from various sources. The most important problem faced by the researchers is the availability of reliable data pertaining to immigration into Assam. Scholars have to work with data of varying level and reliability. India's decennial census is the most important single source of data for migration analysis. The 1961 Indian census provided data on migration by place of birth classified as (i) within the district of enumeration ; (ii) outside the district, but within the state of enumeration ; (iii) outside the state of enumeration, but within India ; and (iv) outside India. The 1961 census also provided data on migration by duration of residence in the place of enumeration, nature of work and age groups. The 1971 census further provided data on marital status of the migrants on the basis of place of last residence and duration of residence at the place of enumeration. In spite of such marginal improvement of the quality of data, serious controversy on immigration into Assam, particularly from outside the country, appears to be inadequate and the data compiled by Indian censuses are not verifiable. Non-availability of 1981 census data due to census was held in Assam in 1983 has also added to the problem of accurate information on immigration. The 1991 census data on migration are not yet available. Because of such weaknesses of the data on migration are still debating on the veracity and authenticity of the figures, intellectuals are still debating on the veracity and authenticity of the statistics regarding the actual number of foreign immigrants in Assam provided by various official sources. Moreover, another serious limitation of census data lies in the frequent changes of the administrative boundaries both at state and district levels. Thus, the study of the problem of immigration into Assam holds difficulty because of inadequate and unreliable data. Keeping such limitations in view data for the study have been taken from Census of India and other relevant statistical reports.

Immigration Streams and Volume

Assam has witnessed a long history of immigration since the begin-

ing of the 19th century. Historically, the whole process of immigration into Assam can broadly be divided into two phases : Pre-Independence Immigration and Post-Independence Immigration. However, the nature, volume and causes of migration during the Pre-Independence period were different from the Post-Independence period.

Pre-Independence Immigration

Historical evidences indicate that a stream of feeble migration into Assam occurred in the later part of Ahom rule. However, the continuous process of immigration into erstwhile Assam started since the Province of Assam was annexed by the British in 1826. The process of immigration, which started initially in a small way just after annexation, attained vigorous momentum as soon as the British consolidated power in the entire region. There were several streams of immigration into Assam during the British rule. Their origin magnitude and causes, however, differ from one another.

Immediately after annexation of Assam, the British started tea cultivation as early as 1835 near Sadiya. When the tea cultivation proved successful, several England-based Companies took up large scale tea plantation in Upper Assam after 1851. As labour force was not available locally and the local people of Assam were unwilling to work in the tea gardens, the planters started in porting indentured labourers from Chotanagpur region belonging to such tribes like Munda, Santhal, Ho, Oraon and Gond. According to 1901 census, the total number of labourers in the state stood at 6.54 Lakh. With the expansion of tea gardens, the requirements of labourers also went up. Consequently, their immigration was maximum during 1911 - 31. As per 1921 census there were about 24 Lakh persons falling into the "Coolie" class in Assam. The import of labourers for tea gardens in Assam which continued up to 1931 was practically stopped in 1941. As these labourers did not go back to their origins, localities they settled down in the tea gardens and then adjoining vacant lands mainly in old Dibrugarh, Lakhimpur, Sibsagar, Darrang and Cachar districts. As per 1921 census, the total number of tea-tribes population in Assam stood at 32.5 Lakh (13.12 per cent of Assam's total population) and they form a separate class of population giving a new dimension to the broad population base of the state.

The discovery of coal and petroleum in Upper Assam in the late part of 19th century brought a new economic order and accommodated opportunity to Assam. The colonial administrators needed a skilled and educated

labour force to man the various departments and to construct roads and railways. They found the local source unable to provide such labour force and induced professionals for the service sectors, technicians for mining, industry, tradesmen, police and security personnels from outside the province. Thus a new set of induced immigration set in with the coming of various categories of people mainly from Bengal, Bihar, Uttar Pradesh, Rajasthan and also from Nepal.

Tables 6.1 & 6.2 clearly illustrate the alarming trend of immigration of Bengal-born population into Assam during 1911 - 31.

Table 6.1
Growth of Bengal-born population in Assam, 1911-31

Year	Bengal-born (Total)		Mymensingh-born	
	Assam	Assam Valley	Assam	Emmenced as P.C. of Assam Valley
1911	194,000	120,000	87,000	39.8
1921	376,000	301,000	192,000	57.1
1931	576,000	496,000	311,000	62.7

Source : Census of India, 1931, Vol. III, Pt. I

Table 6.2
Immigration of Bengal-born population into Assam Valley, 1911-31
(In thousand)

District	1911	1921	1931
Goalpara	72 (34)	151 (78)	170 (89)
Kamrup	4 (1)	44 (30)	134 (80)
Darrang	2 (1)	20 (12)	41 (30)
Nagaon	4 ( )	38 (52)	120 (108)
Sibsagar	14	14	12
Lakhimpur	14	14	19 (2)

(Figures within the parentheses indicate persons born in Mymensingh)

Source : Census of India, 1931, Vol.III, Pt.I.

Contemporary to these immigrations, a stream of labourers in search of employment started from areas in East Bengal (now Bangladesh). When Assam was separated from Bengal in 1874, the latter province included the districts of Sylhet, Cachar and Goalpara. The former province was largely virgin land with sparse population. Sir Henry Cotton, the then chief Commissioner of Assam felt that the vast and fertile cultivable lands be reclaimed to step up foodgrain production. Since the first wave of immigration the process of immigration of land hungry peasants into the Brahmaputra Valley from Sylhet, Mymensingh and Rangpur districts of East Bengal got accelerated. Initially the immigration of peasants from these areas was encouraged by the Zamindars of Lower Assam with the connivance or active connivance of the officials. It virtually opened the floodgates for Muslim immigration into Assam in spite of having the vacant and unexploited lands in the state. The Census Report of 1911 points out that the unbridled immigration of farm labourers from Mymensingh, Sylhet and Rangpur districts to Assam was occupied mainly the Char lands of Goalpara district. As a result the population of Goalpara district jumped up by 16 per cent in 1901 - 11 as against only 2 per cent in the previous decade. Since then the immigration continued unabated and the immigrants began to spread over the other districts of lower and central Assam, viz. Kamrup, Darrang and Nowgaon districts. In 1971, one fifth of Goalpara district's population and one-seventh of Nagaon district's population were recorded as Bengali-born and a large majority of them were from the district of Mymensingh.

The inflow of these immigrants received an increase vigour under political patronage of the Assam Government which was dominated by the Muslim League leaders from 1926-42 with a brief interruption in 1939 gave all encouragements to these new settlers from East Bengal (Davis, 1951). For the settlement of these immigrants the Government appointed Colonisation Officers for the Nagaon district in 1919-29 and for the Barpeta, Mangaldai and North Lakhimpur Subdivisions in 1924-30. The probable impact of such immigration was felt seriously by the then Superintendent of Census Mr. C.S. Mullan. In the Census Report of 1931 he made profound remarks regarding the future implications of such unabated immigration which read as "probably the most important event in the province during the last twenty five years - an event, moreover, which seems likely to affect permanently the whole future of Assam and to deserve more careful

study did the Burmese invasion of 1826 the whole structure of Assamese culture and civilisation has been the invasion of vast tracts of land hungry Bengali immigrants, mostly Muslims, from the districts of East Bengal and in particular from Mymensingh. Wherever there is waste-land thither flock the Mymensinghias. In fact, the way in which they have seized upon the vacant area in the Assam Valley seems almost uncanny. We cannot close without a mild protest against the policy which has permitted this vast immigration to take place. The population which must amount to over half a million has transplanted itself from Bengal to the Assam Valley during the last twenty five years. It looks like a marvel of administrative organisation on the part of the Government but it is nothing of the sort, the only simile I can compare it to is the mass movement of a large body of ants". These hard working, Muslim immigrants, after settling down mostly in the flood plains of the Brahmaputra Valley and cultivable waste lands brought a tremendous change in the agricultural economy of the state by introducing a rival system of jute, vegetables and rice on a commercial scale. As they became permanent settlers in Assam Valley, with the passage of time, many of the Muslim immigrants have accepted Assamese as mother tongue. However at one time these immigrants had proved to be a great concern to the indigenous people in certain areas. The inevitable consequence of occupation of char lands, grazing lands and wastelands in the areas so held by the locals was frequent friction between the immigrants and the local people. The Assam Government could foresee the problem and introduced a "Line system" as early as 1920 to impose restrictions on settlement of immigrants in certain areas predominantly inhabited by backward plain tribes. The main objective of the Line System was to isolate the immigrants from the areas settled by the locals and to give land settlement to the immigrants in segregated areas beyond which they were not allowed to settle. But, because of lukewarm response of the Assam Cabinet headed by Sir Saadulla towards the "Line System", encroachment of reserved forest areas and wastelands in the tribal belt by the immigrants went on unabated. Even during those days the people of Assam were very much apprehensive of underhanded move in favour of the immigrant muslims for strengthening their vote bank in the state.

Besides these immigrants, there was another contemporary stream of migration into erstwhile Assam from Nepal during 1911-31. The majority of the Nepali immigrants were graziers, ex-servicemen, porters and agricultural labourers. Their total number stood at 70,345 in

1921 which increased to 83,100 in 1931 (Table 6.3).

Table 6.3
Nepali-born population in Assam 1911-31

Year	Persons	% total population
1911	21,741	0.35
1921	47,656	0.67
1931	79,744	0.94
	83,700	1.02

Source: Census of India, 1931, Vol. III, Pt. I

The majority of the Nepali graziers occupied the riverbanks and the foothill areas while many of them settled down in the outskirts of the urban areas. Although the flow of Nepali immigration had almost ceased after 1921, the process again continued after Independence. Most of the Nepali immigrants depended on livestock farming. Many of them took up agriculture together with cattle rearing as their main occupation. They settled over both the districts of Assam with high concentration in Darrang, Lakhimpur and Khasi Hill districts.

It is an exception for the Assam experienced large volume of net migration in 1911-31 and 1921-31 as revealed by census reports. Mr. Mc Swiney, the State Superintendent of Census, 1911 highlighted the large scale influx into Assam in the census report. According to him there were 636,000 immigrants in 1911 out of which 12.5 per cent of Assam's total population. According to Mr. Lloyd, the then Superintendent of Census of Assam, the total number of foreign-born population in Assam stood at 1,200,157 in 1921 constituting 16.1 per cent of the total population. According to 1931 census, there were 14,08,703 persons (1.52 percent) who were born outside the province. But facts and records reveal that during the Second World War also immigration of Muslim farmers continued from East Bengal under the 'Grow more Food Programme' initiated by Sir Saadulla. Late Gopinath Bordoloi also 'Simlup the Congress Ministry' in early part of 1939 in order to evict the unauthorised settlers from the reserved land. But owing to the resignation of Congress in 1939 the process was halted and the entire immigration scenario in Assam took a new turn.

Post Independence Immigration

The country was partitioned into India and Pakistan at the time of

Independence. In accordance with the Sylhet referendum the Muslim majority Sylhet district was separated from the province of Assam to be included in East Pakistan while four Hindu majority police stations - Patherkandi, Ratabari, Karimganj and some portion of Karimganj remained in India. Thus, Assam was delimited by a newly drawn boundary at the time of Independence and hence a new process of mass migration started. Immigration into Assam during Post-Independence period assumed an alarming magnitude under the changed political scenario in the subcontinent. As an aftermath of the country's struggle for freedom there were communal disturbances in East Pakistan and Assam resulting in unofficial transfer of population. Millions of Hindus fleeing their lives and properties poured in the newly formed East Pakistan started migrating to India. Assam and Tripura being adjacent to East Pakistan on the eastern flank had to receive a heavy burden of refugees and naturally to a lesser extent Tripura. On the other hand, a considerable number of Muslims had left Assam due to the same reason mainly from Goalpara district. But even after the Nehru Liaquat Pact signed on 8th April, 1950, majority of those Muslim immigrants who left during the disturbances came back to Assam. The process of immigration which started as 'forced migration' at the time of partition continued uninterrupted for long.

The 'High tide' of immigration during the Post-Independence period was from 1950 to early seventies with the continuous influx of Hindu refugees followed by Muslim peasant migrants from East Pakistan (now Bangladesh). The Last Census gives the total number of refugees in Assam as 2,74,455 of which 2,72,075 came from East Pakistan. The Cachar district alone, due to its proximity to Sylhet district, received 98,177 persons, followed by Goalpara with 44,067, Nagaon 12,871, Darrang 16,885, Lakhimpur 12,955, Sibsagar 7,514, Khasi Hills 5,995 and Garo Hills 5,073. Since then, the number of refugees increased tremendously. During the period of 1951-61, the number of Hindu refugees who entered Assam stood at 4,87,000 which rose to 6,28,249 according to the Census of 1961. Consequent upon the post-natal problem of communal disturbance in East Pakistan, a fresh exodus of Hindu refugees started in 1964. The total number of Hindu refugees who came to Assam since partition of the country rose to 10,08,455 in 1964 (Table 6.4 and 6.5).

The stream of Hindu refugee migration from East Pakistan since partition did not stop altogether. When the pre-partition immigration of the Muslim peasants was induced by 'pull factor', 'push factor' was mainly responsible for the mass migration of the Hindus. The general inter-mi-

rocky communities from East Pakistan during Post-Independence period. Since they become a 'partition liability' for the country, they were relocated in different parts of erstwhile Assam and Tripura. The Hindu refugees who settled down in different parts of the state formed a different occupational category. Most of the refugees belonging to the middle-class Bengali community were educated and quite a large number of them were educated. They preferred to settle down in low-rated sub-urban areas. When the educated section was absorbed in different categories of jobs in government offices, banks, railways, tea industries, private companies, the other section took up small-scale and business in the towns of Assam. Today, they have become a 'small trading community' in the state. Another section of the Hindu refugees belonging to the Namasudra community of scheduled caste took up cultivation as their occupation and settled down in the countryside. Over the years there has been a substantial increase in number of Hindu refugees in Assam and other North Eastern States.

Table 6.4
Refugee population in Assam, 1951

District	Refugee population
Cachar	98,173
Goalpara	44,967
Kamrup	42,871
Nowgong	42,056
Darrang	18,815
Lakhimpur	11,965
Sibsagar	7,514
Khasi Hills	5,995
Garo Hills	5,072
Total	2,34,445

Source : Census of India, 1951, Vol. XII, 1A

The flow of immigrants from erstwhile East Pakistan assumed alarming proportions during 1950s. According to Mr. R.V. Vaghaiwalla, the then Superintendent of Census, as many as 13,44,028 immigrants were enumerated in Assam in 1951. In 1961, the number of immigrants enumerated in Assam was 13,53,581. According to Pakyrama, the Superintendent of 1961 Census Operation, 7,34,860 persons enumerated in Assam

sam returned their birth place as Pakistan. He had also expressed doubts about the correctness of the birth place as declared by the migrants. The abnormally high growth rate of Muslim population in Assam during 1951-61 (39% as against 21% in East Pakistan) substantiates the fact that Muslim immigration into Assam continued unabated even after the creation of East Pakistan. As the pre-partition migrants settled down in the districts bordering East Pakistan, the new migrants who came as infiltrators could easily get into these districts crossing the unchecked border and settled down among the old settlers unnoticed. According to Union Home Ministry report (The Assam Tribune, 13 June, 1991) a total number of 11.28 lakh migrants from erstwhile East Pakistan entered into India between 1954-71. With Assam having 300 km open border, one can easily conclude that a major chunk of these infiltrators smacked into Assam. The magnitude of immigration during 1961-71 was of the order of 15,03,545 persons. Again, according to 1971 Census, 9,09,429 persons enumerated in Assam returned their place of birth as Pakistan (Table 6.5). Apparently many of these migrants belonged to minority communities including Hindus, Chakmas, Hajongs, Garos, etc.

Table 6.5
Refugee population in Assam, 1961

District	Refugee population
Kamrup	98,399
Lakhimpur	97,941
Cachar	82,724
Goalpara	82,035
Darrang	82,372
Nowgong	68,287
Sibsagar	57,195
Mikir Hills	18,554
Khasi Hills	15,524
Mizo Hills	14,807
Garo Hills	10,157
Total	6,28,242

Source : Census of India, 1961, Vol. III, Pt. IIC, p. 218.

Besides the Bengali Muslims and Hindu refugees, there was another significant wave of refugee migration from East Pakistan belonging to

minority tribal communities. An appreciable number of tribal refugees, mainly the chakmas and Hajongs, have abandoned their hearth and homes for fear of persecution on the ground of religion and fled from the Chittagong Hill Tracts of south East Pakistan during 1964-71. Although it is not possible to obtain exact number of refugees fled from East Pakistan, thousands of Chakmas and Hajong refugees have been rehabilitated in Assam (Here Assam includes Mizoram, Meghalaya and Arunachal Pradesh) and Tripura. Initially, it may be mentioned that about 10,000 Chakmas and Hajongs refugees came to India in 1964 and they were rehabilitated in erstwhile NEFA, now Arunachal Pradesh. Their number has now increased to about 65,000 and the people of the state have been agitating for their eviction. On the other hand, the Supreme Court of India has directed the State Government to provide adequate protection to the refugees. Thus the Chakma refugee issue has become a political cold war between the Centre and the state Government. As a matter of fact, the tribal refugee-flow from Bangladesh to North Eastern States is continuing till 1990s and their ecological cauldron in Assam and North Eastern States together will be new fabric.

Table 6.6
Population of Assam by place of birth in 1971

	Place of birth	Persons	Pct. of total population
1.	Born in the place of enumeration	49,84,676	66.80
2.	Born elsewhere in the district of enumeration	25,97,471	19.39
3.	Born in other district of Assam	5,11,934	3.66
4.	Born in other states of India	5,35,030	3.58
5.	Born in Pakistan	9,03,409	6.01
6.	Born in other countries beyond India and undemarcated	57,596	0.38
	Total population	1,49,36,549	100.00

Source : Census of India, 1971, Assam, Migration Table, Pt. II D.

Table 6.7
Population composition of Assam according to major linguistic groups

Language	1951	1961	1971	Growth rate (%) 1951-61	1961-71
Assamese	1,946,172	6,737,638	8,904,917	36.52	31.77
Bengali	1,685,172	2,208,209	2,882,029	19.18	43.47
Hindi	225,111	513,979	796,481	58.03	54.18
Nepali	96,028	180,843	349,116	88.35	93.00

Source : Bhuyan, J.C., 'Assamar Janagathoni, Pratiphalan, Asom Andolan aru Samparkyikaran', Dispur, Vol. X, 1991.

Although the overall trend of immigration from Nepal was consistent throughout during 1940s, the process did not cease altogether. Census reports gave the number of Nepali-speaking people living in Assam (excluding Meghalaya, Mizoram and Nagaland) as 1.25 lakh in 1951 and 2.15 lakh in 1961. According to J.C. Bhuyan, the Joint Director of Census of Assam, 1991, the Nepali speaking population in Assam stood at 96,028 persons in 1951 which rose to 180,843 persons in 1961 and 349,116 persons in 1971 (Table 6.7). Thus the Nepali population of Assam registered an abnormally high growth rate, 88.35 per cent during 1951-61 and 93.00 per cent during 1961-71. Such an exponential rise in population cannot be a function of natural growth. Therefore, one can very easily conclude that immigration from Nepal into Assam also assumed an alarming rate during Post Independence period. There was little or no official resistance to such high magnitude of migration from Nepal. There is also no doubt that their number has registered a sharp rise during 1961-91 period also. As the Nepali migrants are expert in grazing and farming activities, they have settled down throughout the state mainly with the hill settlers. Many of the Nepalis have adopted Assamese and noted it as their spoken language in the census enumeration.

The pattern of illegal immigration from Bangladesh to Assam has changed during 1970s, especially after the Bangladesh liberation war in 1971. During the Bangladesh war of 1971 there were heavy exodus of both Hindu and Muslim migrants from Bangladesh to India, particularly to Assam, Tripura and West Bengal as refugees. The creation of Bangladesh in 1971 forced over 10 million people to take refuge in India (Mukherji, 1979). Though after liberation of Bangladesh many of these

Table 6.8
Growth of Hindu and Muslim population in Assam

Religion	1951 Population	1971 Population	Growth rate (1951-71)	1991 Population	Growth rate (1971-91)
Hindu	58,86,061 (66.63)	10,964,693 (72.52)	86.15	15,047,291 (67.13)	12.89
Muslim	1,681,859 (24.98)	3,592,124 (24.76)	81.95	6,373,204 (28.43)	77.45

(Figures in the parentheses are percentages to total population)
Source: Censuses of India, 1951, 1971 and 1991.

Indo-Bangladesh boundary, overwhelming majority of the immigrants belonged to these two communities. The rate of growth of population among these major religious communities in Assam since 1951 shows that both Hindus and Muslims had registered equally high growth rates during 1951-71 signifying mass migration from erstwhile East Pakistan. For the first the 3rd 20 years (1941-1961) the growth rate of Muslim population has remained as high as 77.42 per cent while the growth rate of Hindu population has dropped to 41.89 per cent. Such a high percentage increase of Muslim population cannot be attributed to the natural increase of indigenous Muslim population alone. In the absence of recent detailed migration data it is difficult to make an estimate of the volume of illegal migrants, but the consistently very high growth rate of the Muslim component inspires a clear indication that unabated infiltration from Bangladesh is still going on.

In addition to the streams of immigration mentioned in the foregoing discussion, there has been different streams of migrants coming into Assam from other parts of the country at different times. The fertile stream of Indo-Aryan migration from Bengal Bihar, Uttar Pradesh and Rajasthan which started after the annexation of Assam by British became large during Post Independence period. The developmental activities which started in the state immediately after Independence generated a stream of migrants comprising various categories of people from other parts of India mainly due to jobs and trade opportunities. Census of India 1971 enumerated a total population of 5,35,434 persons in Assam as born in other states of India. Though figures on language and religion are not reliable, yet one can get an estimate about the volume of immigration into Assam from other parts of the country when the distribution of population of Assam according to language spoken is taken into consideration. If we take the people speaking Hindi, Oriya, Nepali, Kannada, Malayalam, Tamil, Telugu, etc. and the 'unclassified group' of people together, they total 626,000 in 1951, 1,10,092 in 1961 and 2,11,047 in 1971 accounting for 3.05 per cent, 1.05 per cent and 1.20 per cent of the total population respectively. These migrants have settled in various parts of the state with their large concentration in the towns. For example, the Marwaris who came to Assam in the early part of the present century have settled in large number throughout the state. Today, the community controls almost the whole of the main business and industry, besides a large part of Assam and other North Eastern States. The trend of immigration from other parts of the country though slow in rate, has been continuing in view of the growing industrial, development, increasing government and commercial activities, modern skyline

of urbanisation in the state attracted various categories of people to come and settle down permanently. A large segment of the north Indian migrants work mainly as labourers, rickshaw and thela pullers, porters, coolers, watchmen, as all traders and transporters. Other migrants from south, Eastern states and north India came as job seekers and businessmen. Their number has increased considerably in recent years. Thus, in the category of people who come under the category of migrants from other parts of country, some take a sizeable proportion and add a new dimension to the population make up of the state.

The above are the main waves and streams of immigration into Assam from various origin since the beginning of the present century. As we have already stated, different streams of immigrants both from within and outside the country are still coming causing a great strain and stress to the state. The century-long immigration has added a new but sensitive dimension to the population base of the state. The pervasive impact of unabated immigration on demographic, economic, socio-cultural, political and the state politics is at present, quite conspicuous.

Consequences. Among the demographic consequences the trend of population growth in the state during the post Independence period can be taken to be most significant and a sensitive issue. During the last 90 years (1901-1991) Assam's population has increased from 3.2 million to 22.4 million, an increase by almost 7 times compared to 3.5 times increase in the country as a whole during the same period. The total population which was 3.2 million in 1901 had already reached 6.85 million in 1951 and then increased rapidly to 22.4 million in 1991. Thus, the year 1951 could be considered as the 'point of demographic divide' in the rapidly changing demographic profile of Assam. Immigration has always been a major determining factor in the exceptionally high growth of population in the state. Since the early decades of the present century the state's population has consistently grown at a higher rate than that of the national average, but the demographic picture got an abrupt turn since 1951.

Although such a change is also not easily in the ratio of demographic scenario, the abnormal growth rate experienced by Assam cannot be a function of natural increase alone. It can safely be concluded that large scale immigration since the beginning of the present century has been responsible for high population growth in the state. It would be worth mentioning here that in 14 districts of Assam the growth rate is between 50-105 per cent during 1971-91. The most important districts are Dhemaji (104.48), Nalbari (96.39), Kokrajhar (75.56), Karbi Anglong (72.04),

Kamrup (64.69), Bongaigaon (64.41), Sonitpur (56.94), Lakhimpur (55.91), Dhubri (55.77), Darrang (54.12), Goalpara (52.66), Nowgong (51.17) and Morigaon (51.01). The high population growth in the state either due to natural increase or immigration has also its impact on other demographic variables such as age and sex, dependency ratios, internal mobility, etc. The age structure has been changing with ever increasing percentage of young population below 15 years of age. It increased from 43 per cent in 1951 to 46.5 per cent in 1951 resulting in high dependency ratio (93.5 per cent). Sex ratio in Assam has shown a continuous decline from 915 in 1951 to 897 in 1951 indicating preponderance of male selective migration to the state. Apart from this, internal mobility of the people from rural to urban areas has been increasing day by day as the limited land base in the rural areas cannot absorb more population. The immigrants finding no land for cultivation are getting into the town in search of livelihood. This has resulted in the growth of slums and other associated problems in the towns.

Table 6.9

Decadal growth of population in Assam and India (in percentage)

	1921-31	1931-4	1941-51	1951-61	1961-71	1971-81	1971-81
Assam	19.91	20.40	9.99	31.58	34.95	-	53.95
India	11.0	14.22	13.31	21.51	24.80	25.66	34.77

Source : 1991 Census, *Demographic Diversity of India*, New Delhi

Among the economic consequences, the most important one is related to the capacity of the prevailing economy of the state to absorb huge immigrant population. The simple [illegible] ratio indicates that the notion of land plenty in Assam as conceived by the immigrants is now a myth only and the ground realities are quite staggering. The arithmetic density of population in the state at present (1991 census) is 286 persons/sq. km as against the country's 266. The physiological density (700 psq. km) and agricultural density (173 psq. km) of the state are much higher than those (physiological density 370, agricultural density 165) for the country on the average. The population density of Assam which was only 42 persons/sq. km in 1931 increased to 102 in 1951 and then to 286 in 1991. It was estimated by Mr. M. Ilan that the plains of Assam could support 500 persons and the H.P. only 60 persons per square mile. The optimum population of the state as a whole would be about 12 million. But in 1961 the total population was 11.87 million and the annual growth

rate has been placed at 0.5 per cent (Das, 1970). According to this estimate it is now difficult to say that population of Assam is below the optimum, and the state is now carrying an additional load of 10 million population. The intensity of population pressure on the agricultural economy of the state can be better understood from the fact that average land holding size in the state has declined from 1.46 hectares in 1970-71 to 1.36 hectares in 1982-83. Assam's per capita land is 0.35 hectare (1991) as against the country's average of 0.39 hectare. Since the reversal of the emerging demographic pattern is not possible now, intensity of population pressure will increase year by year. Whatever economic development is achieved so far, particularly in the agricultural sector, has been neutralized by the abnormal population growth in the state.

The social impact of immigrants on the host population is, of course, determined partly by how different the immigrants are from the population of the receiving area. As the immigrants in Assam are heterogeneous and diverse in caste, religion, language and culture, there may be profound socio-cultural implications. The different migrant groups have brought significant change in the socio-cultural profile of the state, especially in respect of ethnic diversity. However, the impact of the immigrants from Bangladesh are different from those from other parts of the country. Language and religion are two important manifestations of culture, the difference of which could be the source of social tensions. When exodus takes place in large waves and the situation does not permit spontaneous assimilation with the host population, conflict may begin. The influx of unabated immigrants into Assam has created almost such a situation in the present day Assam. Although the earlier migrants have already assimilated with the local culture, new migrants pose slightly different situation. Assam had already faced a serious language problem in 1960s and the under-current of language conflict still prevails in the immigrant dominated areas. Because of the heavy concentrations of immigrants, ethnic religious composition in some districts of Assam like Dhubri, Darpeta, Goalpara, Nagaon, Hailakandi, etc. has also undergone drastic change.

The most pervasive impact of large scale immigration into Assam is the dominant roles played by the immigrant groups in the state's political affairs in recent times. It is obvious because when influx of migrants adds substantially to the size of a particular group, the concerned group may tend to aspire for political power. It is worth mentioning here that despite the risk implications, there were no genuine

efforts on the part of the successive State and Central Governments to check the flow of illegal immigration into the state. On the other hand, immigrants received political patronage from a section of the politicians and parties just to consolidate their political power taking advantage of the immigrants vote banks. All political parties were fully aware of the far reaching consequences, even then the Government in power practically kept open the floodgate of the illegal immigrants for decades. Thus, Assam became land of El dorado for the immigrants, particularly from Bangladesh. It is also true that the indigenous people of the state have seldom welcomed the immigrants with completely open hearts. The Pre-Independence immigrants were seen useful and nation-strengthener as they were accepted as the population pressure on the state's land resources was minimum at that time. But the Post-Independence migrants were considered by many as a relatively huge burden and threat to the local culture and polity. All political parties were aware of the explosive situation, but they showed less concern for the solution of the vexed problem. Ultimately the All Assam Students Union (AASU) took up the issue and spearheaded the six years long mass movement in 1979 to pressurise the Central Government on the background of pro-foreigners mass movement; the controversial IMDT (Illegal Migration Determination Tribunal) Act, 1983 was adopted by the Parliament. The objective of the Act was to detect and deport foreign infiltrators who entered India after 25th March, 1971 as per the provisions of the Foreigners Act. But the objective of the Act remained unfulfilled due to lack of political will of the Government. Unfortunately, certain political parties and minority organisations have mixed up the foreigners issue with Indian citizens living in Assam. It must be remembered that all minorities are not foreigners. Under such paradoxical situation identification of foreign nationals in Assam has become a difficult and complex task.

The historic Assam Accord was signed in 1985 after prolonged negotiations between the Central Government and AASU leaders to find out a solution of the vexed foreigners issue. Incidentally the anti foreigners movement gave rise to regional politics in Assam. The Asom Gana Parishad came to power in 1985 but the foreigners issue remained unfulfilled and unsolved because of alleged apathetic attitude of the Central Government. Despite the provisions of the Assam Accord that foreigners who entered Assam on or after March 25, 1971 shall not have to be detected and expelled in accordance with law,

very little progress has been made in this direction during the last ten years. Although some portions of the border fence and roads have been constructed for some time, yet immigration seems to be continuing. The Congress Party headed by Late Hiteswar Saikia when regained power in the state in 1991, gave a new twist to the already complex foreigners issue. The Government, despite being aware of the explosive situation, raised a series of contradictory and misleading statements as regard the actual volume of foreign nationals in Assam. The Chief Minister Late Hiteswar Saikia himself once declared that there were 20 lakhs foreigners in Assam and later on denied his statement when some political leaders of minority community threatened to pull down his government. The suicidal policy of the Government and also of the Election Commission of India to include the names of large number of people with doubtful nationality in the voter lists of Assam has now brought a radical change in the electoral scenario of the state. Although not all migrant groups seem to aspire for political clout, some groups are exerting political influence in those areas where they are in majority.

Assam abounds in many small and large ethnic groups and communities. These small communities are now panicked for the fear of losing their political right and cultural identity. It is also a fact that unabated immigration is the root of unprecedented social tensions in many areas of Assam and other North Eastern States. There can be no two opinions that the demographic invasion brought about by the 'high level' immigration has now completely altered the balance against the indigenous population in respect of demography, language, culture, economy and polity. The Inter-State Associated Nationality, of late, realised the dimensions arising out of such a situation. Because of fear psychosis arising out of the fear of being swamped over in their own land consequent upon the outsider's increasing dominance, a section of the sons of the soil have already brought to the question of self-governance.

The explosive issue of immigration into Assam and for that matter North East India as a whole, has been accepted as a national problem. The Government of India must have a determined political will to find out a permanent solution of the problem without further delay. All sections of people irrespective of caste, creed, religion and political affiliation should face it critically in the interest of peace, harmony and speedy economic development of the state.

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7

Population

Introduction

Population forms an important component in the whole process of socio-economic development of a region. It is essential because of its dual role as a producer and consumer. Hence, a proper appraisal of its size, growth, composition and quality is considered prerequisite for an effective planning for balanced and sustainable socio-economic development of a region. Such an exercise is highly essential for a socio economically backward state like Assam which currently witnesses a number of diverse population problems.

With an area of the country's 2.39 per cent, Assam shelters 2.65 per cent of the country's total population. According to 1991 census it records a population of 22,414,322 and occupies the thirteenth position among the Indian states. In terms of population size, Assam is larger than even a developed country like Australia or Netherlands and a developing country like Nepal. The arithmetic density of population of the state is also as high as 286 as against 267 persons per sq. km in the country as a whole. But it is disconcerting enough to note that Assam accounts for only 1.04 per cent and 1.87 per cent of the country's Net domestic product and state domestic product (at current prices) respectively. On the other side, Assam is characterised by a diverse population composition in respect of ethnicities, religion and language having varied socio-cultural practices. This is why Assam is often referred to as "India in miniature". Thus, the prevailing high pressure of population and persistently high population growth in the midst of population diversity and acute economic backwardness in the state would certainly have a serious pervasive impact on its demographic and socio-economic structure (Das, 1990).

Peopling and Ethnic Composition

Assam has a long history of peopling. It has witnessed several waves and streams of migration of people belonging to various racial and ethnic groups from different directions since pre-historic time. It

very little can be deciphered to trace the succession of peopling process in the state. Again the process of interstitiating of different racial and cultural elements over time has made their identity further complicated.

Broadly speaking, Assam has population of four racial traits – (1) Proto-Australoid, (2) Mongoloid, (3) Aryo-Mongoloid and (4) Aryo-Mongolo-Dravidian. But ethnologically, broadly three major groups have been identified in Assam – (1) Austro-Asiatic, (2) Tibeto-Chinese and (3) Indo-European (Taher, 1993). These groups of people had settled in certain parts of the state in segments in different points of time.

Austro-Asiatic- The peopling process in the state is said to have started with the immigration of the Australoids of Austro-Asiatic speaking people from South-East Asia during a few millennia before Christ. They are now represented by the Mon-Khater speaking Khasi, the Although most of them have settled in Khasi and Jaintia Hill districts of Meghalaya, a small proportion is also found to live in some parts of N.C. Hills and Karbi Anglong districts of Assam. After a long gap, another wave of migration of this Austro-Asiatic stock took place into the state immediately after the British annexation in 1826. Racially, the Austroloids are tribal people speaking Mundari dialects, a branch of the Austro-Asia in linguistic family. They were brought to Assam by the British from central India to work in the tea plantations as labourer. They are known as Mundu, Ho, Savara, Orson, Gondi tribes, etc.

Tibeto-Chinese - The Tibeto-Chinese comprised Tibeto-Burman and Siamese Chinese groups who entered into Assam at different times beginning from the pre-historic period. The Tibeto-Burman people who are racially Mongoloid settled in different parts of the state having migrated from Myanmar, Indo-Sib Burma. The Mishings of upper Assam and the Bodos of lower Assam form the early settlers of this group. The late-settlers (after 1826) of this group of people consisted of the Kachin and Kuki Chin of Karbi-Anglong and N.C. Hills districts of Assam. On the other hand, the Siamese-Chinese group of people who came to this part of the country from Shan state of Myanmar during the medieval period, forms a large segment of Tibeto-Chinese group. The Ahoms settled in upper Assam represent this segment of people. The Khamtis, Khamyangs, Aitons, Phakes, and Turungs inhabiting the upper Assam at small groups represent the later-day Tais. Professing Hindu religion they have contributed a lot towards building the present Assamese society and culture.

Indo-European- This is another large group of people consisting of both

Hindus and Muslims speaking Indo-European languages. Their migration into this part of the country began as early as first millennium B.C. They were originally from Caucasoid racial descent, and subsequently mixed with the later migrants of the same stock and of other racial stocks. The early settlers of this group are the Hindus who migrated from the northern plains of India and settled in the plains of Assam. The Muslims of the same stock started entering Assam from the early thirteenth century. Both these important segments of population who settled in the plains of Assam speak Assamese and Bengali languages. Further, after the British annexation, a large group of traditions, technicians and other professionals came to this part of the country from different states of India. They belong to all the major religious groups of the country. The Nepalis also entered into the state during the same period. The Bengali Muslim peasants inhabiting the plains of Assam represent one of important segment of immigrants who came to Assam from erstwhile East-Bengal (now Bangladesh) before independence in 1947. Almost during that time a substantially large number of Nepalis entered into Assam. Besides, at the time of India's partition and after that a large number of Hindu refugees and poverty stricken Muslim peasants infiltrated into the state from the erstwhile East Pakistan. Unfortunately, this immigration trend has not yet been completely stopped.

Population Growth

Demographically speaking, Assam is characterized by a very high rate of population growth which is even higher than the country's average growth throughout the present century. At the beginning of the present century, Assam's population was 3.29 million. It increased to 8.03 million in 1951 and 22.41 million in 1991 (Table 7.1) witnessing an average annual exponential growth rate of 1.80 per cent during 1901-1951 and 2.50 per cent during 1951-1991 as against country's corresponding growth rates of 0.83 per cent and 2.15 per cent. As a consequence, the state's population to the country's total increase from 1.34 per cent in 1901 to 2.65 per cent in 1991 through 2.22 per cent in 1951.

When we look at the data on the birth and death rates of the state, it appears that the trend of population growth in the state, as also in the other north-eastern states, is somewhat unnatural as compared to other states of the country. Because the birth and death rates in Assam do not deviate much from that of the national averages, it means that had there been no migration into the state, the growth rates of population in Assam would have been almost similar with that of the average growth rates in

the country. The history of peopling in the state is characterised by a slowly multiplicative phenomenon. There can be said that growth of population in Assam has been slower due to both natural increase and migration. It may however, be mentioned here that the pressure of migration into the state was quite intense during the early decades of the twentieth century. Growth rates of population in the state had also remained low during the pre-independence period. Accordingly, the distinct demographic process with low fertility and mortality identified as demographic history of the state.

During the first phase (1901-1931) of the demographic history, the state's population increased by 144 per cent as against an increase of 112 per cent in the country (Table 7.1). Besides small volume of migration, the relatively low and uniform increase in growth of the state is mainly due to the existence of unfavourable high and steady mortality during the period. Although immigration into Assam had been since the Ahom reign in 1826, it became active from the beginning of the present century. The main streams of migrants settled down in the Brahmaputra valley districts and the plains of Cachar. The spread to the hill districts was the prerogative of the Khasi, Jaintia and Garo Hills. Assam's unique ethnic composition is the result of migration of Bengali labourers from erstwhile East Bengal, tea garden labourers from Central India and the plains from Nepal

with improvement of health and medical facilities among others are responsible for the significant decline in death rates. On the other side, the increase in crude birth rate could not make any significant headway. A host of inter-related socio-economic factors such as universality of marriage, marriage at lower age, religious belief, illiteracy, poverty, etc. in fact mentality, etc. might be responsible for keeping the birth rate high here as elsewhere in the country. Subsequently, however, the gradual expansion of family planning programme accompanied by progress in education contributed to some extent towards bringing down the birth rate in many parts of the country (Visaria, 1990). This is borne out from the steady fall of crude birth rates in Assam from 38.5 in 2001 and crude death rates from 17.8 to 9.0 during 1971-1991. It means there had been a marginal decline in the natural growth rate of population from 22.7 to 13.8 during the period. One of the important reasons of decrease in the death rate as well as birth rate in the state is the decline in infant mortality rate (IMR). As for instance, it witnessed a fall of IMR from 140 in 1971 to 77 in 1991, as against all India figure of 129 and 80 per thousand in the two years. Additionally, rise in life expectancy has also been an important factor of high natural growth of population in the state. However, there exists a significant spatial variation of birth and death rates within the state due to a number of socio-economic factors.

From the above discussion it is clear that migration played a dominant role towards alarmingly high growth of population during 1951-1991 in the state. The decades after independence, in fact, witnessed a new stage of demographic development in the state. The period 1951-1971 experienced an unprecedented volume of immigration when population growth rate in the state shot up to 34.47 per cent and 34.95 per cent respectively during 1951-1961 and 1961-1971 (Table 7.1). The more important streams of migrants during this period consisted of Bengali Hindus and Muslim peasants in large volume from erstwhile East Pakistan. It may be mentioned here that the immigration of Muslims was more spectacular during 1951-1961. The Bengali arrivals from East Pakistan were directed especially to Assam because of the vacant communal characteristics there. Even after 1971, immigration from present Bangladesh and Nepal has been continuing unabated till today. On the other hand, immigration of people from other parts of India has also not been so insignificant. After independence, people mainly from Bihar, Uttar Pradesh, Rajasthan, Orissa and Punjab migrated in large number into the state more particularly to the urban areas for seeking economic opportunities in trade and commerce, industries, construction works and many other occupations.

The immigration and in migration of population having varied socio economic levels have to a great extent influenced the demographic scenario in the state. For instance, high total fertility rate and child-women ratio as prevalent among the Muslims more particularly among the immigrant ones, have been responsible for high rate of population growth among them in the state, as observed in the country in contrast, it is, however, important to note that as compared to the volume of immigration and immigration, the size of emigration from this state is very insignificant because of relative absence of mobility of the indigenous people. If the population in the state continues to grow at the present rate it is likely to cross 23.5 million mark by 2001.

It is significant to note that growth of population varies spatially within the state depending upon the nature and extent of migration, and a number of socio-cultural factors influencing natural growth. Before independence, growth rates of population have been considerably high in the districts of middle and lower Brahmaputra valley due to continuous streams of immigration mainly from East Bengal and Nepal.

The spatial pattern remained more or less same even after the independence. However, the two most dominated hill districts, viz. Karbi Anglong and N.C. Hills, had started experiencing high growth rates. During 1951-61 Karbi Anglong recorded the highest growth rate of population in the state (79.21 per cent), closely followed by Dhemaji (68.16 per cent) and Bongaigaon (60.51 per cent) as against the state average of 34.97 per cent. But during 1961-71 Dhemaji district had experienced the highest growth rate (105.42 per cent), followed by Karbi Anglong (53.28 per cent) as against the state average of 34.95 per cent (Table 7.2). This is indicative of the fact that the growth of population during 1961-71 in Assam had been unprecedented and it was more so in Karbi Anglong and Dhemaji districts.

Satisfactorily, the population growth rate in the state has been checked significantly during the last two decades (1971-1991) with the exceptions of Dhemaji and N.C. Hills districts (Table 7.2). Similarly, during that period, the population growth in Dhemaji and N.C. Hills districts have been as high as 107.50 per cent and 58.30 per cent respectively as against the state average of 53.36 per cent. From the Table 7.2, it is further evident that throughout the present century population growth rates have been significantly high in the plain districts of Kokrajhar, Bongaigaon, Darrang, Nalbari and Dhemaji and hill districts of Karbi Anglong and N.C. Hills. On the other hand, Sibsagar, Jorhat and Golaghat which have witnessed

low growth rates of population throughout the century, are the only districts having been least influenced by immigration (Table 7.2). Availability of vacant land in the hilly areas as against a heavy pressure of population on the plains, attracted the migrants to Karbi Anglong and N.C. Hills districts in the recent past, resulting in high growth rates in these districts. Dhemaji district's rapid population growth, particularly after 1951, has been mainly associated with high natural growth rate among the tribal people combined with influx of immigrants from Bangladesh. The growth rate in the district also appears to be significantly high due to its small population base. Thus, it may be concluded that the growth rate is notably high in recent time in most of the sparsely populated districts of the state.

Population Distribution and Density

Distribution and density of population are not uniform throughout Assam. The variation in physical condition, economic advancement and degree of transport accessibility is largely responsible for population distribution in the state. The built-up plain areas are considerably densely populated and the hill areas sparsely populated. Availability of productive land and better transport and communication facilities combined with ongoing process of urbanisation and industrialisation have been greatly associated with high concentration of population in the Brahmaputra and Barak valleys of the state. With an area of 72 per cent and 9 per cent of the state they respectively constitute 8[illegible] per cent and 1[illegible] per cent of the state's population. The narrow Mahanadi rural belts of the Brahmaputra valley are thinly populated. Again, due to better transport and communication facilities and high degree of immigration, the districts of the lower and the central Brahmaputra valley are somewhat densely populated as compared to that of the upper Brahmaputra valley (Table 7.4 and Fig. 7.1). According to 1991 census data, the more populated districts in the state include Kamrup (20 lakh), Nagaon (18.9 lakh), Sonitpur (14.2 lakh), Barpeta (13.8 lakh), Dhubri (13.3 lakh), Darrang (13 lakh) and Cachar (12.1 lakh). On the other hand, the least populated district is N.C. Hills (1.5 lakh).

The density of population (person per sq km) is very uneven in the state. It has also been increasing overtime as a result of the increase of population throughout the state. During the 1971 census, the population density in the state was 180 as against the country's average of 177. But it increased to as high as 286 in the state as against 257 in the country in 1991. It is further seen that the density of population in Assam is not only higher than the country's average, it is higher than many other states in the

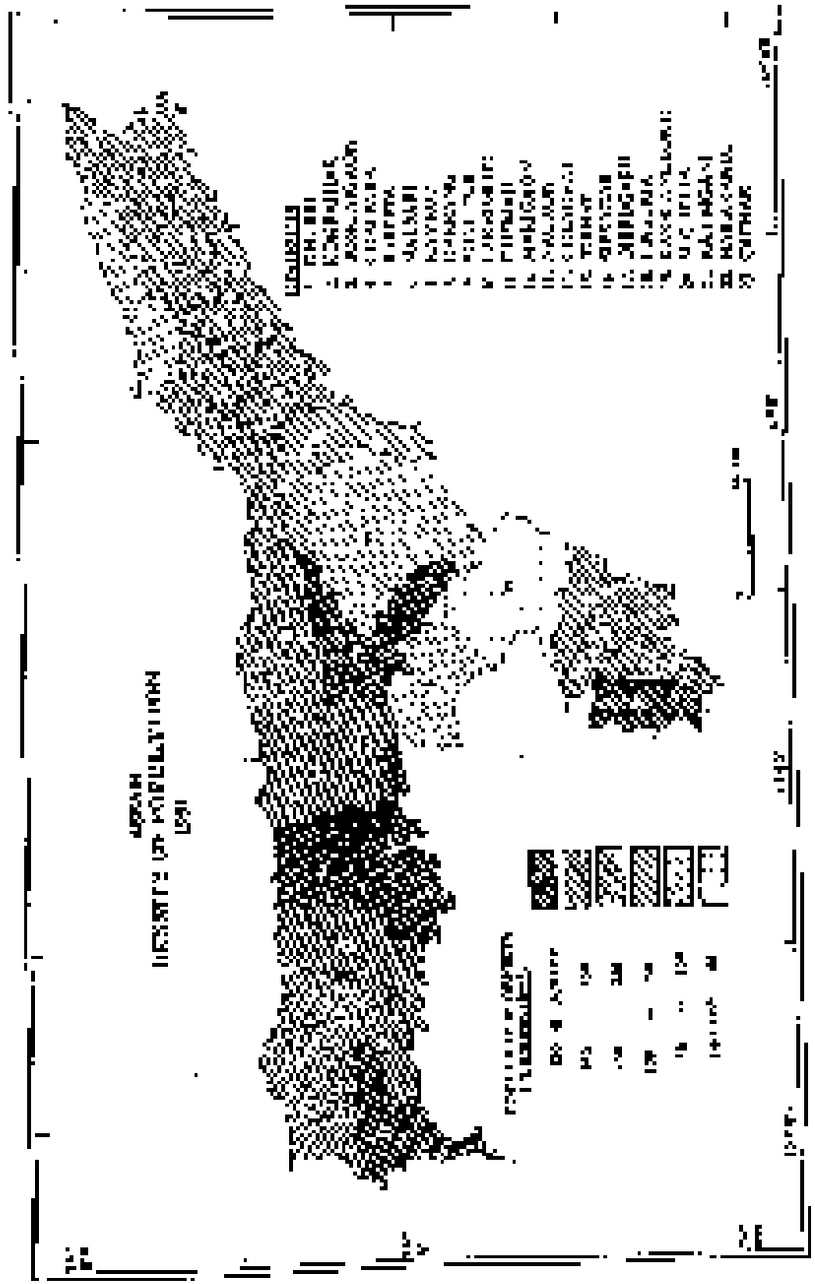

Fig. 7.1

Table 1.1

District-wise decadal variation in population growth (in per cent) in Assam during 1901-1991

District/State	1901-11	1911-21	1921-31	1931-41	1941-51	1951-61	1961-71	1971-91
1. Dhubri	−37.26	−11.42	15.05	+10.57	+15.21	−27.67	40.51	+55.57
2. Kokrajhar	+16.70	+90.75	+39.65	+26.59	+9.50	−41.34	−54.10	+76.78
3. Bongaigaon	+29.94	+36.94	+35.94	+20.85	−4.00	+60.5	−40.29	+64.54
4. Goalpara	−27.41	+37.67	20.50	−7.77	+11.33	+37.22	45.88	+54.12
5. Barpeta	20.02	34.04	+69.02	41.05	−18.77	+22.62	+35.81	+45.02
6. Nalbari	+11.30	−14.20	+27.92	+39.58	+9.48	+49.62	+42.02	49.27
7. Kamrup	+11.16	7.06	9.32	+14.60	21.87	−37.73	+38.80	−65.72
8. Darrang	−0.25	+11.78	−26.00	+35.30	+24.11	41.77	−48.24	55.63
9. Sonitpur	+24.33	−40.69	20.50	−19.73	+24.26	+35.82	27.62	+57.14
10. Lakhimpur	+17.36	+22.62	+25.99	35.96	−21.62	+50.46	+43.39	+56.29
11. Dhemaji	−45.30	+63.30	+16.90	+5.47	+3.35	+68.56	+103.42	+107.50
12. Marigaon	+15.50	+11.99	−41.56	+30.87	+24.33	37.89	+27.57	50.90
13. Nagaon	+15.84	−31.96	+41.35	−10.34	+41.41	+35.91	+38.99	+51.26
14. Golaghat	16.25	+20.14	+15.29	11.46	−19.52	+36.04	+30.85	+56.19
15. Jorhat	+16.63	−37.54	3.85	+15.12	15.01	25.17	+17.47	+13.10
16. Sibsagar	+3.41	+20.46	+14.44	+15.65	+15.38	+23.36	9.47	−38.76
17. Dibrugarh	+27.10	+35.40	+27.31	−10.87	−26.23	+11.15	+22.63	−37.78
18. Tinsukia	22.16	−28.12	−27.00	14.72	1.08	−35.92	+31.02	+37.03
19. Kachi Anglong	N.A.	N.A.	N.A.	N.A.	+20.56	+79.2	−68.28	+74.72
20. N.C. Hills	33.12	5.97	+13.60	+13.75	+5.15	+35.95	−40.01	+95.30
21. Karimganj	+12.94	+3.19	−4.91	−9.52	+29.81	+27.96	−25.13	+42.05
22. Hailakandi	15.09	17.59	+7.08	+10.29	+19.18	+27.27	−23.61	+45.91
23. Cachar	12.37	−5.58	+7.60	+13.08	+23.92	+22.60	−23.96	+41.59
ASSAM	+16.99	+20.48	+19.91	20.40	−19.85	−34.98	+34.95	−53.26
INDIA	+5.75	0.31	11.00	+14.23	−13.351	+21.51	+24.80	−54.38

Source: Aspects of Population Profile of Assam, Census of India, Series 4, Assam, 1991.

country except only West Bengal (767), Kerala (749), Bihar (497), Uttar Pradesh (471), Tamil Nadu (429), Punjab (402), Haryana (372) and Goa (318). So far as variation in density of population in Assam is concerned, it is as high as 350 in the Barak valley and 340 in the Brahmaputra valley, and as low as 31 in the Hills region (Table 7.4). On the other hand, among the districts in the state, Nagaon district in the Central Brahmaputra valley records the highest population density (494), while N.C. Hills district the lowest (31).

Depending on the variation in population density, the districts of Assam can broadly be categorised into four density levels. Accordingly, the high density (400 and above) districts include Nagaon, Dhubri, Kamrup, Karimganj, Nalbari and Barpeta; medium density (250-400) districts Morigaon, Darrang, Goalpara, Sibsagar, Hailakandi, Lakhimpur, Bongaigaon, Cachar, Dibrugarh, Jorhat, Sonitpur, Kokrajhar and Tinsukia; low density (100-250) districts Kamrup and Tiruchirapalli, and very low density (below 100) districts Karbi Anglong and N.C. Hills (Fig. 7.2). Thus, the resultant pattern of population in the state reveals that the density is strikingly high in the districts where the impact of immigration is notably high and the Muslims constitute a significant proportion of total population.

Age-Sex Composition

The age-sex composition of a population indicates the demographic and socio-economic ownership of the region. Like India and other developing countries, the bulk of the Assam has still been quite high. This has resulted in a significantly high proportion of children in the state as elsewhere in many other parts of the country. It is discouraging enough to note that while proportion of children in the developing countries is above 35 per cent, it is even below 25 per cent in the developed countries. Strikingly, in 1971, the children below 15 years of age constituted as high as 47 per cent of the total population in Assam. But the adult population (15-60 years of age) constituted only 48 per cent and the old population (60 and above) 5 per cent of the total population in the state. However, as a consequence of the slow decline of birth rate in the contemporary period, the proportion of children below 15 years of age in the state has come down to 40 per cent in 1991. At the same time, the proportion of adult population at age group 15-60 has, on the other hand, increased to 54 per cent. As a result, the dependency ratio (the proportion of children and old age population to adult population) of the state's population has declined from 107 per cent in 1971 to 84 per cent in 1991. It may be mentioned

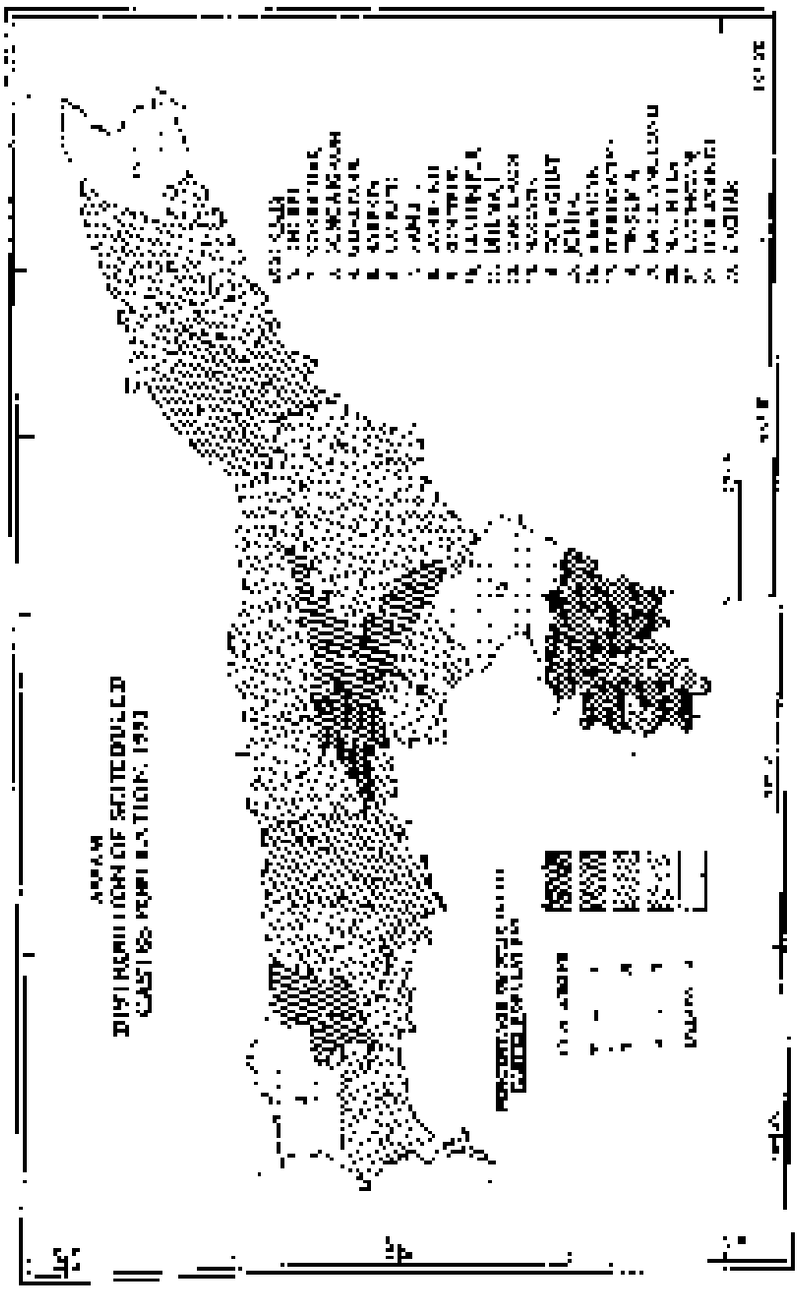

Fig. 7.2

Table 7.1

Spatial pattern of population growth (in per cent) in Assam during 1951-1971 and 1971-1991

Period	Population Growth (in per cent)									
	30-40	40-50	50-60	60-70	70-80	80-100	100-120	120-140	140-220	220 & above
1951-1971		Jorhat, Sibsagar	Karimganj, Hailakandi, Cachar	Golaghat, Dibrugarh	Nowgong, Sonitpur, Tinsukia	Barpeta, Kamrup, Manipuram, Nagaon, N.C. Hills (State Average: 97.15)	Goalpara, Nalbari, Darrang, Lakhimpur	Kokrajhar, Bongaigaon	Kamrup	Dhemaji
1971-1991	Jorhat, Sibsagar, Dibrugarh	Barpeta, Nalbari, Tinsukia, Karimganj, Hailakandi, Manipuram	Dhubri, Goalpara, Darrang, Sonitpur, Lakhimpur, Nowgong	Bongaigaon, Kamrup	Kokrajhar, Kamrup, Nagaon	N.C. Hills	Dhemaji			
		Cachar	Nagaon, Golaghat (State Average: 58.56)							

Source: Prepared by author using data from *Reports of Population of Assam, Census of India, Series 3, Assam, 90*.

...ence that both children and old people are generally considered to ...characteristics although the difference between male and female in this respect is relatively insignificant. In the rural areas ... is found that the dependency ratio is less as all the rural urban ... areas as against 88 per cent in the rural areas in the state. This is indicative of the prevalence of better economic conditions among the urban people in the state.

Sex composition of a population which is measured in terms of sex ratio (number of females per thousand males) is important to understand the prevailing demographic and social characteristics of a region. The sex ratio of population in Assam has been always more than the average of India. According to 1991 census, Assam recorded the sex ratio as 923 as against the average of 929. The sex ratio in Assam has ... increased gradually from 896 in 1951 to 923 in 1991. Studies have revealed that sex ratio in a state would depend on the magnitude of the migration of the male and female population. It may be noted here that male selective migration from other states hardly brings any positive impact upon the economic progress of the state. The Brahmaputra valley has the maximum number of females in the state. The Barak valley, however, ranks in between the Brahmaputra valley and the hill region in this respect. As a result, urban sex ratio is always lower than the rural sex ratio. According to census data, 1991 sex ratio in Assam is 838 as compared to the rural counterpart (934). The sex ratio in Guwahati, the capital city of Assam, is only 781. According to the social customs and practices, the sex ratio in the tribal areas is usually higher than the non-tribal areas. The tribal people in one social group or another are found to be more liberal and tolerant in the matter of sex. Among the districts the sex ratio is found to be the highest in Dhubri (1038) and the lowest in N.C. Hills (877). Of the other districts, the sex ratio in the plain districts is found to be higher than the hill districts. The sex ratio is also higher in the scheduled castes (967) as compared to the scheduled tribes (949) and other than scheduled castes and tribes (916).

Rural-Urban Composition

The process of urbanisation in Assam has been extremely slow. According to 1991 census, only 11.08 percent of the state's population lives in towns as against 9.88 percent in 1981. Most of the urban centres in Assam are small in size. The remaining 88.92 per cent of the population lives in the rural areas. Assam ranks 17th in the country in respect of urbanisation. The low degree associated with this

Table 7.4
Percentage distribution of population and population density in different geographic regions in Assam, 1991

Region	Area (in sq. km)	Population	Percentage share of area	Percentage share of population	Population density (persons per sq. km.)
1. Brahmaputra Valley	59,193	191,09,103	71.61	85.25	372
(i) Lower Brahmaputra Valley	20,148	40,10,913	25.69	33.74	306
(ii) Middle Brahmaputra Valley	14,240	32,36,000	18.28	23.15	366
(iii) Upper Brahmaputra Valley	21,705	58,42,387	27.67	26.06	269
2. Barak Valley	6,922	24,91,496	8.82	11.12	360
3. Hill Region	15,323	8,13,524	19.54	3.63	53
Assam	75,438	224,14,322	100.00	100.00	295

Sources: Statistical Hand Book, Assam, 1996, Directorate of Economics and Statistics, Govt. of Assam.

are the state's extremely marginal location combined with very slow pace of transport and industrial developments.

According to 1991 census, out of the total number of urban centres in Assam, 59 are small towns having population size of below 20,000. Out of the remaining 28 urban centres, 4 are cities (with population 1 lakh and above), 4 large towns (with population 50 thousand to 1 lakh) and 20 medium towns (with population 20 thousand to 50 thousand). With a population of 5.84 lakh Guwahati turns out to be the largest city in the state. With a high primacy it is gradually emerging as a city of metropolitan character in the entire North-East region. Guwahati city alone constitutes 21.5 per cent of the state's total urban population.

During the period 1971-1991, the urban population growth in Assam has been 93 per cent as compared to 53.26 per cent for the entire population. Although there has been a fast growth rate of population in the already existed urban centres during 1971-1991, the formation of 15 new towns during the period has been primarily responsible for considerably high urban population growth during 1971-91 in the state. Besides, expansion of urban area boundary of the existing towns has also been no less significant in this respect. But it is noticeable that the population growth among the small towns has been very low as compared to that among the large towns and cities. As a matter of fact, during the period 1971-91, the population growth in the large urban centres (with population above 20 thousand) was as high as 138 per cent as against 23.2 per cent in the small towns in the state. The lack of diverse developmental activities in most of the small towns in the state is responsible for such a low population growth. On the other hand, due to the expansion of trade and commerce and diverse employment opportunities in the large urban centres in the state, the migration of people from rural areas and small towns has increased greatly in recent time. This phenomenon is often called concentrated urbanisation. Because large urban centres are growing fast in both population and functions at the cost of small towns. Among the small and medium towns, Sonari, Dipoli and Hefiong experienced a very high growth of population (above 200 per cent) during the period 1971-91. But, on the other hand, Badarpur and Barpeta towns witnessed unexpectedly a negative growth of population (below zero per cent). All these have resulted in spatially varied topography of urbanisation in the state (Kar and Das, 1998).

The spatial pattern of urbanisation in the state varies from one district to another. According to 1991 census, the number of urban centres is found to be the highest in the districts of Dhubri, Barpeta and Kamrup

(7 in each district), and the lowest in Dhemaji district (only 1). In terms of level of urbanisation again, Kamrup district occupies the highest position (37.76 per cent) and Dhemaji district the lowest position (1.86 per cent). The other districts having the urbanisation level above the state average (11 per cent) include N.C. Hills (22.87 per cent), Dibrugarh (17.67 per cent), Tinsukia (16.49 per cent), Jorhat (15.27 per cent) and Dhubri (12.15 per cent). But the districts having urbanisation level significantly below the state average are Nalbari (2.31 per cent), Darrang (4.99 per cent) and Mangaldi (5.15 per cent).

The study of occupational structure and characteristics of urban population also reflects the behaviour of different urban centres in the state. Due to the lack of industrialisation, most of the urban centres that have emerged in the state are based on administrative and trade and commerce functions. The towns like Duliajan, Digboi, Namrup, etc. are, however, a few industrial towns in the state engaged in manufacturing, construction and repairing works.

Social Composition of the Population

As already mentioned, the state of Assam exhibits a great diversity in respect of population composition. The population of Assam is composed of such a diverse ethnic, cultural and linguistic stocks that the state is often regarded as a living anthropological museum. Its population composition, in fact, hardly differs from that of the country as whole. It may be mentioned here that the Constitution of India has scheduled the tribal people and certain low caste people among the Hindus and Sikhs as scheduled tribes and scheduled castes respectively for their socio-economic upliftment. Accordingly, besides religious and linguistic composition, the population of Assam as also in the country may broadly be divided into three groups—scheduled castes population, scheduled tribes population and non-scheduled population. There are altogether six-seen scheduled caste communities in Assam. Among them six belong to Assamese Hindus and four Bengali Hindus. But there is a large number of scheduled tribe communities in the state. Broadly, they can be either hill tribes or plain tribes. The Dimasa and the Karbi are major hill tribes, while Bore, Mishing, Rabha, Tiwa, Sonowal-Kachari and Deori are major plain tribes in the state. The Muslims and the tribal communities like tea garden labourer and Koch-Rajbongshi are treated under the non-scheduled population group in the state. According to 1991 census, of the total population in the state, scheduled castes constitute 7.40 per cent (India 16.45 per cent), scheduled tribes 12.82 per cent (India 8.08 per cent) and the remaining

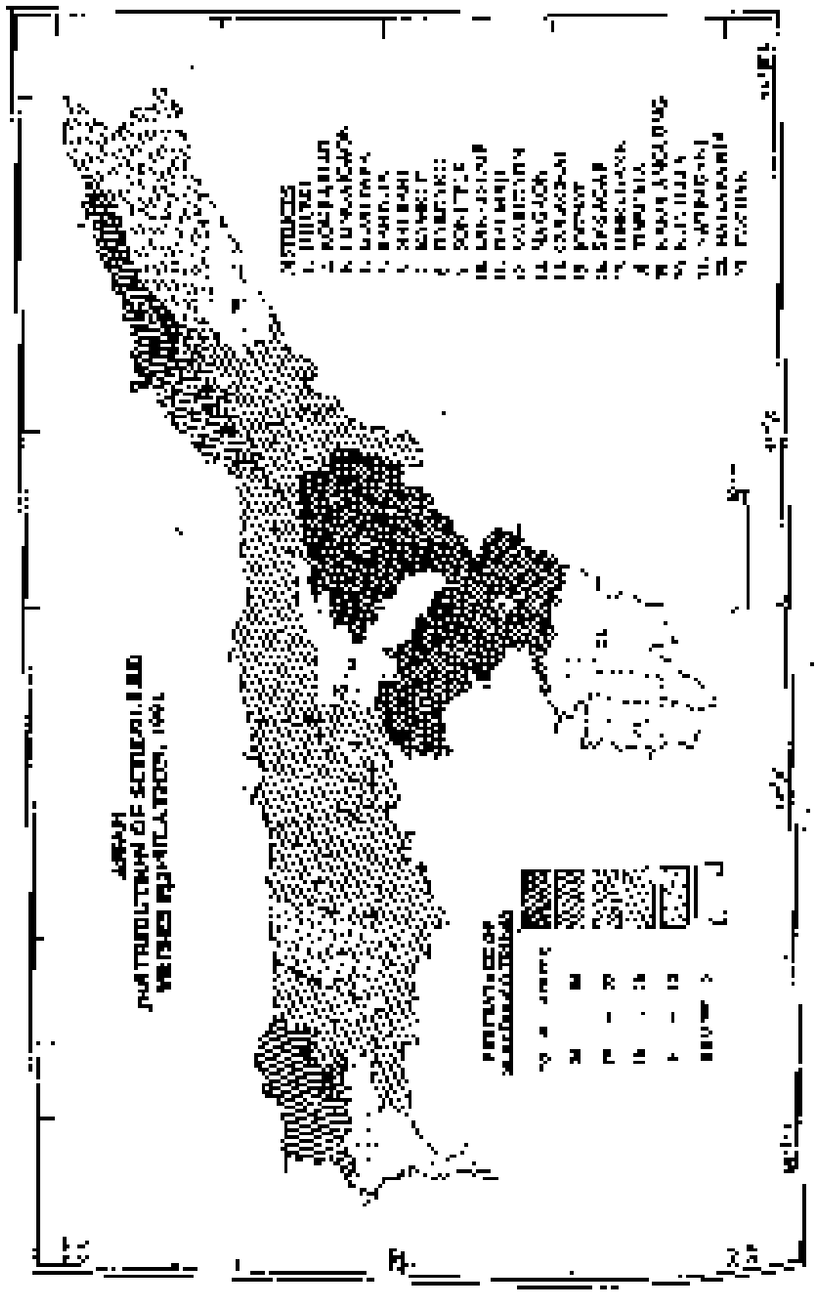

Fig. 7.3

non-scheduled population, 79.76 per cent (India: 75.46 per cent). In 1971 the proportions of scheduled castes and scheduled tribes in the state were 7.91 per cent and 3.68 per cent respectively. It means that both these population groups experienced a growth of 81.81 per cent and 76.91 per cent respectively during the last two decades (1971-91).

So far the spatial distribution of population is concerned, it is not uniform both among the scheduled castes and scheduled tribes. While on the one hand, the scheduled castes people are to some extent uniformly distributed, the scheduled tribes people are found in concentration in some areas of the state (Fig. 7.2 & 7.3). In terms of the distribution of scheduled castes, the district having more than 10 per cent scheduled castes in the state include Cachar (14.70 per cent), Karimganj (14.38 per cent), Morigaon (13.78 per cent), Bongaigaon (10.74 per cent) and Nagaon (10.50 per cent). Thus it is found that the Cachar districts in the Barak valley and two in the Brahmaputra valley together constitute 48.36 per cent of the total scheduled castes population (1,659,412) in the state. The proportion is found to be the lowest in Sadiya district of N.C. Hills (2.67 per cent). But strikingly enough, scheduled tribes population constitute as high as 69.34 per cent and 51.26 per cent of the total population respectively in the districts of N.C. Hills and Karbi Anglong. Besides, the proportions of scheduled tribes population are also found to be considerably high in the districts of Dhemaji (45.92 per cent), Kokrajhar (41.15 per cent) and Lakhimpur (25.57 per cent). All these five districts together share 40.21 per cent of the state's total scheduled tribes population (2,834,411). The proportion of scheduled tribes population is found to be the lowest in the Barak valley districts of Hailakandi (0.16 per cent) and Karimganj (0.17 per cent). So far the distribution of major tribal communities in the state is concerned, the Mikirs-Rabhas are concentrated in N.C. Hills, Karbis in Karbi Anglong, Bodos in the south-bank part of the lower and central Brahmaputra valley, Mishings and Deoris in the south-bank part of the upper Brahmaputra valley, Rabhas in the south-bank part of the lower Brahmaputra valley and Tiwas in the south-bank part of the central Brahmaputra valley. It is worth mentioning here that 13.82 per cent and 3.18 per cent of the state's total scheduled castes and scheduled tribes population respectively live in the urban areas. It thus means that the tribal people in the state live mostly in rural areas and hence they are primarily associated with the agro-based economy.

Although Assam is a Hindu dominated state, people of the other religious groups live here in varied proportions. According to 1991 cen-

sus data, various religious groups living in the state in terms of their proportions to total population are Hindu (67.13 per cent), Muslim (28.43 per cent), Christian (3.32 per cent), Buddhist (0.29 per cent), Jain (0.09 per cent), Sikh (0.07 per cent) and other minor religious groups including tribal religion (0.07 per cent). In contrast to this, the religious composition of India as a whole is constituted by Hindu (81.53 per cent), Muslim (12.59 per cent), Christian (2.32 per cent), Sikh (1.94 per cent), Buddhist (0.76 per cent), Jain (0.40 per cent), other religions (0.29 per cent), and religion not stated (0.05 per cent). It is seen that the proportion of Muslim population in Assam is significantly higher than that of the country as a whole. Strikingly, Assam occupies the second position, only after Jammu and Kashmir, among the states in the country in terms of the proportion of Muslim population. It means that both the distribution and growth of population among different religious groups are not uniform throughout the country. It is seen in the case of Hindus and Muslims - the two major religious groups in the state - that during the period 1971-1991 the Muslim population (72.33 per cent) experienced a significantly high growth as compared to that among the Hindu population (41.61 per cent). In the case of the country as a whole also, the growth of Muslim population (41.02 per cent) has been higher than Hindu population growth (52.11 per cent). As a result of high population growth rate among the Muslims, the proportion of Muslim population in the state has increased from 24.56 per cent in 1971 to 28.43 per cent in 1991. On the other hand, the proportion of Hindu population has decreased from 72.51 per cent in 1971 to 67.13 per cent in 1991. Such a significantly high growth of Muslim population in the state during the last two decades is indicative of the prevalence of high birth rate and immigration among them. Satisfactorily, however, as a consequence of the slow improvement of socio-economic conditions among the Hindus, the natural growth rate of population among them has declined to a great extent in the state during this period.

So far the growth of Muslim population during 1971-91 at district level is concerned, it was the highest in Dhemaji (682.62 per cent) and the lowest in Hailakandi (55.56 per cent). The other districts witnessing high growth of Muslim population in the state are N.C. Hills (409.92 per cent), Sonitpur (131.72 per cent), Karbi Anglong (111.42 per cent), Darrang (108.10 per cent), Lakhimpur (106.65 per cent) and Golaghat (104.83 per cent). It is thus noted that the growth of Muslim population in all the districts is higher than that of the Hindu population growth in the state as a whole. In respect of Hindu population, the growth is found to be the highest in N.C. Hills district (87.70 per cent) and the lowest in the undivided Nagaon district (22.27 per cent). It is worth mentioning that except Karbi Anglong and undivided Lakhimpur districts, the growth of Hindu population during the period 1971-91 has been below 45 per cent in all other districts.

In respect of the spatial distribution also, both the Hindu and the Muslim population groups exhibit varied patterns. In the case of Muslim population, the districts like Dhubri (50.47 per cent), Barpeta (36.07 per cent), Hailakandi (54.79 per cent) and Goalpara (50.18 per cent) have occupied dominant positions. About 36 per cent of the state's total Muslim population (6,373,244) live in these four districts. Other districts having considerably high proportions of Muslim in the state include Karimganj (49.17 per cent), Nagaon (47.18 per cent), Morigaon (45.31 per cent), Cachar (34.49 per cent), Bongaigaon (32.74 per cent) and Darrang (31.97 per cent). The district having the lowest proportion of Muslim in the state is Dhemaji (1.48 per cent). But out of 19 districts in Assam, as many as 19 are Hindu dominant where the proportion of Hindu is above 50 per cent. But among these, the districts having significantly high proportion of Hindus are Dhemaji (99.87 per cent), Jorhat (93.54 per cent), Dibrugarh (91.30 per cent), Tinsukia (90.18 per cent), Sibsagar (89.25 per cent), Golaghat (86.11 per cent), Karbi Anglong (84.63 per cent) and Sonitpur (80.19 per cent). The proportion of Hindus is found to be the lowest in Dhubri (28.33 per cent). On the other hand, the districts having considerable proportions of Christian population in the state are N.C. Hills (24.47 per cent), Karbi Anglong (12.48 per cent), Kokrajhar (9.81 per cent) and Goalpara (7.89 per cent). It may be mentioned here that a large proportion of tea garden and ex-tea garden labourers and a considerable proportion of scheduled tribes, particularly the hill-tribes, profess Christianity. Nowadays, however, many tribal people more particularly in the plains follow Hindu way of life and social practices. The Hindus, being the most numerous in most parts of the state, occupy the highest socio-economic rank in the society. The Hindu population of the state consists of the followers of the Vaishnavites, Saktas and Saivaites. The role of the Vaishnavism has been found to be very significant in removing the feeling of caste-cross differences across the state.

Language is the most important medium of human interaction. The language data of any area reflect the [illegible] of its population. It is worth mentioning that Census of India has been providing basic information on linguistic characteristics of the country's population. The language spoken by any individual is ascertained from his mother tongue

As per the Census of India, there are altogether 114 languages in the country each having a numerical strength of above ten thousand. Out of these, 18 are called scheduled languages as they are included in the Eighth Schedule of the India's Constitution and the rest numbering 96 are non-scheduled languages. The Eighth Schedule languages are Hindi, Bengali, Telugu, Marathi, Tamil, Urdu, Punjabi, Malayalam, Kannada, Oriya, Gujarati, Rajasthani, Assamese, Nepali, Konkani, Manipuri, Kashmiri, and Sanskrit. On the other hand, the minor languages which have the numerical strength of below ten thousand each are clubbed together to call them 'total of other languages'. Among the major languages, while the scheduled ones have 85 mother tongues, the non-scheduled have 131 mother tongues.

So far the linguistic composition is concerned, India's population is broadly composed of five linguistic families- (1) Indo-European (75.30 per cent), (2) Dravidian (23.5) per cent), (3) Austro-Asiatic (1.13 per cent), (4) Tibeto-Chinese (0.97 per cent) and (5) Semitic-Hamitic (0.01 per cent). It means that the Indo-European (primarily the Indo-Aryan) and the Dravidian are the two major linguistic families in the country. On the other hand, Indo-European (86.95 per cent) and Tibeto-Burmese (1.25 per cent) form the major language families in the state of Assam. In the country as whole, in terms of numerical strength of speakers Hindi is the largest language (39.85 per cent of the total population), followed by the Bengali (8.22 per cent), Telugu (7.80 per cent), Marathi (7.38 per cent), Tamil (6.26 per cent), Urdu (5.13 per cent), and Sanskrit, the smallest (0.01 per cent). The proportion of the Assamese speaking population in the country is only 1.55 per cent. The proportion of the scheduled language speakers in the country is 96.29 per cent. It may be mentioned here that the population of the non-scheduled languages is largely concentrated at the north-eastern states of the country.

So far the linguistic composition of Assam's population is concerned, unlike many other states of the country, it has two major scheduled languages- Assamese and Bengali. They respectively constitute 57.81 per cent and 21.67 per cent of the total population of the state as per the 1991 census data. Although Assamese is the same language, it is largely confined to only the Brahmaputra valley. On the other hand, Bengali is the major language in the Barak valley. About four-fifth of its population speak Bengali. In addition, Bengali speaking population is also found in considerable number in other districts of the state. Further, being inhabited by a number of tribal groups, Assam also has a significantly high proportion of

non-scheduled language speakers (12.53 per cent). Among the non-scheduled languages, Bodo/Boro, Mishing, Kachi, Santali, Garo and Rabha are important in terms of their number of speakers (above 1 lakh population each). The tribal language speakers like Boro live largely in the lower and middle Brahmaputra valley, Mishing in the upper Brahmaputra valley and the Kachi in Karbi Anglong hill-district. The Nepali speaking people, on the other hand, live mostly in the districts of Sonitpur, Nagaon and Tinsukia. The tea gardens and the urban areas are the major concentrations of Hindi speaking population in the state. The state altogether has 87 languages including 69 non-scheduled ones. This is indicative of the prevailing high degree of linguistic diversity in the state.

It may be mentioned here that among some of the major scheduled and non-scheduled languages in the state, the proportion of speakers of the Assamese language has declined from 60.88 per cent in 1971 to 57.81 per cent in 1991. Bengali increased from 19.71 per cent to 21.67 per cent. Hindi decreased from 5.42 per cent to 4.62 per cent. Nepali decreased from 2.39 per cent to 1.93 per cent; Bodo/Boro increased from 3.65 per cent to 5.28 per cent. Mishing increased from 1.21 per cent to 1.70 per cent; Kachi increased from 1.31 per cent to 1.58 per cent and Rabha increased from 0.22 per cent to 0.50 per cent. At national level also, the proportion of Assamese speaking population has decreased from 1.63 per cent in 1991 to 1.55 per cent in 1991.

The probable causes behind such changing pattern of the linguistic composition of the state's population may be understood when the growth rates of population of each language is compared with that of the average growth of state's population during 1971-91 (33.26 per cent). Accordingly, it has been noted that Assamese (45.57 per cent), Hindi (30.66 per cent) and Nepali (23.89 per cent) language speakers have witnessed significantly low growth rate even below the state average as compared to Bengali (68.51 per cent), Karbi (85.34 per cent), Mishing (115.20 per cent), Bodo/Boro (121.93 per cent) and Rabha (246.99 per cent). The decreasing proportion of the tribal language speakers accompanied by high growth rates among them during 1971-91 are indicative of the prevailing high natural growth rate among them, and also return of many tribal people who included themselves as Assamese in the 1971 census. This process is known as retribalization. As a consequence of this, the proportion of Assamese speakers in the state has declined significantly witnessing a no-cut lower growth rate among them during 1971-91. Moreover, the natural growth rate of Bengali speaking population in the state would be mainly

due to the prevalence of high natural growth rate among them and partly due to migration. Besides, inclusion of the Chakma, Hajong and Lyngngam under Bengali language by the Census of India might be an additional factor towards high growth rate among them. On the other hand, significantly low growth rate as evidenced particularly by Nepali speakers might be the result of low natural growth and also return of many Nepali people as Assamese during the census. But the low population growth among the Hindi speaking population is associated with low natural growth and emigration. In any case, the growth rate of the rapidly increasing language-speaking population in the state (99.03 per cent) during 1971-91 was much higher than that among the scheduled language speakers (49.37 per cent). On the whole, it is found that Assam presents a diverse linguistic composition and each language maintains its identity and distinctiveness in the broad framework of Assamese society.

Literacy Pattern

Literacy and educational attainment are considered to be the basic parameters of socio-economic development of any society. As a matter of fact, the quality of human population of any society can be judged through its educational attainment. But unfortunately Assam is lagging much behind in respect of literacy and education than many other parts of the country. According to 1991 census the literacy rate in Assam is found to be 52.89 per cent as against country's 52.21 per cent. Although the literacy rate in Assam appears to be slightly higher than that of the national average, it is steadily lower than the states like Kerala (89.91 per cent), Mizoram (82.27 per cent), Goa (75.51 per cent), Maharashtra (64.87 per cent), Himachal Pradesh (63.86 per cent), Tamil Nadu (62.66 per cent), Nagaland (61.65 per cent), Gujarat (61.29 per cent), Tripura (60.44 per cent) and even its position at state level is as low as seventeenth in the country and fifth in the North East.

In fact, like many other parts of the country the progress of literacy in Assam was slow prior to Independence. In the beginning of the twentieth century, about 96 per cent of the state's population were illiterate. There was hardly a literate woman per one hundred females in the state at that time. The literacy rate came down to only 87 per cent in 1941. There was no productive effort as such in the country for spread of education. But increase in literacy rate had started a momentum after independence of the country. After Independence, during a period of four decades (1951-1991), the literacy rate increased from 21.79 per cent to 52.89 per cent (Table 7.5). Satisfactorily, as a result of the rise in literacy rate the pro-

viding male-female is still crucial in this respect but it can come down to a great extent. During the period 1951-1991 the female literacy rate in the state witnessed a significant rise (from 9.48 per cent to 43.03 per cent). It is thus clear that the literacy and educational development is essentially a post-Independence phenomenon. But even after fifty years of independence, about two-fifth of the state's population is illiterate. The literacy rate, however, varies widely across the state. The variation in literacy is even found to be more significant in respect of rural urban male female and different social components in the state. Such variations in literacy rate in the state are associated with cumulative effects of physical, economic and social constraints on the historical legacy.

Table 7.5

Progress of literacy in Assam, 1901-1991

Year	Literacy rate* (in per cent)		
	Person	Male	Female
1901	4.17	7.43	0.59
1911	5.19	9.07	0.97
1921	7.11	12.22	1.40
1931	8.57	14.60	1.87
1941	13.14	22.79	4.34
1951	21.79	33.25	9.48
1961	32.98	44.28	19.60
1971	34.60	44.51	23.52
1991	52.89	61.87	43.03

Source : Calculated on the basis of data from Census of India, 1951 & 1971, Assam, Part I, General Report and 1991, India, Paper 2 of 1992, Final Population Totals

*Effective Literacy Rate (excluding 0-4 years for 1901-1971 and excluding 0-6 years in 1991). There was no Census in Assam in 1981. Assam includes Meghalaya and Mizoram till 1961

Spatial Variation in Literacy- When looked at the district level, it is found according to 1991 census data that the literacy rates in the state vary from 38.31 per cent in Dhubri to 65.51 per cent in Jorhat (Table 7.6). Only three districts in Lower Assam have literacy rate above the state average. In fact, literacy rate is found to be significantly high in the urbanized and socio-economically advanced districts like Kamrup, Jorhat, Sibsagar and Cachar. On the other hand, it is quite low in the socio economically backward districts like Dhubri, Kokrajhar, Barpeta, Darrang and Karbi Anglong.

where either immigrant Muslims or tribal people constitute a considerable proportion of total population. But the impact of Christianity has, however, made fossilisation in the tribal-dominated N.C. Hills district somewhat better in this respect (Fig. 7.4).

Table 7.6
District-wise literacy rates in Assam, 1991

District	Literacy rate (in per cent)		
	Total	Male	Female
1. Dhubri	38.31	47.19	26.75
2. Kokrajhar	40.57	49.57	30.92
3. Bongaigaon	49.66	58.67	38.71
4. Goalpara	45.31	55.47	37.58
5. Barpeta	43.24	57.61	33.20
6. Nalbari	55.99	66.95	44.39
7. Kamrup	65.04	73.67	55.01
8. Darrang	42.80	50.80	32.53
9. Sonitpur	48.14	56.30	36.60
10. Lakhimpur	58.56	68.26	44.85
11. Dhemaji	53.84	65.43	41.12
12. Marigaon	47.99	56.17	39.19
13. Nagaon	54.74	63.49	46.30
14. Golaghat	58.54	66.50	49.35
15. Jorhat	65.51	73.29	56.88
16. Sibsagar	61.46	71.91	56.14
17. Dibrugarh	58.32	66.32	48.89
18. Tinsukia	50.28	59.27	39.99
19. Karbi Anglong	45.53	55.55	34.35
20. North Cachar Hills	57.36	66.39	47.14
21. Karimganj	54.21	64.05	41.26
22. Hailakandi	51.07	61.08	31.04
23. Cachar	59.18	68.79	48.76
ASSAM	52.89	61.87	43.03
INDIA (Excl. J & K)	52.21	63.15	39.29

Source: *Primary Census Abstract, General Population, Scheduled Castes and Scheduled Tribes*, Series-4, Assam, Part II-D, Census of India, 1991.

The spatial variation in literacy rates in the state becomes further

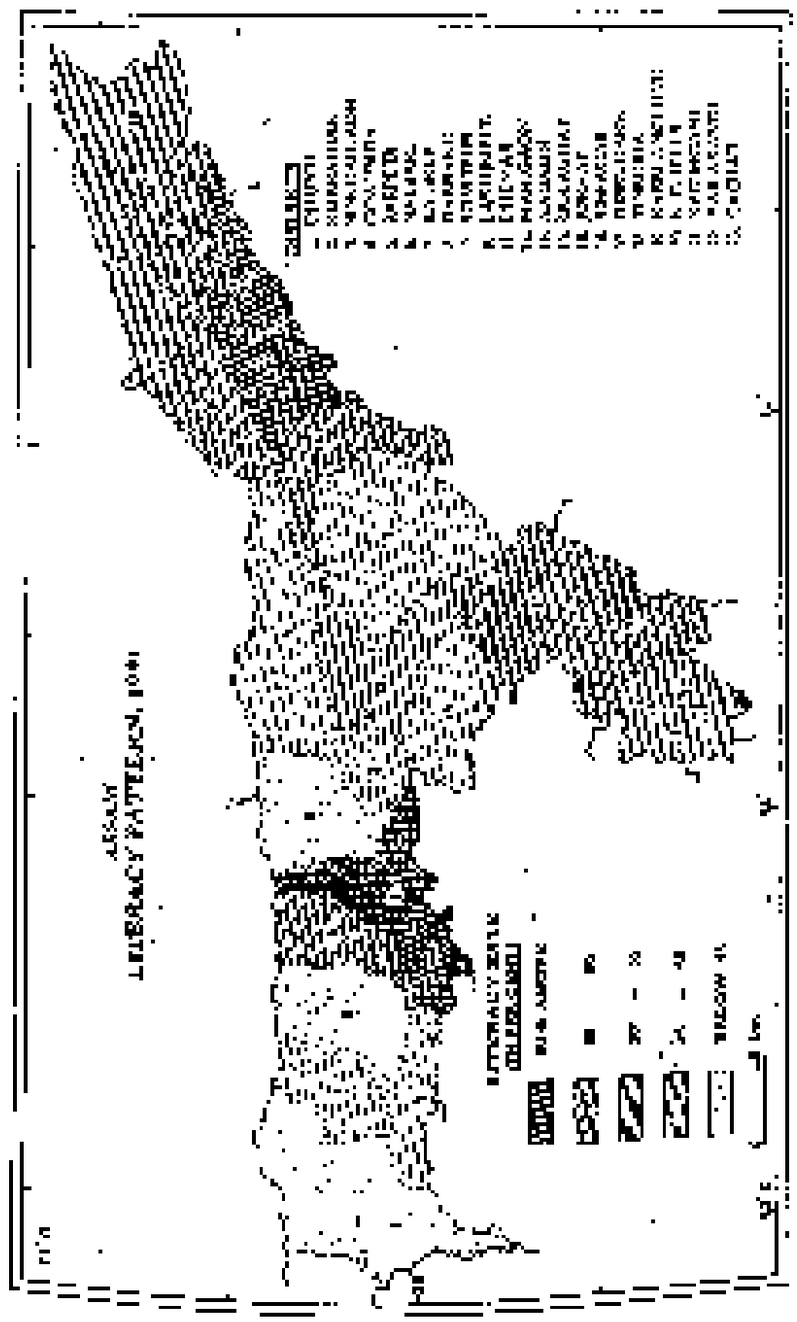

Fig. 7.4

clear when it is viewed separately for its rural and urban areas. Striking is the urban literacy rate in the state was high as 39.39 per cent as against 49.32 per cent for its rural counterpart. Among the districts, the rural-urban differential in literacy rates is found to be the highest in Kokrajhar (urban : 77.14 per cent; rural : 33.92 per cent) and the lowest in Jorhat (urban : 74.95 per cent; rural : 62.78 per cent). The differential in this respect is generally found to be low in the areas where the overall literacy rate is already high. So far the spatial variation in rural literacy rate is concerned, it is significantly higher than the state's average in the districts of Sibsagar, Jorhat, Lakhimpur, Kamrup, Golaghat, Cachar and Nalbari. The rural literacy rate is, however, below 40 per cent in the districts of Dhubri and Kokrajhar. Among a host of the rest, poverty combined with lack of adequate educational facilities and consciousness towards education are primarily responsible for the prevalence of low literacy in most of the rural areas of the state.

Male-Female Disparity in Literacy - As elsewhere in the country there exists a significantly high male-female disparity in literacy in Assam. In fact, the disparities between male and female educational development are rooted, among other factors, in the persistence of some attributes of the spurious modernisation of the colonial era. The prevalence of strong societal prejudices against women's mobility and education has been responsible for the slow progress of literacy in the state. It may be mentioned here that the relative deprivation of women in the field of education results in deprivation in many other attributes (Raza and Agarwal, 1986). According to 1991 census data, the female literacy rate in the state stands at 43.03 per cent as against the male literacy rate of 61.52 per cent. It is, however, satisfactory to note that the female literacy rate in the state is slightly higher than that of the corresponding national average (39.19 per cent). Besides, it is encouraging to note that the sex disparity in literacy in the state has been gradually decreasing since the beginning of the twentieth century. This is indicative of increasing spread of female education in various parts of the state. Nevertheless, sex differential in literacy is still much higher in the rural areas (male: 58.66 per cent; female : 39.19 per cent) than that of the urban areas of the state (male: 84.35 per cent; female : 73.32 per cent). It is significant to note that the male-female disparity in literacy is much low in the neighbouring Christian dominated tribal states, namely Meghalaya, Mizoram and Nagaland.

So far as the spatial variation in male-female differential in literacy is concerned, it is strikingly high in the districts of Dhemaji, Hailakandi and Nalbari, and considerably low in the districts of Sibsagar, Nagaon and

Golaghat (Table 7.6). The same is also true with respect to the rural and urban areas of the state. The lowest and the highest male-female disparity in urban literacy are recorded respectively by Sibsagar district (male: 85.25 per cent; female: 80.71 per cent) and Barpeta district (male: 82.81 per cent; female : 66.07 per cent).

Literacy among different Social Groups

So far as the literacy rate among the scheduled castes, scheduled tribes and other population in the state is concerned, it is satisfactory to note that unlike many other parts of the country it is quite uniform. According to 1991 census data, the scheduled castes and scheduled tribes record literacy rates of 53.91 per cent and 49.15 per cent respectively as against 53.39 per cent for the non-scheduled population group. The corresponding percentages for the country as a whole, however, are 37.41 per cent, 29.60 per cent and 57.69 per cent. Although the levels of literacy in Assam among different social groups are relatively better than the country's rates, there exists a significantly high rural-urban and male-female differential in literacy among them in the state. The rural-urban differential in literacy rate in the state is, however, found to be quite low among the scheduled castes (urban: 65.71 per cent; rural: 51.95 per cent) as compared to the scheduled tribes (urban : 78.18 per cent; rural: 48.09 per cent). On the other hand, scheduled castes record the highest sex disparity in literacy (male: 63.88 per cent; female: 42.99 per cent), followed by scheduled tribes (male: 58.93 per cent; female : 38.98 per cent) and non-scheduled population (male: 62.11 per cent; female: 43.09 per cent). Besides, the literacy rate is also found to be significantly low among the immigrant Muslim population and tea garden and ex-tea garden labour population in the state. Thus, all these spatial characteristics and social strands make the literacy topography in the state varied and complex (Kar and Shmin, 1994). It may, however, be kept in mind that only literacy rate cannot reflect the educational development scenario of any area in true perspective. For instance, of the total literates in Assam according to 1991 census, as high as 30.29 per cent have the educational attainment of only up to below primary and primary levels. Besides, there are some more literates who do not have any formal education. On the other hand, the proportions of matriculates and graduate and above are found to be only 11.48 per cent and 3.76 per cent respectively. It, therefore, necessitates the analyses of educational attainment of the literates. Because the quality of human population in an area depends greatly upon the educational levels of its people.

Occupational Pattern

The proportion of population engaged in economic activities (work participation rate) and the occupational structure of the workers indicate to a great extent the overall economic development scenario of the state. According to 1991 census data, the total work participation rate in the state is found to be 36.09 per cent (main workers : 31.20 per cent; marginal workers: 4.89 per cent) as against the country's average of 37.96 per cent. It is, however, satisfactory to note that the work participation rate has witnessed a significant rise during the last two decades. As per the 1971 census data, the work participation rates in the state and the country were 27.96 per cent and 32.93 per cent respectively. But there is still a significant gender disparity in work participation. Both in the state and the country, the female work participation rates (Assam - 21.61 per cent; India - 22.27 per cent) are notably lower than their male counterparts (Assam - 49.45 per cent, India - 51.96 per cent). Within the state again, the work participation is considerably higher in the rural areas (36.71 per cent) than that of the urban areas (30.93 per cent). Further, it is found that the gender differential in work participation in urban areas of the state is noticeably higher than rural counterparts. On the whole, the low work participation rate in the state as in other parts of the country is largely associated with lack of development of the non-agricultural sector. Besides, the considerably high proportion of non-working population in the age group 0-14 is also no less important in keeping the work participation low in the state.

So far the spatial variation in work participation rate in the state is concerned, the participation rate is found to be high in the tribal dominated and economically backward districts like Dhemaji (44.07 per cent), Lakhimpur (42.86 per cent), Karbi Anglong (42.78 per cent) and N.C. Hills (42.06 per cent) and the tea garden dominant districts like Sibsagar (41.94 per cent), Tinsukia (40.68 per cent), Golaghat (40.98 per cent), Sonitpur (40.23 per cent), Darrang (40.19 per cent) and Dibrugarh (39.52 per cent). But the work participation rate is found to be quite low in the Muslim dominated districts like Karimganj (28.99 per cent), Dhubri (29.45 per cent) and Barpeta (30.03 per cent). The female work participation rate is also found to be the lowest in these districts (Table 7.7). Thus, it may be said that the economic conditions and the social prejudices play an important role in determining the female work participation in different parts of the state.

Table 7.7
Districtwise work participation rates in Assam, 1991

	District	Total work participation rate (in per cent)		
		Person	Male	Female
1.	Dhubri	29.45	40.60	8.33
2.	Kokrajhar	29.93	50.76	10.27
3.	Bongaigaon	30.94	49.52	10.78
4.	Goalpara	35.68	48.02	7.48
5.	Barpeta	30.03	47.02	10.96
6.	Nalbari	33.13	46.07	19.50
7.	Kamrup	32.48	48.96	13.04
8.	Darrang	40.19	50.61	29.07
9.	Sonitpur	40.23	51.52	27.85
10.	Lakhimpur	42.86	47.53	37.84
11.	Dhemaji	44.07	48.09	41.49
12.	Morigaon	34.87	51.24	17.89
13.	Nagaon	35.46	50.67	19.07
14.	Golaghat	40.99	49.61	31.59
15.	Jorhat	36.35	47.07	27.81
16.	Sibsagar	41.95	49.64	33.43
17.	Dibrugarh	39.52	48.02	29.14
18.	Tinsukia	40.68	50.81	29.67
19.	Karbi Anglong	42.78	51.08	33.63
20.	North Cachar Hills	42.06	52.36	30.09
21.	Karimganj	28.99	48.10	8.68
22.	Hailakandi	31.49	49.03	11.97
23.	Cachar	31.84	49.32	13.07
ASSAM		36.09	49.45	21.61
INDIA (Excl. J & K)		37.96	51.61	22.27

Source : *Primary Census Abstract, General Population, Scheduled Castes and Scheduled Tribes, Series-4, Assam, Part II-D*, Census of India, 1991.

Table 7.8
Districtwise work participation in different occupational sectors in Assam, 1991

District	Sectorwise percentage of workers to total main workers		
	Primary	Secondary	Tertiary
1. Dhubri	75.87	5.85	18.27
2. Kokrajhar	84.03	2.95	13.07
3. Bongaigaon	75.04	4.61	20.35
4. Goalpara	75.20	4.88	19.92
5. Barpeta	76.33	5.28	18.39
6. Nalbari	71.66	6.44	21.90
7. Kamrup	45.65	11.94	42.41
8. Darrang	83.97	3.13	12.90
9. Sonitpur	77.81	2.97	18.22
10. Lakhimpur	80.54	3.26	16.20
11. Dhemaji	85.66	2.17	12.17
12. Marigaon	82.23	4.66	13.11
13. Nagaon	74.42	5.63	19.95
14. Golaghat	81.08	3.94	14.98
15. Jorhat	69.69	6.27	24.24
16. Sibsagar	78.79	3.54	17.67
17. Dibrugarh	70.75	6.25	23.00
18. Tinsukia	73.81	7.95	18.32
19. Karbi Anglong	85.00	3.50	11.32
20. North Cachar Hills	64.33	6.25	29.42
21. Karimganj	68.09	7.45	23.55
22. Hailakandi	77.28	5.08	7.64
23. Cachar	69.43	5.94	24.63
ASSAM	73.99	5.56	20.45
INDIA (Excl. J & K)	67.53	11.97	20.50

Source : *Primary Census Abstract, General Population, Scheduled Castes and Scheduled Tribes, Series-4, Assam, Part II-B, Census of India, 1991.*

The predominance of the agrarian economy of the state is also reflected in its occupational structure of the working population. It is found that as high as 84 per cent of the total main workers in the state is engaged in agriculture. On the other hand, only 6 per cent of the total main workers

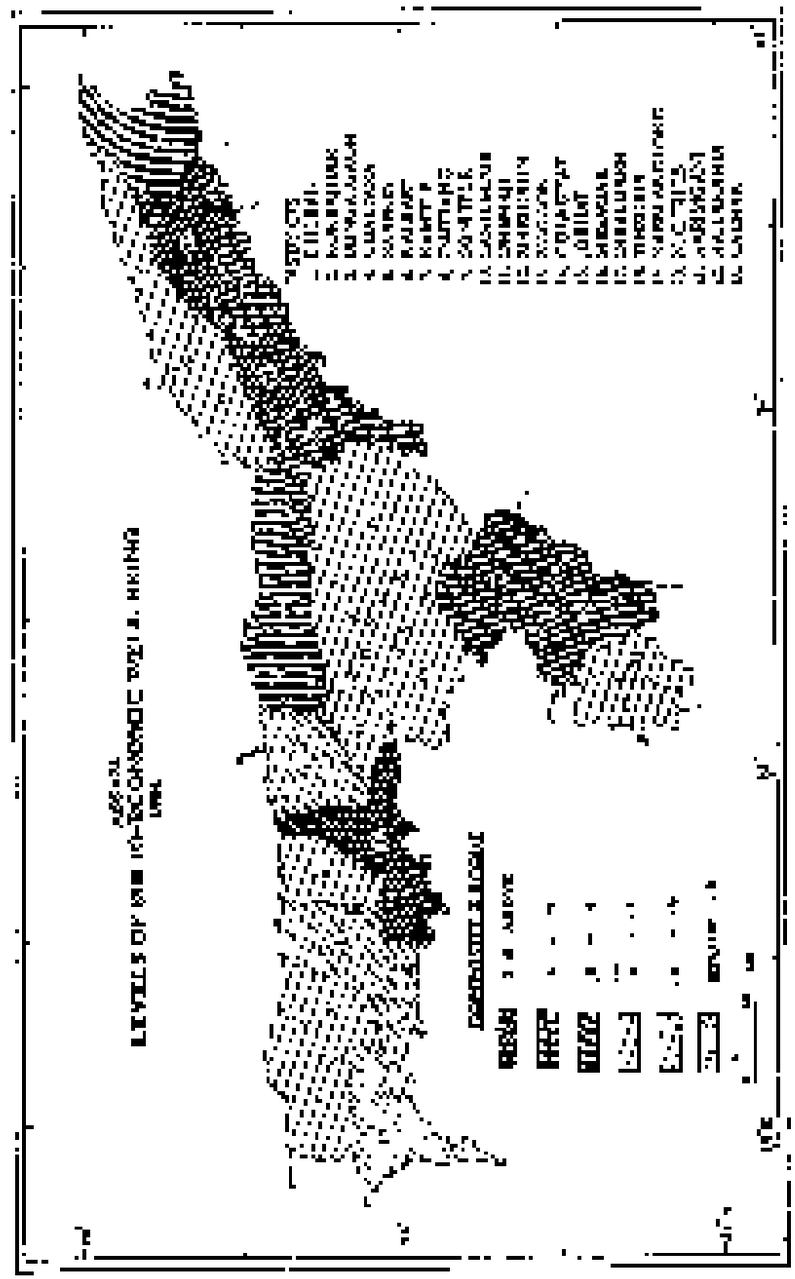

Fig. 7.5

of the urban areas in the state is engaged in agriculture. The proportions of main workers engaged broadly in the primary, secondary and tertiary sectors in the state as a whole are found to be 73.99 per cent, 5.56 per cent and 20.45 per cent respectively. The pattern in this respect does not vary much also in the case of the districts (Table 7.8). In the urban areas of the state, however, about 90 per cent of the main workers are engaged in secondary and tertiary sectors. Unlike many other districts of the state, the proportions of main workers engaged in tea plantation and to a certain extent in livestock farming, fishing and lumbering are considerably high in the districts of Dibrugarh (30.74 per cent), Tinsukia (30.72 per cent) and Sibsagar (24.57 per cent). On the other side, the proportion of agricultural workers (cultivators and agricultural labourers) is found to be significantly high (above 75 per cent) in the districts of Dhemaji, Karbi Anglong, Kokrajhar, Marigaon and Barpeta. In the case of Kamrup district, the most urbanised district in the state, the proportions of main workers engaged in manufacturing, and trade and commerce are found to be 8.96 per cent and 13.26 per cent respectively. It thus reveals that Assam is still long way to go in the field of industrialisation. It is highly discouraging to note that the prevailing traditional agricultural system and slow progress of the non-agricultural sector have not been able to generate job opportunities in accordance with the rising population in the state. This situation has resulted in increasing unemployment even among the educated youth in the state. Besides, there has been marked increase of rural to urban migration.

Socio-economic well-being

From the foregoing discussion it is clear that the population characteristics of Assam do not portray a satisfactory picture as compared to many other states of the country. The level of socio-economic well-being is, in fact, the result of the cumulative performance of a number of related population attributes. The population attributes like crude birth rate, infant mortality rate, literacy rate, urbanisation level, work participation in non-primary sectors, etc are indicative of the overall development process in an area. Again the attributes like literacy and educational attainment may also act as factors of development. The way education raises the quality of human population, the same way it also helps to enhance the quality of any production or service. The importance of female education as a crucial determinant of fertility amongst women in different parts of the country is well known. This is also found to be true in the case of death rate, infant mortality rate, life expectancy at birth and female age at mar-

riage. That is why female education is often treated as an effective instrument in the reduction of birth rate and improvement of physical well-being of human life.

So far the UNDP's (United Nations Development Programme) Human Development Report is concerned, the determination of human development index at country level is based on only three indicators: GDP per capita, life expectancy at birth and adult literacy rate including gross enrolment ratio. Here, in the present study the relevant data available at district level pertaining to demographic (proportion of population in age group 0-6, sex ratio, adjusted crude birth rate, infant mortality rate and female mean age at marriage), social (male literacy rate and female literacy rate) and economic (work participation rate and work participation in non-primary sectors) aspects have been taken into consideration (Table 7.9) for determination of level of socio-economic well-being. The technique applied here for calculation of composite value is the one well known as composite Z-score [1]. It may be mentioned here that while calculating the composite score the algebraic signs of the individual Z values of the negative indicators (population in age group 0-6, adjusted crude birth rate, infant mortality rate) have been reversed in order to make them compatible with that of the positive indicators.

The resultant composite scores clearly reveal that the level of socio-economic well-being in the state is quite uneven (Fig. 7.5). On the whole, the south-bank districts of the upper Brahmaputra valley of the state witness a high level of socio-economic well-being, followed by the hill districts and the Barak valley districts. In fact, the socio-economic well-being of human population at various parts of the state is the result of the interplay of a host of factors ranging from historical legacy through population composition and social practices to infrastructure and economic development characteristics. Accordingly, the level of socio-economic well-being is found to be the highest in the considerably socially and economically developed district of Jorhat (10.79) in the upper Brahmaputra valley and the lowest in the Muslim population dominated and economically backward district of Dhubri (10.25). On the other hand, the most urbanised and considerably industrially and economically advanced district of Kamrup in the lower Brahmaputra valley occupies the second position (10.56) in this respect. Unfortunately, because of overall economic backwardness and lack of any positive historical legacy, certain districts having considerably high proportion of Muslim and tribal population in the plains like Barpeta, Darrang, Marigaon, Bongaigaon,

Table 2.9

Selected Indicators of Socio-Economic well-being

District	Percentage of population in age group 0-6	Sex Ratio	Adjusted Crude Birth Rate	Infant Mortality Rate	Mean Female Age at Marriage	Male Literacy Rate	Female Literacy Rate	Percentage of Urban Population	Percentage of main workers	Percentage of Non-primary workers	Composite Score	Rank of Socio-Economic Well-being
1. Dhubri	25.3	930	38.2	128	16.9	47.3	28.8	12.2	27.2	24.1	-10.25	22
2. Kokrajhar	20.7	910	29.7	78	18.2	49.6	30.9	6.1	33.9	16.0	-3.02	19
3. Bongaigaon	21.5	940	28.3	120	17.6	54.7	36.7	9.1	30.3	25.0	-5.11	17
4. Goalpara	22.7	947	35.2	100	17.5	55.9	37.6	7.8	29.2	24.8	-5.28	20
5. Barpeta	21.2	939	41.2	101	17.8	52.6	33.2	7.0	26.1	23.7	-7.25	22
6. Nalbari	18.6	936	42.0	96	18.1	57.0	44.2	2.3	36.6	28.3	-2.58	16
7. Kamrup	17.4	879	28.3	77	18.4	73.7	55.0	32.8	38.7	54.1	10.50	2
8. Darrang	20.2	938	42.0	111	18.0	50.8	32.5	4.9	31.2	16.8	-6.91	21
9. Sonitpur	19.2	913	34.0	77	18.5	58.7	38.6	7.3	35.5	23.2	0.06	9
10. Lakhimpur	20.1	931	34.1	112	18.2	68.2	48.9	6.5	32.1	19.5	-0.24	10
11. Dhemaji	22.6	927	25.9	119	18.5	65.4	47.1	1.9	31.6	19.3	-2.27	14
12. Marigaon	21.9	941	30.5	98	18.0	56.2	39.2	5.3	28.9	17.8	-1.34	18
13. Nagaon	20.7	929	32.9	97	17.9	62.5	46.5	10.9	29.2	25.6	-0.96	11
14. Golaghat	18.9	920	32.1	81	18.3	66.5	49.8	5.9	33.4	18.5	4.35	6
15. Jorhat	16.4	912	31.5	47	19.0	77.3	58.9	15.3	34.4	30.5	10.79	1
16. Sibsagar	16.9	905	31.1	75	19.0	71.9	56.1	7.2	36.5	21.2	7.05	4
17. Dibrugarh	17.7	905	34.4	61	19.1	66.7	48.9	17.6	34.7	29.3	9.30	3
18. Tinsukia	19.4	897	37.5	75	18.6	59.3	40.0	16.5	36.5	26.2	1.49	8
19. Karbi Anglong	21.3	906	33.7	86	18.8	55.6	34.4	10.6	38.0	15.0	-1.42	13
20. N.C. Hills	19.3	857	29.7	108	19.2	66.4	47.3	22.9	38.3	33.7	5.20	5
21. Karimganj	19.5	946	38.5	111	18.2	64.1	44.8	7.3	36.9	31.6	-2.56	15
22. Hailakandi	20.3	929	33.1	99	18.2	64.1	41.0	7.6	29.1	32.7	-1.33	12
23. Cachar	18.4	931	32.6	97	18.5	68.8	48.2	9.8	29.7	30.6	3.40	7
Mean	19.9	922.3	34.5	92.9	18.3	61.8	42.7	10.1	31.8	24.9		
Standard Deviation	1.8	22.9	6.1	16.3	0.6	7.5	7.8	6.9	3.7	8.4		

Source: Census of India, 1991

Kokrajhar, Nalbari, Kamrup (R) and Dhemaji account a discouragingly low position. But among the two hill districts the N.C. Hills district which has a considerably high proportion of urban population and Christian tribal population witnesses encouragingly high socio-economic well-being (5.220 as compared to the scores as for Sonitpur and tribal dominated Karbi Anglong (-1.421. This pattern of socio economic well-being also reflects the prevailing unevenness in the overall development scenario in different parts of the state. Such an attempt is therefore proved to be useful in identifying problem areas and determining necessary planning inputs for a balanced human resource development across the state. While doing so more emphasis needs to be given to uplift the weaker sections of the society in respect of education, health and family welfare. The role of NGOs in this respect is vital not only for most effective implementation of various social development programmes but also for ensuring active participation of people towards success of such programmes.

Note

1. Composite Z Score, $Z = \sum X_{ij} - \bar{X}_j / S_j$

Where, X_{ij} is the value of the attribute for jth area and i and $\bar{X}_j$ and S_j respectively are the mean and standard deviation of the jth attribute for all areas.

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8

Urbanization

The urban centres play an important role in socio-economic development in any area as centres of dissemination of administration, trade and commerce, industry, culture, education, medical care and various important services and facilities. That is why the urbanization level is considered as one of the important indicators of socio-economic development. It is, however, unfortunate that Assam is lagging much behind in respect of urban development compared to the states like Maharashtra, Gujarat and Tamil Nadu. According to 1991 census, urban population constituted only 11.08 per cent of the total population of Assam. On the other hand, the proportions of urban population in Maharashtra, Gujarat and Tamil Nadu were as high as 38.73 per cent, 34.45 per cent and 34.20 percent respectively. It is however noteworthy that the number of towns in Assam has increased from 15 in 1901 to 87 in 1991.

Historical Background

The history of urbanization in Assam dates back to the pre-historic period. Even though urbanization, especially in the pre-British period, is not easily available, Assam has always been an agrarian state. A large proportion of its population engaged in the primary sector generally live in the villages. The emergence of non-agricultural activities like trade and commerce, services, industries and communication, industries etc. has been a gradual process very slow until the recent past. Some additional factors which developed in the long past have been still functioning.

The process of urbanization in Assam may be discussed according to the following chronological time-periods:

1. Urbanization during the ancient period
2. Urbanization during the medieval period
3. Urbanization during the British period
4. Urbanization during the post-independence period.

Tezpur and Pragjyotishpur have been identified as ancient cities of Assam. Situated on the north bank of the river Brahmaputra, Tezpur was the administrative capital of the Salastambha rulers (Barpujari, 1992). On the other hand, Pragjyotishpur was the capital of Kachi kings, and later residence of Bhaskaran during the Ahom rule. Recent archaeological evidences proved that there were two more ancient capital cities-one in Baibabari, the capital city of Bhauma ruler, in the Phulbari region of Garo Hills district of present Meghalaya and another in Dhabarari region of Barpathar in Golaghat district (Choudhury, 1996). Both these cities date back to 6-8 century A.D.

During the medieval period, the capital cities built by the Ahom rulers were mainly in places like Gargaon, Rangpur, Sivasagar and Jorhat. Other cities of Assam came into being during this period were Dimapur (capital of the Kacharis), Maibong (new capital of the Kachari Kingdom) and Sadiya (capital of Chutiya Kingdom). Structurally, the riverbank and other natural locations, High walls, bastion, pavilion, tank, etc. of these towns were basically rural in character.

During the British period with the process of consolidation of British rule a new set of towns emerged in different parts of Assam in association with the development of rail and river transport, exploitation of forest and mineral resources, expansion of modern education, promotion of tea cultivation and trade and commercial activities. The medieval towns had also undergone change both spatially and functionally. Tezpur and Gauhati may be cited as examples of trade-cum-pilgrim towns. British gave much priority towards expansion of transport and communication in the state with a view to exploit its rich natural resources. Accordingly, the Calcutta port was connected by feeder network. Obviously, the urban centres of that time were mainly acting as centres of exploiting all the surplus resources from the state. The British encouraged foreign capital investment especially in production. The British administration had also been responsible for large-scale migration of cultivators and labourers into the state. Unfortunately, no systematic effort had been made to modernize agriculture. Tea industries and Digboi oil refinery were the only worth mentioning manufacturing units in the state during the British period. The nucleus of urbanization in the state was almost absent. The towns that emerged were mostly the centres of civil administration.

It is, however, worth mentioning that the British administrators played a positive role towards urban development planning in the state. The steps taken in this respect were planning the layout of the urban centres, reserved land for public uses, development of public building in modern line, improvement of road network and introduction of Municipal Town

improvement acts. The total effect in respect of urban growth in the state during the long British period was hardly significant. The number of towns in the state increased from 12 in 1901 to only 23 in 1941. The proportion of urban population had also increased from 2.3 per cent to 3.16 per cent during 1901-1941.

During the post independence period, both the number of urban centres and proportion of urban population in the state have witnessed a considerable increase. In fact, at the time of partition a large volume of migrants from within and outside the country had settled in the urban and semi-urban, and also rural areas of the state. There has been again the pressure of rural to urban migration within the state. In addition, due to development initiatives under the different five year plans, decentralization of administration and slow process of economic diversification and industrialization the number of urban centres and proportion of urban population in the state reached 47 and 11.68 per cent respectively in 1991. If the trend continues, like this, number of urban centres in Assam may exceed 100 by 2001.

Urban Growth : A Size-Class Analysis

The Census of India categorizes the urban centres into six groups on the basis of population size. This grouping helps understand the urban development pattern in any area. The urban centres with population of 1 lakh and above are grouped as class I, 50 thousand to 1 lakh as class II, 20 thousand to 50 thousand as class III, 10 thousand to 20 thousand as class IV, 5 thousand to 10 thousand as class V, and below 5 thousand as class VI. It may be mentioned here that the Census of India recognizes the places with a minimum population of 5 thousand, population density of 400 persons per km², 75 per cent of male workers in the non agricultural activities and municipal committee or town committee as towns or urban centres. Besides, a place without satisfying the first three criteria may be recognized as town through the state government notification. In 1901, the urban population size in the state was only 77 thousand. Being distributed in 12 towns this constituted only 2.3 per cent of the state's total population. Out of 12 towns, Guwahati (11,661) and Dibrugarh (11,227) were the only Class IV towns in the state. The class V towns were Barpeta, Goalpara, Karimganj, Sibsagar, Silchar and Tezpur, while the Class VI were Nagaon, Dhubri, Jorhat and Golaghat. The towns under the category of class V together constituted about half of the total urban population of the state in 1901.

In 1921, the number of towns in the state increased to 22 as a result of the emergence of 10 new towns during 1901-1921. The important towns among them were Tinsukia, Lumding, Dorandooma, North Lakhimpur, Palasbari and Goalpur. The growth rate of urban population became 3.68 per cent per annum during that period. In 1941, the proportion of urban population in the state became only 4.1 per cent, with two-third being concentrated in 2 class III and 6 class IV towns. The urban population in the state, however, witnessed a significant increase during 1941-1951 (6.9 per cent per annum). Accordingly, the average size of population per town had increased from 8,669 to 14,031 during the period 1941-1951. Such a rapid growth of urban population was mainly because of the influx of migrant population at the time of partition. This put tremendous pressure on the existing infrastructures, services and job availabilities in the selected towns. Among the towns, Lumding, Hailakandi, Karimganj, Nagaon, Silchar, Dhubri, Mangaldoi and Makum witnessed a very high growth rate of population during that period. It is worth mentioning that the urban population growth rate in the state became as high as 12.6 per cent per annum during 1951-1961 as a result of the emergence of as many as 29 new urban centres and growth of existing ones. Moreover, Guwahati became the single class I city in the state after crossing the one lakh mark by 1961. The size of urban population in the state had further increased from 7.9 lakh in 1961 to 13.2 lakh in 1971 experiencing an annual growth rate of 6.68 per cent. The number of urban centres had increased to 71, and out of these 47 belonged to class V and VI categories. With the emergence of three more Class I urban centres called cities (Dibrugarh, Silchar and Jorhat), the size of urban population became 24.7 lakh in 1991 being distributed in 87 urban centres (Fig. 8.1). Thus, Guwahati city together with these newly emerged cities have constituted about 38 per cent of the total urban population in the state. It is worth mentioning that due to the promotion of the small and medium urban centres to the respective lighthouses, the proportion of urban population in the Class V and VI towns had decreased from 25 per cent in 1961 to 14.5 per cent in 1971 and 6.3 per cent in 1991. It means that there has been high concentration of urban population in the Class I and II urban centres. Some of the urban centres like Bongaigaon, Dhubri, Goalpara, Jorhat, Makum, Namrup, North Lakhimpur, Rangia, Sonari, Guwahati and Halling witnessed considerably a high growth of population during the last two decades (1971-1991) due to functional diversities combined with inclusion of new areas within the urban boundaries. For instance, the population of Guwahati city was increased by more than 4 times during 1971-1991. This is mainly attributed to large-scale migration due to shifting

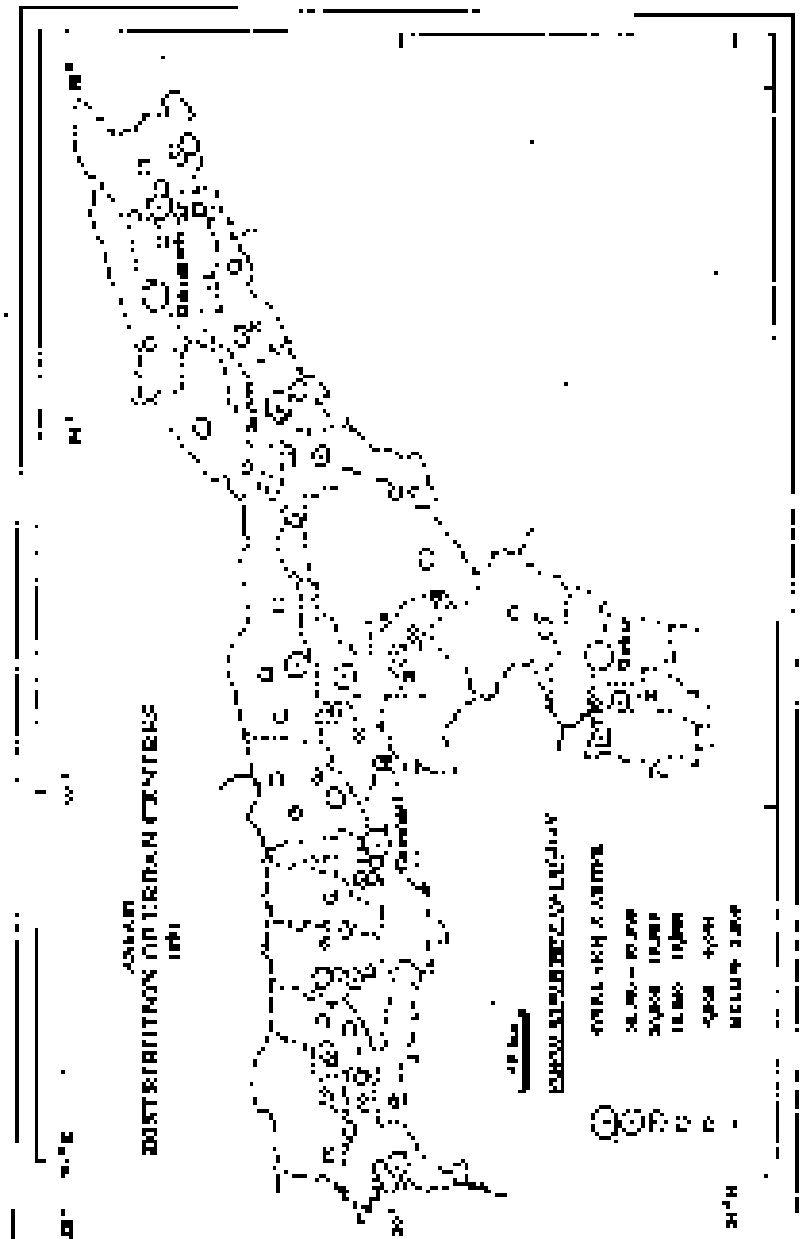

Fig. 8.1

of capital of Assam from Shillong to Guwahati and also increasing functional diversities, and physical expansion of urban boundary encompassing many new rural areas in the urban fringe.

During 1901-1991, the urban population in the state was increased by about 30 times, while the number of urban centres was increased by 7 times only. It may be mentioned that although the small towns constitute a very small proportion of population, their role is quite significant in providing direct services to the rural areas. However, a proportionate distribution of population in Tenni Tanat size category of urban centres is necessary towards bringing a balanced urban and regional development in the state. If present trend continues, the proportion of urban population in the state would be around 15 per cent by 2001. The Class I urban centres would constitute about 42.5 per cent of the total urban population. The population of Guwahati city is expected to reach one million mark in the 2001 Census.

Pattern of Urbanization at District Level

After about five decades of independence, Assam still remains as one of the least urbanized states in the country. On the other hand, Assam is well endowed with mineral and forest resources, fertile soil, high potential for hydel power development and extensive cultivation of tea and jute. It is discouraging enough to note that only Kamrup district in the state has got the higher proportion of urban population (32.4 per cent) than that of the country's average (25.8 per cent). Guwahati, the state capital of Assam and the headquarters of Kamrup district, alone accounts for 23.4 per cent of the total urban population of Assam. The least urbanized district (Dhemaji) has the urban population of only 1.88 per cent.

So far, the level of urbanization is concerned, it is quite uneven across the state. As already mentioned, it varies from as low as 1.88 per cent in Dhemaji district to as high as 32.4 per cent in Kamrup district. Out of all the districts, only Kamrup, N.C. Hills, Dibrugarh, Tinsukia and Jorhat have the urbanization level above the state average (11.08 per cent). On the other hand, urbanization level is between 5 per cent and 11 per cent in as many as 14 districts. Dhemaji, Nalbari and Darrang are among the least urbanized districts in the state with urbanization level below 5 per cent (Fig. 8.2).

So far distinctwise distribution of urban centres is concerned, Dhubri, Barpeta and Kamrup each has seven urban centres, while Nagaon and Sarbi Anglong six urban centres each. Sibsagar, Dibrugarh and Tinsukia

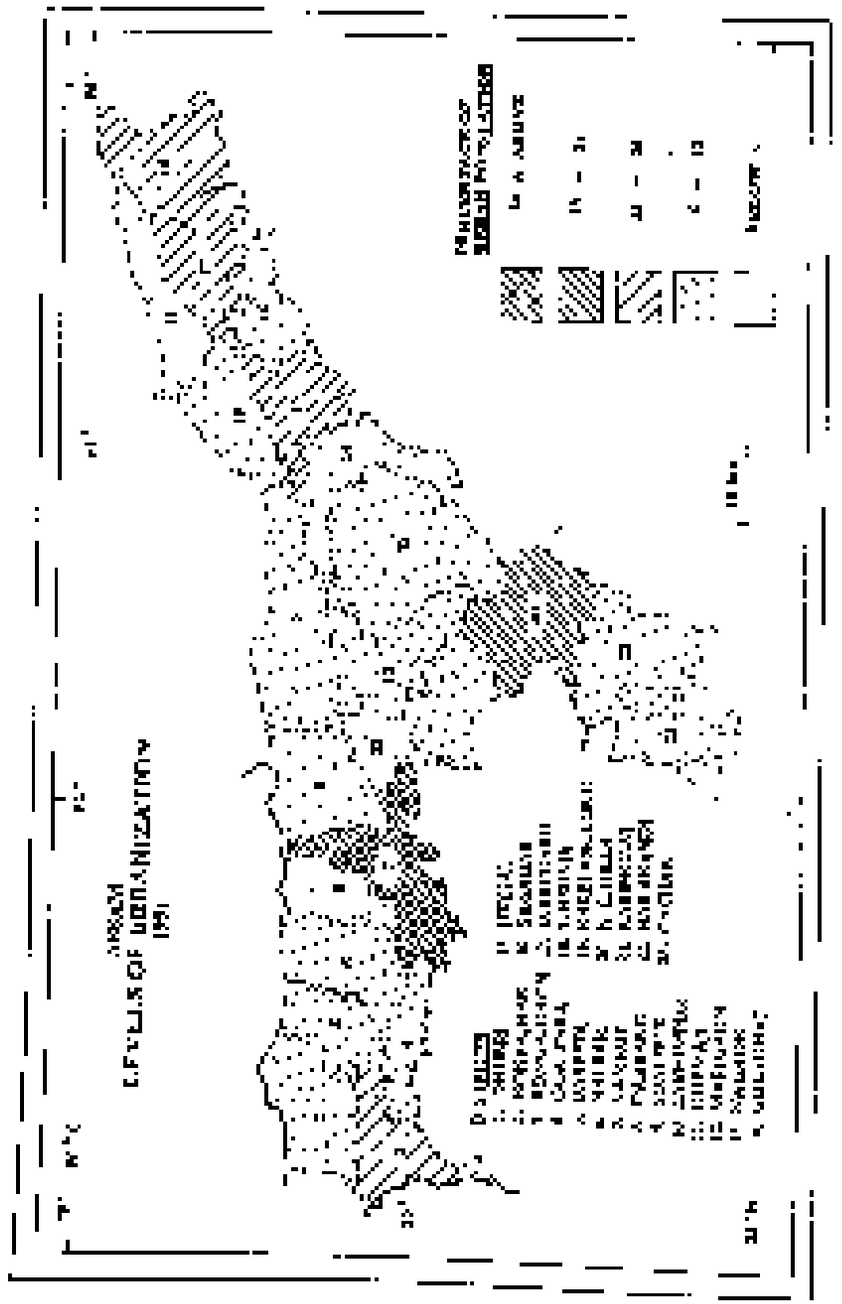

Fig. 8.2

five each. Bongaigaon and Damang five each and the remaining districts have got 2 to 3 each, except Dhemaji district with only one urban centre.

Regional Pattern of Urbanization

Spatial variation in the levels of urbanization reflects a mixed scenario of regional economy in the state. For better understanding of the prevailing urban characteristics as many as six urban regions may be identified in Assam. They are (1) North Bank Plain, (2) Lower Brahmaputra Valley, (3) Central Brahmaputra Valley, (4) Upper Brahmaputra Valley, (5) Barak Valley and (6) Hill Zone.

1. The North Bank Plain Region

The districts of Darrang, Sonitpur, Lakhimpur and Dhemaji form the North-Bank Plain region. It accommodates 17.6 per cent of the state's total population. The population density is moderate (274 persons per km²). The urbanization level is as low as 5.7 per cent as against the state average of 11.08 per cent in 1991 census. There are 10 urban centres in the region. Agriculturally, it is one of the advanced regions in the state. The share of its net production is about 21 per cent of the state. So far industrial growth is concerned, the major industrial units and SSI units constitute about 10.22 per cent and 16.56 per cent of the state's respective total. The overall population growth in the region during 1991-1995 (60.42 per cent) was slightly higher than the state average (53 per cent). There is not a single Class I urban center in the region so far. Tezpur, with a population of 54,999 is the largest urban centre in the region belonging to category II. The road density in the region (0.16 km/km²) is lower than the state average (0.46 km/km²).

2. The Lower Brahmaputra Valley Region

This region comprises the districts of Dhubri, Kokrajhar, Bongaigaon, Goalpara, Barpeta, Nalbari and Kamrup. It constitutes 15.77 per cent of the state's total population. The density of population is considerably high here (395 persons per km²). The growth of population is moderate. The level of urbanization here (13.8 per cent) is slightly higher than the state average. There are 32 urban centres in the region. The region is agriculturally productive. The share of its net production is quite high. Industrially also, the region is quite developed. 28.14 per cent and 10.95 per cent of the state's major industrial units and SSI units are located in this region. Guwahati, the capital city of Assam is the only Class I urban centre in the entire region. The other important urban centres include

Dhubri, Bongaigaon and Goalpara. Significantly, about half of the state's total urban population lives in this region. The transport system is also considerably developed. The road density is found to be slightly higher than the state average.

3. The Central Brahmaputra Valley Region

The districts of Mangaldai and Nagaon form the Central Brahmaputra Valley Urban region. This zone holds about 11.36 per cent of the state's total population. The population density is as high as 357 persons per km². The population growth rate was also significantly high during the last three decades. The proportion of urban population in the region is found to be only 9.50 per cent. There are 8 urban centres in the region. With a population of 91,324 Nagaon is the largest urban centre of the region. The area is agriculturally advanced. The road density of the region (0.57 km/km²) is also significantly higher than the state average.

4. The Upper Brahmaputra Valley Region

This urban region is comprised of Golaghat, Jorhat, Sibsagar, Dibrugarh and Tinsukia districts. About 20.48 per cent of the state's total population lives in this region. The population density is moderate (252 persons/km²). The population growth during 1971-1991 in the region was also moderate. The level of urbanization in the region (12.30 per cent) is slightly higher than the state average. There are 19 urban centres in the region. It is worth mentioning that this is the only urban region where there are two Class I urban centres—Dibrugarh and Jorhat. Tinsukia is emerging as an important trade and commercial centre and transport node in the region. Again, Digboi, the first industrial town of the entire northeast region is also located in this region. Being rich in mineral fuel and petroleum and timber resource base, this urban region alone contains as high as 45.50 per cent of the major industrial units and 24.14 per cent of the SSI units of the state. It is also the major tea producing area of the state. It is worth mentioning that more than 60 per cent of the state's tea is produced in all this region. It thus reflects that the region has a high potential for further economic development in future.

5. The Barak Valley Region

This urban region consists of Karimganj, Hailakandi and Cachar districts. It shelters about 11.77 per cent of the state's total population. The density of population is found to be 360 persons/km². The level of urbanization is also quite low (8.55 per cent). There are 7 urban centres in

this region. Unfortunately, this region has not witnessed any significant progress in agriculture, that its share of tea production at the state is only about 10 per cent. Silchar is the only Class I urban centre of this region.

6. The Hill Zone

This urban region is comprised of Karbi Anglong and North Cachar Hills districts. Only 3.6 per cent of the state's total population lives in this region. The density of population here is extremely low (53 persons/km²). The proportion of urban population in the region (12.93 per cent) is found to be slightly higher than the state average. There are 9 urban centres in the region. Diphu and Haflong, both belonging to category III, are the major urban centres in this region. This region is lagging behind both agriculturally and industrially. The proportions of major and SS industrial units in the region are only 2.7 per cent and 2.1 per cent of the state's total respectively. This region is, however, rich in forest resources and limestones. There is immense potentiality of horticulture development in the region in near future.

Problems of Urbanization

Although the pace of urbanization has been quite slow in the state, the urban problems like shortage of housing, lack of adequate safe drinking water, lack of efficient transport system, lack of adequate educational and health services, lack of proper drainage and sewerage system, lack of adequate employment opportunity, traffic congestion, lack of proper garbage management and shrinking open and public spaces, etc are not an uncommon feature of the urban centres. As a matter of fact, a sizeable amount of financial support and infrastructures are essential for the main maintenance of the 87 urban centres in the state with a population of about 2.5 million. The maintenance of the urban market drainage and garbage disposal becomes crucial in most of the large urban centres particularly during the summer monsoon season. Because of lack of proper planning and management, the living condition in the urban areas gets extremely deplorable.

Out of so many problems, congestion in public places and traffic and drainage problems deserve immediate attention. During the British period towns were too small both in respect of area and population. There was land reserves for different public utilities in those days. But, growth of population combined with diversification and intensification of urban

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9

Agriculture

Introduction

The densely populated areas with a very high proportion of rural population cultivating individually owned land, generally exhibit a kind of farming which may be called small-scale agriculture. It is characterised by small size of landholding and technologically a low level of farming practice. The small size of landholding that has fragmented into several plots creates a situation quite detrimental to adoption of modern agricultural practice. Such characteristics along with other adverse socio-economic factors limit the intensive agricultural output resulting in a disability of the sector to keep pace with the increasing demand for crops (Bhagabati, 1991).

In India, there are large number of farms which are very small to moderately small and medium-size landholdings. Through intensive irrigated agriculture a minimum subsistence unit for a family under the present condition can be considered to be four hectares (Singh and Dhillon, 1984). According to the agriculture census, 1990-91, nearly 89 per cent of the operational holdings of the country is of below 4 ha. size. The figure is well indicative of the dominance of smallholding farming in the country. It is more so in the case of Assam where the average size of operational holdings is 1.28 ha and the percentage of holding below 4 ha. size is nearly 95 (1990-91). As a matter of fact, in spite of various efforts made by the government towards improving the condition of small farming through land reforms and a number of agriculture modernisation programmes, Assam still continues to be dominated largely by smallholders, less productive subsistence type of farming. Only in the case of a small fraction of relatively rich farmers, the subsistence mode of farming has been in transition from predominantly traditional to a modernised one. However, any development in the sector undoubtedly bears special significance on the overall economic development of the state.

In fact, broadly two types of farming have been in practice in Assam.

small scale peasant and large-scale tea plantation farming. Between the two the peasant farming is more important in the sense that it alone contributes slightly less than half of the State's Domestic Product. Moreover, while it covers 65 per cent of the State's total working force, the tea plantations employ less than 10 per cent. Besides the peasant farming is more problem ridden and tension ridden than the tea plantation (Das, 1984). As the mode of production, management and the nature of problems of plantation farming are quite different from those of the wide space dominated by peasant farming, the former is excluded from the purview of the present investigation. The study is primarily concerned with the pattern of cropping, performance of the agricultural sector in terms of yield and output and the factors influencing it. Special emphasis has been given to the rice monoculture and crop intensity in terms of both heterogeneity and productivity.

Agro-Climatic Zones

Based on rainfall and temperature, terrain and soil characteristics, Assam has been broadly classified into six agro-climatic zones:

1. *Upper Brahmaputra Valley (North)* - comprising the districts of Dibrugarh, Tinsukia, Sibsagar and Jorhat. Main crops grown are rice, tea and mustard and sugarcane.
2. *Central Brahmaputra Valley* - comprising the districts of Nagaon and Morigaon. Rice, jute, tea and mustard, pulses are mainly cultivated here.
3. *Upper Brahmaputra Valley (South)* - comprising the districts of Lakhimpur, Dibrugarh, Sibsagar, Jorhat and Golaghat. Main crops include rice, tea and mustard and sugarcane.
4. *Lower Brahmaputra Valley* - comprising Kamrup, Goalpara, Dhubri, Kokrajhar, Bongaigaon, Barpeta and Nalbari districts. Main crops are rice, tea, rape and mustard, potato, wheat and pulses.
5. *Hills* - comprising the districts of Karbi Anglong and North Cachar Hills. Main crops are rice, maize and sugarcane.
6. *Barak Valley* - comprising the districts of Cachar, Hailakandi and Karimganj. Main crops include rice, sugarcane and potato.

Each of these zones has its own particularities. However, there is a great deal of uniformity in the agricultural practices in the plain areas. During the summer months with monthly average rainfall remains above 300 mm, the main crops cultivated are rice and jute. During the winter months when the average rainfall remains very low (monthly average being below 10 mm) and rainless, rabi crops like rape and mustard, wheat, pulses and various kinds of vegetables are cultivated. In the hills the dominant agricultural practice is *Jhumming* (shifting cultivation). During the recent period the jhum cycle in most parts has declined to as low as five years resulting in degradation of land and natural vegetation. In the valley floors, however, intensive cultivation is performed wherever possible. There is thus a basic uniformity in the farming practice over the agro-climatic zones in the State.

Agricultural Land Use

Agricultural land use constitutes a dominant feature of the diverse pursuit and the productive enterprises. It includes not only the land used for growing crops and fodder but also that for raising livestocks. Coupland, as defined by Bastal (1976) in the context of the U.S., is an assessment of potential as well as of current use. It includes harvested areas, land that is fallow, idle or in cover crops. It also includes land in the crop rotation currently used for pastures.

The present pattern of agriculture land use in Assam is an outcome of long-spun cultural human settlement and culture. Within the same, diverse ecological setting of the river valleys, hills and ridges and other topographic units combined with varying socio-economic factors have produced significant spatial variation in the pattern of agricultural land utilization (Bhagabati, 1990). However, in Assam agricultural land utilization is mainly meant for cultivation of cereal foodgrains, especially rice, leaving relatively small areas for wasteland, horticulture, pisciculture and dairy farming, unlike the developed agricultural regions of the world.

In Assam, there has been a slow increase in area under different crops. The gross cropped area in the state increased from 22.03 lakh ha in 1951-52 to 31.76 lakh ha in 1975-76 and recently to 39.26 lakh ha (1994-95). About 71 per cent of the total cropped area has been occupied by the foodgrains.

Area under Major Crops

Rice: The agricultural economy of Assam is generally dominated by the cultivation of foodgrains, viz., rice, wheat, maize, gram and small millets. Among these, rice as the staple food crop continues to dominate the state's agriculture. In 1993-94 (triennium average), the area under rice was 25.13 lakh ha accounting for 64.52 per cent of the total cropped area and 91.43

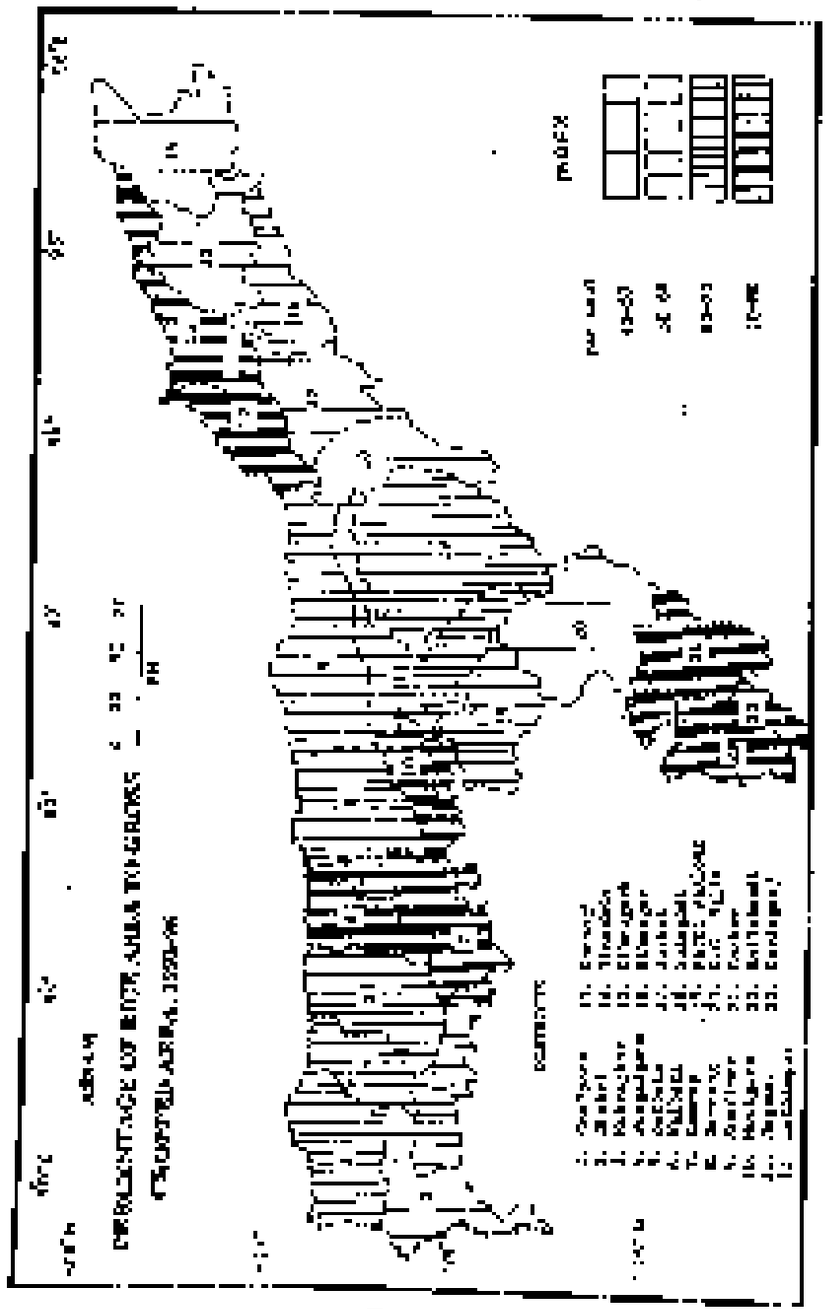

Fig. 9.3

per cent of the total area under foodgrains (Table 9.1 and Fig 9.1). It is also worthy to note that rice area increased from 15.4 lakh ha in 1951-52 to 25.3 lakh ha in 1995-96, registering a growth of 64.28 per cent during the period. Since the introduction of high yielding varieties of rice in the late part of the 1960s, the area under rice in the state not locally increased. Irrigation facilities of the state could not always keep more and more land under it.

Table 9.1

Districtwise PDC of the total cropped area 1995-96

(area in hectares)

	District	Total cropped area	Irrigated	PDC of irrigated area to total cropped area
1.	Goalpara	95161	69509	73.07
2.	Dhubri	220491	127605	57.87
3.	Kokrajhar	142405	94067	66.06
4.	Bongaigaon	143643	96905	67.48
5.	Barpeta	311963	211543	67.81
6.	Nalbari	195881	144159	73.61
7.	Kamrup	221484	157446	71.08
8.	Darrang	279464	171175	61.25
9.	Sonitpur	270350	166491	61.59
10.	Lakhimpur	135716	82230	60.60
11.	Dhemaji	180389	120471	66.79
12.	Morigaon	150337	113955	75.80
13.	Nagaon	97170	69295	71.32
14.	Golaghat	124054	84114	67.80
15.	Jorhat	129705	87529	67.49
16.	Sibsagar	168961	103137	61.05
17.	Dibrugarh	161838	97796	59.96
18.	Tinsukia	175572	81326	46.33
19.	North Cachar Hills	141069	132051	93.61
20.	Karbi Anglong	71613	47911	66.91
21.	Cachar	139274	102415	73.53
22.	Hailakandi	59979	43159	71.96
23.	Karimganj	138114	99843	72.30
	Assam	3691.43	2535.202	68.67

Source: Directorate of Agriculture, Govt. of Assam

Considering the growing and harvesting period, rice in Assam is categorised into three main groups, namely winter rice (sali), autumn rice and summer rice (boro). An important variety of winter rice, locally known as ahu is cultivated in the low lying areas where floods and waterlogged conditions make cultivation of other rice difficult. Ahu has the special ability to grow keeping pace with rising water during flood. It is interesting to note that among the three groups of rice, the practice of taking over other area has recently emerged which may be attributed to the growing awareness among the farmers to select the varieties best suited to a particular ecological set-up.

Winter Rice (Sali) : Nearly 70 per cent of the state's rice area is under sali rice. It is transplanted in puddled soil from nursery beds in July-August and harvested in November-December. Its area increased from 1.22 million ha in 1951-52 to 1.80 million ha in 1990-91 and thereafter recorded a slight decrease to 1.76 million ha in 1995-96. During the period 1951-96, sali rice area increased by 44.3 per cent. Among the districts of Assam, Sibsagar recorded the highest proportion of area under it (81.06 per cent of the district's gross cropped area). It is followed by Kamrup (81.04 per cent), Cachar (80.8 per cent), North Cachar Hills (80.71 per cent), Darrang (80.60 per cent), Karimganj (80.38 per cent), Lakhimpur (80.41 per cent), Nalbari (81.51 per cent) and Jorhat (80.87 per cent). The remaining districts have sali rice area below 80 per cent of their respective gross cropped area. Dhubri and North Cachar Hills exhibit the lowest proportion (around 24 per cent).

Autumn Rice (Ahu) : Ahu rice occupies 24.0 per cent of the state's total rice area. It is cultivated by both the upland and broadcast methods. Ahu is usually sown in the month of March and harvested in July-August. From 0.22 million ha in 1951-52 its area increased to 0.43 million ha in 1995-96, the percentage of increase being 96.37. The cultivation of this group of rice is mainly concentrated in the lower Brahmaputra valley districts where density of population is relatively high. In each of the districts of Dhubri, Goalpara, Kokrajhar, Dhemajipara, Barpeta, Nalbari, and Darrang, ahu rice accounts for more than 30.0 per cent of the gross cropped area. The upper Brahmaputra valley districts on the other hand have below 10.0 per cent of gross cropped area under it.

Summer Rice (Boro) : Boro rice occupies about 6.0 per cent of the state's total rice area. The share of this rice in the total cropped area of almost all the districts is substantially lower than that of sali and ahu. But interestingly, its area has increased more than 6 fold since 1951-52. From a mere

ASSAM : TRENDS OF AREA UNDER RICE AND FOODGRAINS, 1951-96

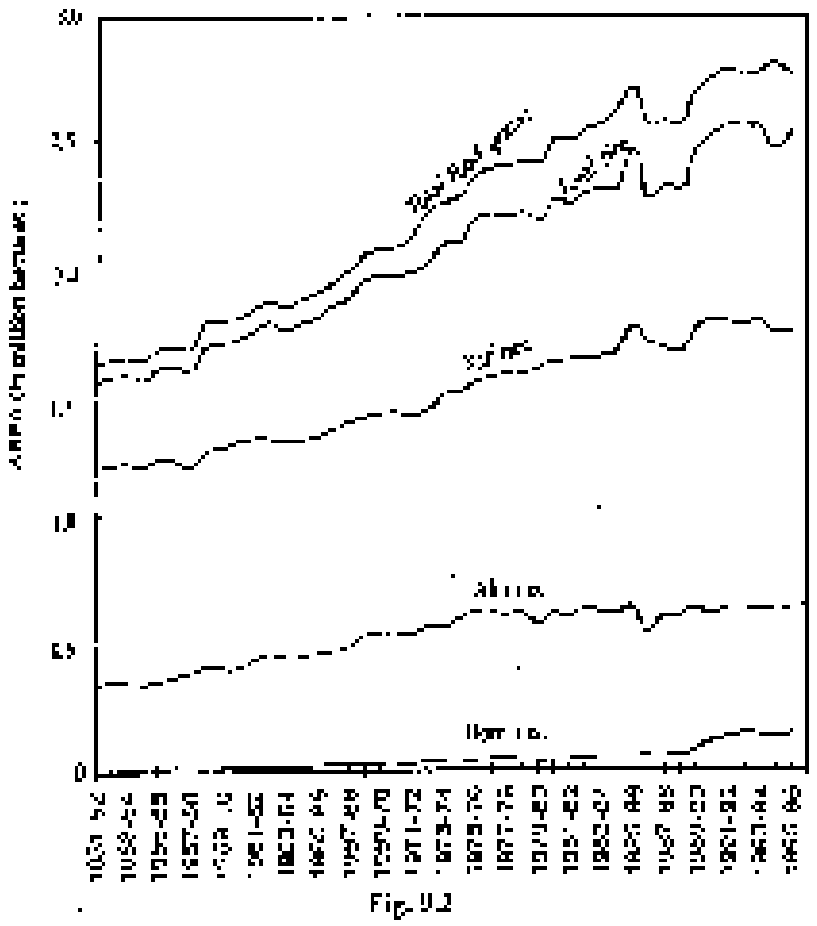

Fig. 9.2

0.07 lakh ha in 1951-52, the area under boro rice increased to 0.14 ha in 1995-96. The rice is grown in the low-lying marshy lands during the rainy and harvested just before the arrival of the first wave of flood in June-July.

A look into the district level pattern shows that boro rice occupies less than 4.0 per cent of the gross cropped area in each of the districts Nalbari, Sibsagar, Jorhat, Golaghat, Dibrugarh, Tinsukia, Lakhimpur, Karbi Anglong and N.C. Hills. Its position is slightly better in the districts of Goalpara, Dhubri, Kokrajhar, Bongaigaon, Barpeta, Darrang, Sonitpur, Cachar and Hailakandi (1-5 per cent). Compared to the above

districts, Karimganj (6.02 per cent), Kamrup (5.73 per cent) and Nagaon (10.52 per cent), and particularly Morigaon (20.98 per cent) show a much better picture in respect of *Aus* rice cultivation. In Morigaon district, the presence of a large number of wetlands provides suitable land for the cultivation of this rice.

The trend of increase in *Aus* rice area in the State (Fig 9.2) is really noteworthy. It shows a sharp increase after 1989. The main reason behind this is the fact that *Aus* rice has gained increasing popularity among the farmers of the chronically flood affected areas where *Aus* rice generally gets damaged by floods.

Wheat : Although the arrival of wheat (*Triticum aestivum*) with some significance in the crop-landscape of Assam dates back only to the mid-sixties of the last century, presently it has been able to occupy a notable position in the crop distribution pattern of the state. The indigenous people of the region even at present do not consider wheat to be their staple food and generally they devote not more than a small portion of their land to this crop. But very recently a growing tendency among the immigrants as well as indigenous peasants to cultivate wheat has been observed in the lower and the central Brahmaputra valley regions.

In 1951-52, wheat occupied only 0.11 per cent of the state's total cropped area. Its area increased to 0.[illegible] per cent in 1970-71 after the introduction of HYV wheat in the state under the influence of green revolution that took place in western India. With 0.85 lakh ha of area in 1995-96, wheat has now spread to all the districts of Assam. The lower Brahmaputra valley comprising the districts of Dhubri, Goalpara, Kokrajhar, Dongaigaon, Barpeta, Nalbari and Kamrup is the main area where wheat has been successfully grown.

Pulses : Occupying 4.32 per cent of the state's total cropped area in 1995-96, next to rice pulses are the important food crops of Assam. Of the total area under pulses, *Aus* pulses such as lentil (*Mosar*), black gram (*Maiusiah*), green gram (*Mosa*) and pea (*Sarai*) cover more than 90 per cent. The central and lower Brahmaputra valley districts, particularly Goalpara, Barpeta and Kamrup produce pulses successfully.

Oil Seeds : With 3.1 lakh ha of land under cultivation, oil seeds occupy for nearly 10 per cent of the state's total cropped area. The important oil seeds grown in Assam include rape and mustard, sesamum, linseed and castor. Among these, rape and mustard alone occupies more than 90 per

cent of the area under the oil seeds. In all the districts of the Brahmaputra valley, rape and mustard is cultivated. In the Barak valley, its cultivation is not significant (below 2 per cent).

Jute : Among the cash crops such as jute, sugarcane, meals, cotton, etc., jute is the most important in terms of hectareage strength. The history of commercial jute farming in Assam is, however, not very long. The partition of India in 1947 affected the jute industries of the Hooghly side of West Bengal badly as the major jute-producing areas went to the erstwhile East Pakistan. Therefore, efforts were made in India to extend jute cultivation in some new areas. Extension of its cultivation to Assam was a direct impact of large-scale immigration of peasants from the neighbouring overcrowded districts (Mymensing, Pabna and Rangpur) of East Pakistan (present Bangladesh). Bhuyan (1977) goes as far as to say that Assam would never become prominent as one of the principal jute-growing states had there been no immigration from East Bengal.

Jute cultivation is concentrated in the lower and central Brahmaputra valley districts of Assam. The area under this crop amounts to 0.88 lakh ha in 1995-96.

Sugarcane : Sugarcane has been grown in Assam since long. In the historic past also the people of the state knew the art of producing various types of molasses from sugarcane. In the *Harsha Charit*, it has been mentioned that among the various presents sent by king Bhaskarvarma of Kamrup to Harshavardhana, *Sada* (molasses) was one. The muslim travellers and historians who came to Assam during the Ahom period referred to sugarcane and confirmed its cultivation in the state. Quazira, for instance, wrote that sugarcane of Assam was soft and sweet and was of three colours-red, black and white (Choudhury, 1987).

Sugarcane is cultivated in all the districts of Assam, but with varying degrees. Its cultivation is mainly concentrated in the Nagaon and Golaghat districts of the Brahmaputra valley and Karimganj district of the Barak valley. In 1995-96, the total area under sugarcane was 36,000 ha.

In addition to the above mentioned important crops, certain other crops having lesser hectareage strength are cultivated in the state. They are potato, sweet potato, banana, papaya, maize, tobacco, chilli, ginger and several kinds of vegetables. The crops like chilli, ginger and tobacco are now cultivated only by a small number of farmers involving very little agricultural land. Occupying very small area these crops fetch more money

than some of the major crops because of their higher market price. Moreover, the gradual emergence of certain new crops like soyabean and sunflower in the cropping pattern of Assam during the recent years, has been found to enrich the agricultural economy of the state.

Crop Output and Yield

Crop output and yield depend partly on natural circumstances and partly on human manipulation of the land resources. The level of agricultural productivity or yield as a concept means the degree to which the economic, cultural and techno-organisational variables are able to exploit the abiotic resources of an area for agricultural production (Singh, 1979). It is dynamic as any modification in the physical factors and improvement in the non-physical bases definitely affects the output of crops per unit of area (Singh and Dhillon, 1984).

Among the food crops, rice has the highest demand in Assam as it is the staple food of the people of the state. Presently the foremost challenge before the state is the appalling increase in population and a corresponding upsurge in the demand for food. The state would be able to meet this challenge only through properly planned sustainable agricultural development programmes. The state recorded an increase of 143.88 per cent in its rice output during the period 1951-96 as againts the country's 259.22 per cent. In 1995-96, the state produced 3.39 million tonnes of rice. Of this, 2.62 million tonnes were constituted by *sali,* 0.51 miilion tonnes by *ahu* and the rest 0.26 m tonnes by *boro* (Fig 9.3). In the last few years, Assam witnessed a remarkable increase in *boro* rice output. From mere 0.02 lakh tonnes, its output reached the present level. Recently *boro* rice has gained unprecedented popularity, especially in the flood-affected areas of the state.

So far per hectare yield of rice is concerned, Assam lags far behind the national status. The average yield of rice in the state increased from 919 kg in 1950-51 to 1, 421 in 1995-96 as against the country's average of 668 kg and 2,617 kg respectively. When compared with the agriculturally advanced states like Punjab (3,500 kg), the position of Assam appears to be quite dismal.

An analysis of the triennium yield data at the district level reveals that the rice yield during 1993-96 on an average was 1,384 kg per ha. The district of Golaghat recorded the highest yield (1,796 kg) followed by Sibsagar (1,787 kg), N.C. Hills (1,786 kg), Dibrugarh (1,667 kg) and Cachar (1,616 kg). Most of the lower Brahmaputra valley districts on the

ASSAM : TREND OF RICE OUTPUT, 1951-1996

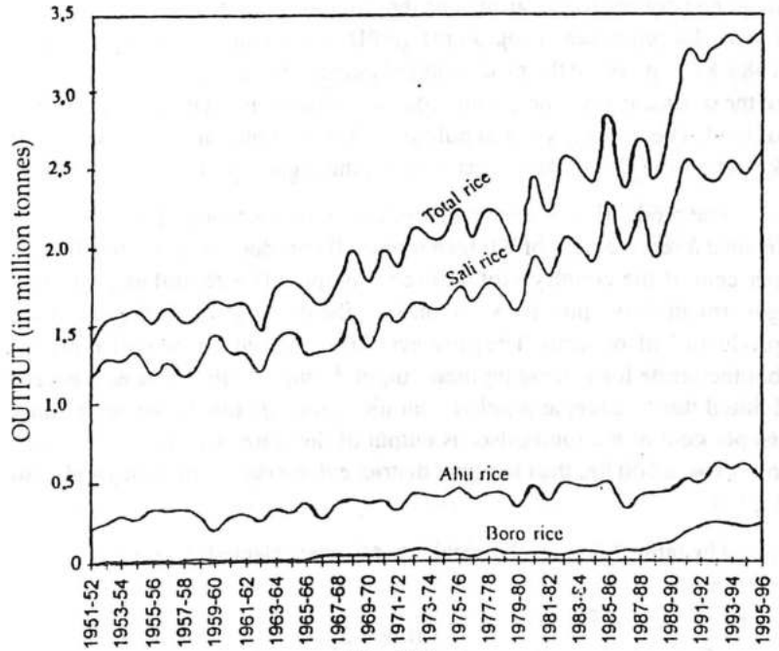

Fig. 9.3

other hand, recorded a relatively low yield (878-1282 kg). Interestingly, the two hill districts- Karbi Anglong and N.C. Hills had average yields much higher than the state's average. In these two districts, wet rice cultivation is practised with all possible care as almost all other major crops are raised through the age -old system of *jhumming* with a very low yield. The yield level in the Barak Valley districts is also found to be relatively high mainly due to extensive *boro* rice practice as well as higher level of adoption of HYV rice. It is important to note that the average yield of *boro* rice has increased from 901 kg in 1951-52 to 1,619 kg in 1995-96, an increase substantially higher than *sali* and *ahu.*

The output of wheat in the state at present stands at 95,000 tonnes and its average yield is 1,107 kg per ha. The production of maize on the other hand is 12,966 tonnes with an average yield of 681 kg. The district of Karbi Anglong shows the highest prodution of maize. In 1995-96, 57.38 per cent of the state's total production of maize came from this district.

The present output of pulses in the state is 6400 tonnes. Non-

availability of best seeds in time and the acidic character of the soil are the main constraints to the growth of their output in the state. The National Pulses Development Programme (NPDP) is being implemented since 1986-87 to increase the production of pulses. However, the desired effect of the scheme is yet to be obtained due to various reasons including shortage of fund. The average yield of pulses in Assam stands at 584 kg. With 970 kg per ha the Golaghat district exhibits the highest yield.

The production of edible oil seeds at present is around 1.6 lakh tonnes against a requirement of 8.0 lakh tonnes. Its production is a little above 1 per cent of the country's total oilseeds output. The central and the state governments have put stress on making the country self-sufficient in the production of oilseeds. The prospect of *rabi* oilseeds in the state is bright, but the scope for increasing their output during the *Kharif* season is very limited due to adverse weather conditions. *Kharif* output contributes only 10 per cent of the total oilseeds output of the state. The average yield of oil seeds is 550 kg, the Golaghat district exhibiting the highest yield (880 kg/ha).

The table 9.2 gives the yield rate of some selected crops cultivated in Assam.

Table 9.2
Yield rates of selected crops (in kg/ha)

Crop	1990-91	1995-96
Autumn rice	873	839
Winter rice	1446	1513
Summer rice	1556	1619
Wheat	1248	107
Jute	1632	1715
Sugarcane	42510	41555
Potato	7240	6816
Rape and Mustard	535	514

Source : Directorate of Economics and Statistics, Assam

Sugarcane production in the state amounts to 1.5 million tonnes with the yield rate of 41,533 kg/ha. Considering the potentiality of sugarcane cultivation in the state, the government of India introduced a centrally sponsored scheme called "Sustainable Development of Sugarcane Based Cropping System" during 1995-96 covering 8 districts. This scheme does not intend to increase the area under sugarcane but aims at enhancing its

yield so that overall income of the farmers per unit area may be increased.

Levels of Technification

Technification as a determinant of agricultural development implies the use of modern techniques in agriculture. As a process, it includes functions like irrigation, fertilizer input, adoption of HYV seeds, use of insecticides and pesticides and other forms of mechanisation (Bhagabati, 1997). The levels of application of these functions vary depending upon a variety of natural and socio-economic factors. The section as follow discusses the levels of technification in the agriculture of Assam in respect of certain modern techniques adopted.

Irrigation

In the monsoon lands, where winter cropping is difficult due to lack of rain water, irrigation plays a decisive role in respect of number of crops raised during an agricultural year. Irrigation, in fact, forms the principal component of agricultural modernisation which is basically more a package than a unitary process.

It is disappointing to note that the gross irrigated area in Assam constitutes only 15.06 per cent of the state's gross cropped area (1990-91). It is here worth mentioning that about 3.5-4.0 lakh ha of land in the state are annually affected by flood. The standing *Kharif* crops (mainly rice) are usually damaged by floods. Under such circumstances the only alternative left for the farmers of the flood-prone areas is to take up *rabi* cropping in order to compensate the loss caused by flood during the summer. Extensive *rabi* cropping, however, may not be economically viable if irrigation facilities are not adequately provided. It is a fact that most of the flood-prone areas in the state do not have any sort of irrigation facility. As a result the lands either remain fallow during winter or render very low yield. On the other hand, the areas where there is regular and timely supply of irrigation water, particularly in winter, show substantial progress in productivity. The chronically flood affected Malaybari area of Kamrup district acts a good example in this regard. The cropping intensity is also found to be higher where intensity of irrigation is more. There is thus a strong positive relationship between the two variables (Fig. 9.4).

It is to be noted that the medium and large irrigation projects

have not been found to be successful in Assam because of either non-completion of the projects or mismanagement of the systems. However, the agriculture of the state has benefited mostly from the minor irrigation schemes. Schemes having a culturable command area upto 2000 ha individually are classified as minor irrigation schemes. There are practically six types of minor irrigation schemes: (1) surface flow, (2) surface lift, (3) deep tubewell, (4) shallow tubewell, (5) dugwell and (6) mobile diesel pump. Of these, the shallow tubewells have proved more successful as the size of the landholding is generally small and the farmers are unable to invest more capital. There is hope that the massive installation of shallow tillers undertaken by the government recently may substantially change the state's agricultural scenario, if implemented properly.

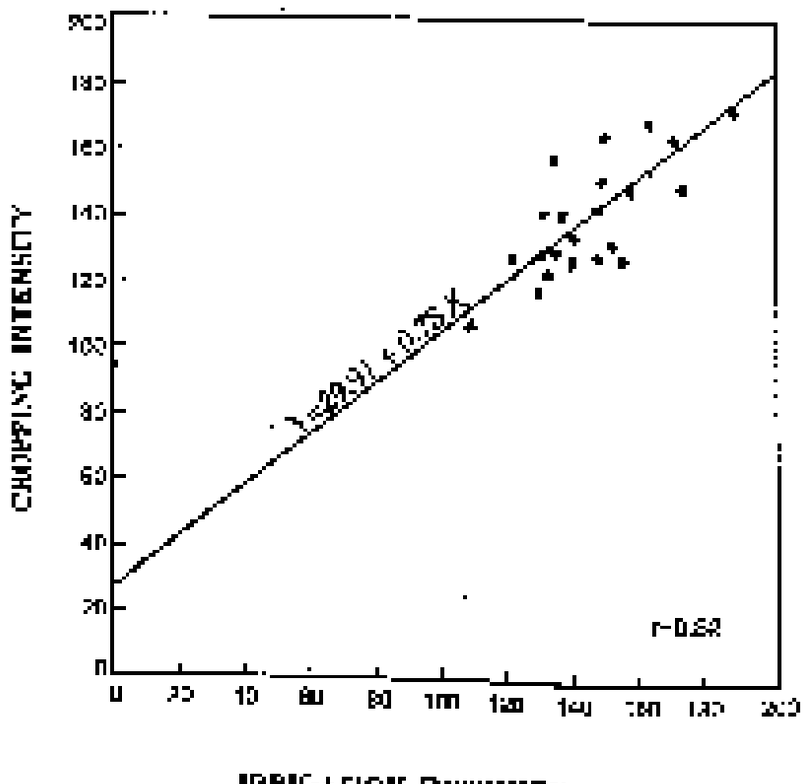

Fig. 9.4

Fertilizer Input

Application of modern technology generally enhances the frequency of cropping and the overall crop output. When more than one crop is raised from the same land, obviously the natural fertility of the soil declines. This necessitates the use of fertilizer. Fertilizer is, in fact, one of the basic inputs of the agricultural development package without which it fails to give the expected results. Nowadays, however, application of biofertilizers is more preferred as these are eco-friendly and sustainable.

In Assam, the level of fertilizer input is very low. The per hectare input of fertilizer is only 10.5 kg. The commonly used chemical fertilizers are Nitrogen, Phosphorus and Potassium. In 1995-96 the total fertilizers consumption in the state amounted to 49, 141 metric tonnes. The use of fertilizer is maximum in the Jorhat district, the per hectare input being 20 kg. In the districts of Kokrajhar, Bongaigaon, Lakhimpur, Dhemaji, Hailakandi, Karbi Anglong and N.C. Hills, the use of fertilizer is minimal (only 4 kg/ha).

Today, however, more stress has been laid on the application of biofertilizers like compost, rhizobium culture, azolla, etc. A scheme called 'Biofertilizer and Organic Manure' under this category is being implemented since 1991-92. The distribution system of fertilizers in the state is channelised through AALUC, STATEFED, ASAMCO, GPSS and other private agencies or dealers under the control of the Department of Agriculture, Government of Assam.

HYV Seeds

The high yielding seed breeding technology is considered as a revolutionary transition from the age-old tradition to contemporary innovation in the practice of agriculture. The ever-increasing population demands biotechnological research to invent high yielding varieties (HYV) so that more food could be produced. Introduction of these varieties in the soils of north-western India during the late sixties of the 20th century as a part of the green revolution, brought about significant changes in the level of foodgrain output of the country. This revolutionary change in the states like Punjab, Haryana and Western UP generated a spread effect which gradually reached eastern India including Assam.

In Assam, HYV rice was introduced during the late 1960s and

presently nearly 50 per cent of the state's total rice area is under these varieties (Table 9.3). Important HYV rice varieties adopted in Assam are IR-8, IR-20, Jaya, Ranjit, Bahadur, Pankaj, Dipla etc. Among the districts of Assam, Golaghat, Morigaon, Hailakandi and Karbi Anglong have more than 60 per cent of the total rice area under HYV rice. On the other hand, districts like Kokrajhar, Tinsukia, Lakhimpur and Dhemaji exhibit a very low percentage of area (less than 15 per cent) under HYV rice (Fig.9.5).

In the case of wheat, the area under HYV wheat in the total wheat area has always been high. As a matter of fact from 1972-73 onward all the varieties of wheat grown in Assam have been of HYV strain. However, it is important to note that with only 3.17 per cent of the state's total cropped area, wheat does not have a significant position in the agriculture of Assam. Moreover, whatever may the area be, the yield of wheat usually remains far below the country's average. Besides ecological constraints, the fact that wheat cultivation in Assam is a recent phenomenon, is adequately reflected in its low area and yield.

Implements and Machineries

It has been realised by all concerned that there is no alternative of mechanisation for agricultural growth at this moment. No field can be properly irrigated unless water is raised by electrically driven pumps or diesel generators. No pesticides can be applied properly to the plants except by means of manually or mechanically operated sprayers. Soil moisture cannot be conserved unless the soil is ploughed deep with iron-made soil scratchers. Thus, it is now commonly agreed that a farmer has to make use of modern implements and machines of some form in order to boost his agricultural output.

Machines are superior and efficient as compared to manual labour and draught power. It is, however, to be remembered that topography and edaphic factors largely control the use of farm implements and machinery in an area. In addition, the question of irrigation available, the size of holding, the degree of farming and the farmer's way of life further determine the use of modern farm implements.

In Assam, the strong attachment of the farmers to the wooden plough, an ancient soil scratcher, prevents him from using other means of ploughing. The wooden plough, however, can be improved upon to increase its efficiency without much difficulty and expense. Agriculture, for further improvement, requires appliances which make

it possible to reduce harvest losses and enable farmers to complete farm operation within a short span of time. This may help them in intensifying the farming practice.

Table 9.3

Percentage of HYV rice area to total rice area (1993-96)

(area in hectares)

	Districts	HYV rice area	Total rice area	P.C. of HYV rice area to total rice area
1.	Goalpara	24636	68503	35.96
2.	Dhubari	40686	127605	31.88
3.	Kokrajhar	20715	94948	21.81
4.	Bongaigaon	30026	94878	31.66
5.	Barpeta	119530	201483	59.32
6.	Nalbari	77122	144200	53.48
7.	Kamrup	79441	157906	50.30
8.	Darrang	69165	171113	40.41
9.	Sonitpur	60472	146941	41.15
10.	Morigaon	58311	92671	62.94
11.	Nagaon	111028	253475	51.69
12.	Lakhimpur	26214	110377	23.74
13.	Dhemaji	17522	69593	25.17
14.	Tinsukia	12949	64120	20.19
15.	Dibrugarh	37503	87580	42.90
16.	Sibsagar	42576	105388	40.47
17.	Jorhat	41514	97356	42.68
18.	Golaghat	53681	81124	66.01
19.	Karbi Anglong	75373	122251	61.66
20.	N.C. Hills	6738	14909	41.84
21.	Cachar	42438	100466	42.24
22.	Hailakandi	25704	42200	61.05
23.	Karimganj	45723	79843	57.26
	Assam	1132949	2529658	44.98

Source : Basic Agricultural Statistics, Directorate of Agriculture, Government of Assam

The Department of Agriculture in Assam through its engineering wing has been trying to develop and popularise certain implements suitable for

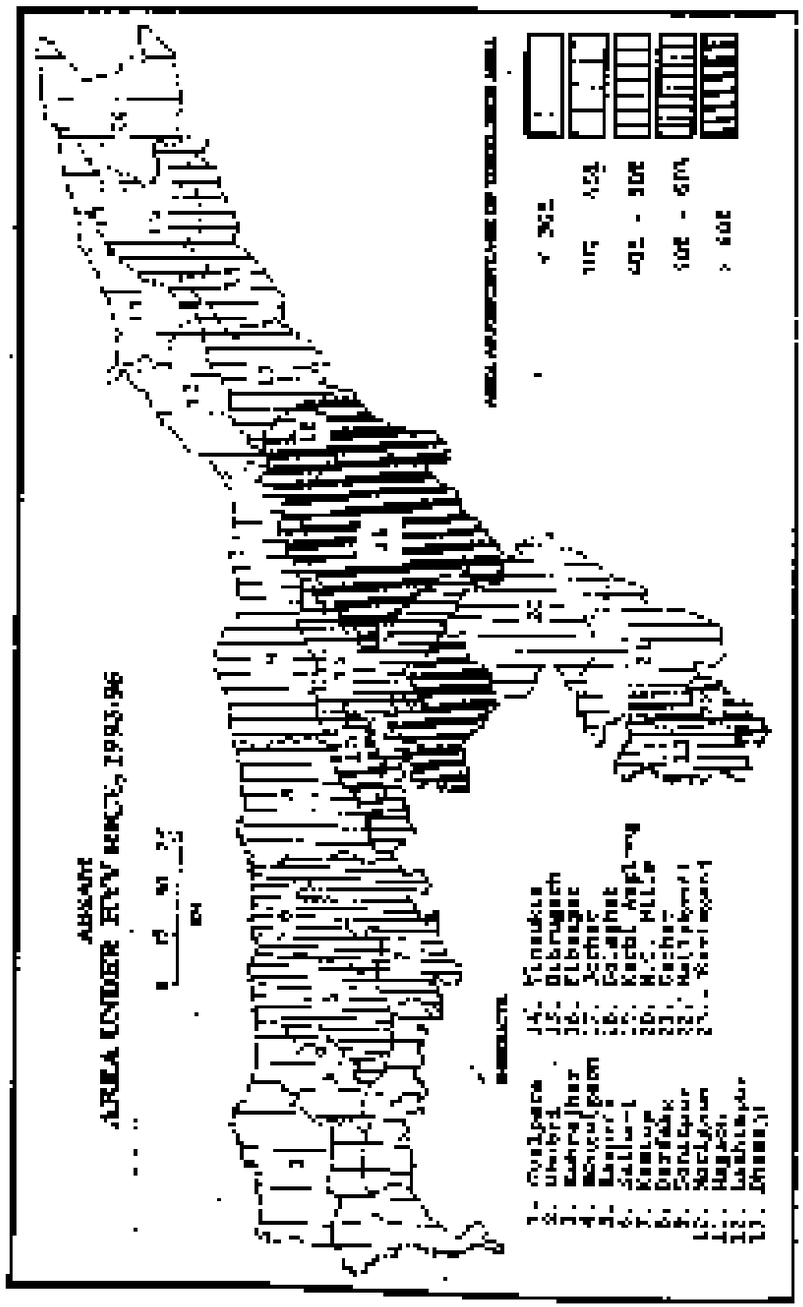

Fig. 9.4

state and marginal farmers who constitute more than 90 per cent of the state's total farmers. Through its 12 workshops, the department has popularised MB plough, paddy weeder, harrow, sprayer, puddler, etc. among the farmers of the state. The present status of availability of farm machineries and implements in the state along with the population that use them has been presented in Table 9.4.

Table 9.4
Type of farm equipment and the number of people using them in Assam

Type of equipment	Population
Manual	
Paddy weeder	17,926
Dry land weeder	2,012
Seed drill	932
Paddy cultivator	4,723
Sprayer	168,449
Duster	52
Other minor implements	1,67,497
Power operated	
Tractor	1,176
Power tiller	4,745
Sprinkler	58
Pumpsets	11,742
Animal drawn	
Mould board plough	1,10,477
BD Puddler	149
Three tyre cultivator	200
BD harrow	4,923

Source : Department of Agriculture, Assam

The centrally sponsored scheme of "Promotion of Agricultural Mechanisation" was launched in the year 1992-93. Accordingly an amount of Rs. 27.6 lakh has been provided to the State for supply of low HP tractors to the farmers at a subsidised rate. The total number farmers benefitted from this scheme in the state stands at 151 only. Thus it has been seen that the use of modern implements and machineries by the farmers of Assam is highly limited.

Prospects for Future Development

The development of agriculture in Assam still depends mainly on the performance of rice cultivation. Rice is the dominant crop for all the farming families, no matter how low its yield may be. The agricultural land use of the state is habitually been measured as characterised by an extraordinarily high proportion of rice acreage (Das, 1984) and as such, in any plan for the development of the agricultural sector, rice is expected to receive topmost priority.

During the last few years, debates on sustainability and long-term effectiveness of development measures renewed the tendency to look to the traditional systems as potential ways of promoting sustained development (Elkins, 1987). But, for meeting the immediate and expanding demand, the traditional practices are often denied and the question of sustainability of the modern practices is simply neglected.

In Assam, the agricultural practice is, by and large, traditional. The present status of farm implements, fertilizer and irrigation use, yield levels of crop per unit of land and harvesting, example adequately indicate that there is yet a long way to modernize the state's farming system. This is no less true in the case of rice farming too. Rice is cultivated on farmworks of highly fragmented landholdings, the average size being 1.28 hectares, or one country's average of 1.69 ha. Interestingly, more than 80 per cent of the operational holdings in the state are below 2 hectares. Moreover, more than 25 per cent of the state's net sown area is regularly affected by flood during June-September which coincides with the wet rice season. Under such circumstances, it is really hard to prescribe alternative rice farming system which would be environment friendly, economically viable and socially acceptable. The existing rice farming system in the state has to be reoriented in the line of what is known as 'eco-farming' in which the water biomass, weeds, animal dung and rainwater can be consistently integrated into the farming process allowing a befitting co-existence in consonance with the seasonal weather changes and the rhythm of the behaviours of the Brahmaputra river system, in order to make it sustainable. The main thrust of rice farming should be shifted from wet to pre-flood early ripening and post-flood short duration local ecological suitability. There is thus a bright prospect of increasing yield and output of rice in the state, if its cultivation is properly looked from a right perspective. The prospect of other cereal crops, especially vegetables, is equally bright in the state.

It is a fact that small-scale agriculture alone cannot help accrue sufficient income for a minimum standard of living and for investment in

agriculture. Therefore, there should be scope for subsidiary work in allied occupations, such as animal farming, piggery, fishing and other small-scale agro-based industries. However, it can be pointed out that the small-scale agriculture farming is the basic base on which the economy of Assam and the future of the hilltop masses largely rest. The necessary reinforcement of such a weak base can be made through proper implementation of the agricultural development plans evaluated within the state's geographical milieu.

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10

Mineral Resources

Introduction

Assam is a treasure home of mineral resources. Lots of work have been done by the state Directorate of Geology and Mining for assessing and locating these mineral resources since the mid 19th century. Jenkin (1835-1853) was the first man who gave an account of limestone deposits of the state. Hannay (1845-1856) presented the picture of petroleum-bearing horizon of the state. Lutenon, Dalton and Hanny gave an account of the gold-yielding deposits of upper Assam in 1853. But, the gold extracted from the Subanshiri river dates back to earlier than eighth century. In 1932, AOC (Assam Oil Company) did a comprehensive work regarding the sedimentary rocks of Assam. But the story of oil goes back as early as the first part of the 19th century. In the case of coal, regular mining was started in 1852 by Railway engineers. In 1892, Ledo Collieries was started followed by Tlack (1884) and Namdang (1895). Besides oil and coal, Assam possesses vast quantities of mineral resources, viz. limestone, sillimanite, base-metals, beryl, building and road metals, asbestos, fire clay, kaolin, fuller's earth, tiles, quartz, silicon, dolomite, etc. But the extraction of most of these is not economically viable except coal, petroleum, limestone and sillimanite (Fig 10.1).

Geological Background

The gneissic group is the oldest rock group in Assam whose age has been fixed as Archaean which mainly occupies major parts of Kochi Anglong district, parts of North Cachar Hill district and some parts of Darrang, Nagaon, Kamrup and Goalpara district. Quaternary deposits are represented in Assam by the older and newer alluvium covering major parts of the plain areas.

The tertiary sediments comprise the Jaintia, Disang, Barail, Tipam, Surama, Dupi Tilla and Dihang groups. The limestone, sandstone and shale assemblages of the Jaintia group are exposed in Gaurapara of North Cachar Hills and Sheelkatta, Kailajan, Deopani and Nambar area of Kochi

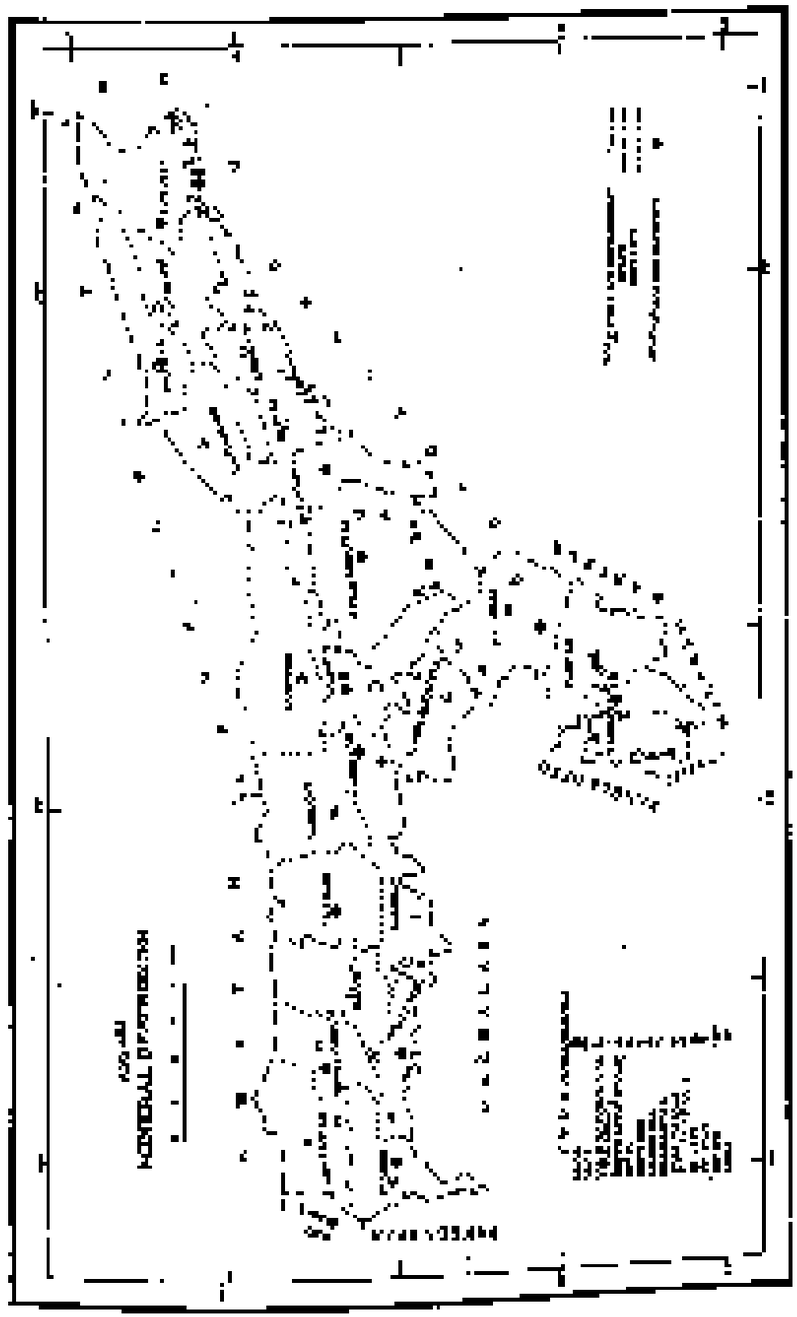

Fig. 10.1

Anglong district. In upper Assam, the Surma Group is completely absent and the Barail Group is directly overlain by the Tipam Group.

Assam possesses vast quantities of different mineral resources. The economically viable mineral resources including the energy resources are described below.

Coal

Coal is one of the most vast mineral resources belonging to the 'energy group'. Assam coal belongs to two distinct stratigraphical horizons: Tertiary formations and Gondwana formations. In upper Assam, the two important Tertiary coal fields are: (i) Makum coal field and (ii) Dilli-Jaipur coal field. The Makum coal field is the oldest coal field and it is about 70 km long and 5 km wide. It has four main mines-Namdang, Dangolai, Ledo and Tipong. The coal division of the Geological Survey of India (GSI) has been conducting regional exploration by drilling work. There are more than 210 million tonnes of high quality coal to be extracted from the Margherita-Ledo coal belt. According to GSI, coal reserve in Makum coal field is 233.66 million tonnes. The Dilli-Jaipur coal fields are located on the east of Dibrugarh and Sibsagar districts. The thickness of the coal seams varies. The total reserve has been estimated by GSI at 54.02 million tonnes.

Table 10.1

Coal reserves in different fields of Assam

Name of coal field	Depth (in meter)	Reserve			Total (in million tonnes)
		Proved	Indicated	Inferred	
Tertiary Coal field					
1. Makum	0-600	123.66	50.19	61.81	235.66
2. Dilli-Jaipur	0-300	9.03	14.19	30.80	54.02
3. Karai Anglong	0-300	0.69	-	2.02	2.71
Gondwana Coal Singrimari	0-300		2.79		2.79
Total		133.38	67.17	94.63	295.18

Source : Directorate of Geology and Mining (DGM), Assam

Table 10.2

Mine-wise production of coal in Assam

Name of Mine	Annual production (Metric Tonnes)		
	1992-93	1993-94	1994-95
Tipong underground	1,53,012	1,55,007	1,47,428
Tirap open cast	6,91,039	5,90,066	6,58,654
Ledo underground	95,179	1,00,258	1,03,212
Bargolai underground	1,18,426	1,27,003	1,27,991
Ledo open cast	1,08,822	2,00,072	1,17,149
Jaipur underground	21,697	26,235	20,545
Namchik	-	-	1,050
Simsang	-	-	905

Source : Directorate of Geology and Mining, Assam

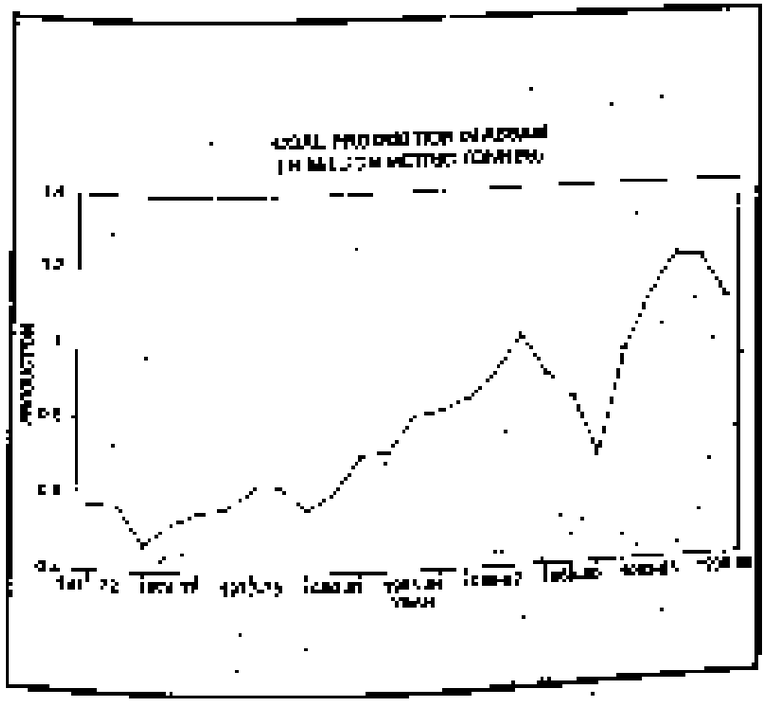

Fig. 10.3

Table 10.5
Coal production in Assam

Year	Production (million metric tonnes)
1971-72	0.497
1972-73	0.571
1973-74	0.471
1974-75	0.526
1975-76	0.556
1976-77	0.572
1977-78	0.620
1978-79	0.597
1979-80	0.563
1980-81	0.512
1981-82	0.703
1982-83	0.710
1983-84	0.801
1984-85	0.812
1985-86	0.841
1986-87	0.903
1987-88	1.001
1988-89	0.950
1989-90	0.870
1990-91	0.660
1991-92	0.951
1992-93	1.150
1993-94	1.201
1994-95	1.191
1995-96	1.278

Source : Directorate of Geology and Mining, Assam

Besides the existing Tertiary coal fields, a number of small isolated coal fields located in Kokilajan, Sheolivela, Khamsai, Jangle and Dejoung river bed of Kurbi Anglong, and Khola Area and Dilma in Mylliem Cherra Hills of Garo belong to Lindsham formation. At Kokilajan coal seam has a thickness of 1.80m. But the coal is of fine grade quality. The total coal reserve of Kokilajan and sheetkamu is estimated at 2.71 million tonnes. At Singrimari small amount of coal occurs in the Lower Barail rocks.

An estimate made by the GSI states that Assam has coal reserves to the tune of 202.39 million tonnes, of which 42 million tonnes have already been exploited from the earth's crust by open cast mining. The table 10.1 shows the coal reserves and production in Assam. From table 10.5, it is clear that the production of coal has declined during 1994-96, while it was the highest during the year 1992-93. At the beginning of this century, the production of coal was only 2 lakh tonnes which increased to 10.78 lakh tonnes during 1995-96.

Oil and Natural Gas

Assam is well blessed by nature in respect of oil and natural gas, which is termed as 'liquid gold'. The story of Assam oil goes back as early as to the time of Lieut. R. Wilcox who recorded the occurrence of oil seepage in the Burhi Dihing at Sapkhang in 1825. Later oil drilling was started in 1889 at Digboi. During the pre-independence period the quest for oil was carried out by the B.O.C. and after independence intensive search for oil was carried out by the ONGC. During the second quarter of the present century, a considerable amount of prospecting and drilling had been done by the Assam Oil Company Limited. Oil has been discovered also in Naharkatiya-Hugrijan areas, namely Dihing valley in 1948, Moran in 1956, Lakwa in 1965, Rudrasagar in 1961, Geleki in 1968, Borholla in 1970, Amguri in 1971, Changpang in 1973, Chandali in 1977, Demulgaon in 1977, Charingajan in 1984, Khorgaon in 1985, Namtim in 1986, and a gas field at Adamtila in 1989. The Naharkatiya-Hugrijan area is on Dihing valley located 60 km south-west from Digboi have the reserves of 45 million tonnes of oil and 210 billion cubic metres of gas. In the Lakwa and Geleki parts, the Tipam sandstone contain thick sands which are expected to become good producers. Besides these fields, oil and gas is found at Borholla, Chandali and Demulgaon.

Presently in Assam, the refineries located at Digboi, Guwahati and Bongaigaon are in operation, while the fourth one at Numaligarh is nearing completion. The Digboi refinery is the oldest refinery in India. The Digboi plant has an initial capacity of 0.50 million tonnes of crude which is later expanded to 0.65 million tonnes. The Guwahati refinery has a capacity of 1 million tonnes while the Bongaigaon refinery with a capacity of 1.35 million tonnes is being expanded to 2.35 million tonnes. The fourth refinery at Numaligarh will have a capacity of 3 million tonnes per year. Tables 10.4 and 10.5 show the production figures of crude oil and natural gas in the state produced by OIL and ONGC.

During 1994-95, Assam's crude oil production was 4.808 million metric tonnes. Of this, 2.195 million metric tonnes and 2.070 million metric tonnes were produced by OIL and ONGC, and till 1996 February, ONGC produced 1.96 million metric tonnes. The natural gas produced by OIL & ONGC was 175.10 million cubic meter during 1994 -95 (Table 10.5).

The ONGC has so far probable 6 structures, of which 2 are hydrocarbon-bearing. At present ONGC has 5 main trunk pipe lines, viz.Lakwa-Moran, Rudrasagar-Lakwa, Geleki-Dikhow Junction, Geleki- Jorhat and Borholla-Jorhat to take crude oil to the terminal at Moran from where it is transported by OIL to the refineries. The prognosticated reserve of 1,05,000 sq. km covered by both OIL and ONGC is about 3900 MMT oil and OEG (Oil Equivalent of Gas).

Table 10. 4
Production of crude oil by OIL and ONGC

Year	Net production by OIL (in million metric tonnes)	Net production by ONGC (in million metric tonnes)	Total production (in million metric tonnes)
1980-81	1.289	0.420	1.709
1981-82	3.016	1.750	4.766
1982-83	2.809	2.136	4.945
1983-84	2.841	2.129	4.970
1984-85	2.688	2.165	4.853
1985-86	2.592	2.264	4.856
1986-87	2.562	2.510	5.072
1987-88	2.395	2.605	5.000
1988-89	2.370	2.826	5.196
1989-90	2.636	2.835	5.471
1990-91	2.551	2.245	4.796
1991-92	2.416	2.336	4.752
1992-93	2.359	2.344	4.703
1993-94	2.648	2.029	4.677
1994-95	2.738	2.070	4.808

Source : DGM, Assam

Limestone

Limestone deposits of Assam are located in Karbi Anglong and North Cachar Hills districts. Many limestone beds are interbedded with

coal-bearing sandstones. Good quality limestones belonging to the Eocene age are suitable for manufacturing cement and have been commercially exploited for this purpose. In Umrangshu area of North Cachar Hills district, limestone occurs with a thickness of 80 metres. In Karbi Anglong district, limestone occurs in Koilajan and Dillai Parbat.In Koilajan area, the deposit was investigated by State Directorate of Geology and Mining in the year 1962 and proved a reserve of 30 million tonnes of cement–grade limestone. The Dillai Parbat limestone deposit in Karbi Anglong has total reserve of 29.41 million tonnes. The reserve of cement–grade limestone occurs in Sainilagso and Sheelvetta, but has no economic significance. In the North Cachar Hills district the Umrangshu area has a massive bedded deposits with a thickness of 80 meters. In Panimur and Garampani, limestone was discoverd by the State Directorate in late sixties but had no economic importance (Table 10.6).

Table 10. 5
Production of natural gas by OIL and ONGC

Year	Net production by OIL (in million cubic meter)	Net production by ONGC (in million cubic meter)	Total production (in million cubic meter)
1982-83	663.87	171.10	834.97
1983-84	641.44	89.99	731.43
1984-85	652.73	143.50	796.23
1985-86	685.27	85.14	770.41
1986-87	777.98	112.25	890.23
1987-88	799.36	232.04	1031.40
1988-89	737.16	238.68	975.83
1989-90	770.95	236.78	1007.73
1990-91	812.46	178.56	991.01
1991-92	788.50	170.62	959.12
1992-93	813.51	185.01	998.52
1993-94	711.78	160.01	871.79
1994-95	748.98	175.10	924.08

Source : DGM, Assam

The production of limestone grew moderately during the last decades. During the year 1995-96, however, there have been some positive change and its production increased to 0.4080 million metric tonnes (Table 10. 6).

Table 10.6
Limestone production in Assam

Year	ACC (in million metric tonnes)	Birla Cement (in million metric tonnes)	UCI at Dillai Darbat (in million metric tonnes)	Total (in million metric tonnes)
1976-77		-	0.0683	0.0683
1977-78	-	-	0.0830	0.0830
1978-79	-		0.1414	0.1414
1979-80	-	-	0.2917	0.2917
1980-81	-	-	0.2007	0.2007
1981-82			0.2202	0.2202
1982-83	-	-	0.2415	0.2415
1983-84	-	-	0.2017	0.2017
1984-85	-	-	0.2092	0.2092
1985-86	-	-	0.2110	0.2110
1986-87	-	-	0.2196	0.2196
1987-88		-	0.2379	0.2379
1988-89	0.0112		0.3113	0.3225
1989-90	0.0001	0.0345	0.3359	0.3405
1990-91	0.0028	0.0655	0.2719	0.3401
1991-92	0.0026	0.0911	0.1816	0.2753
1992-93	0.0020	0.0209	0.1519	0.1749
1993-94	N.A.	N.A.	N.A.	0.2512
1994-95	N.A.	N.A.	N.A.	0.2963
1995-96	N.A.	N.A.	N.A.	0.3080

Source: DGM, Assam
N.A. indicates not available

Sillimanite

Assam contains the best quality massive sillimanite occurrences of India. The deposits occur in the banded gneissic complex of Precambrian age. There, two types of sillimanite deposit occur. One is sillimanite and other is quartz-sillimanite. The important areas are mostly concentrated in Karbi Anglong district, namely Chippilangso, Inspection Saddle, Upper Dhansiri, Chilangso and Amjuram in Nowgaon district. Sillimanite deposits is also found. Sillimanites of Chippilangso area, Nowgaon area and Inspection saddle are most promising

The reserve of sillimanite rock will be in several million tonnes.

Base Metals

The State Directorate of Geology and Mining reported the base metals in the form of Pyrite chalcopyrite and covellite molybdenite etc. at a number of places. At Sonaberia, the pyrite disseminations of gneissic groups are available, but have no significance. Shelvetta, Mukum and Darjuri in Goalpara district are the other important areas. Shelvetta and Mukum have pyrite deposits, but Darjuri has sulphide minerals.

Decorative Stone : Building and Road Metals

In Assam, granite and granite gneisses are available which are suitable for use as decorative stone, building stones and road metals. Decorative stones can be used for manufacture of decorative tiles, slabs etc. Deposits of granite occur mainly in Lower Assam, Karbi Anglong and North Cachar

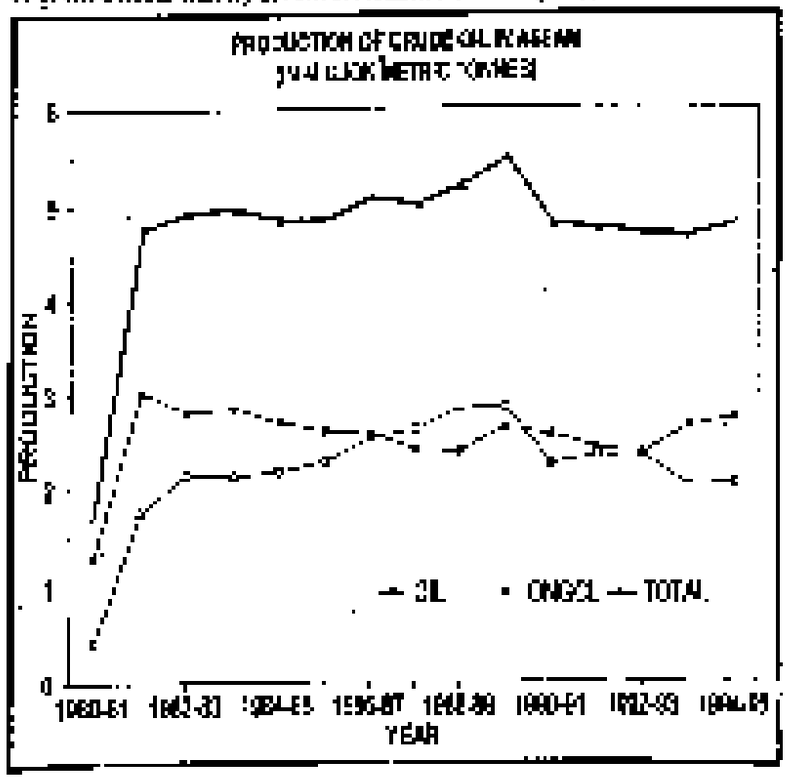

Fig. 10.3

Hills, Jaintia and Cachar districts covering an area of 3,500 sq km. and Garo Hills mainly in Tura, Baghmara, Kalaigaon, Goalpara, Kamrup and Nagaon districts of Lower Assam. Massive sandstones occur in Upper Assam below the coal measures. The formation is mined in quarry and other quarries around Margherita area and can supply several million cubic metres of metals. But there is no systematic survey carried out for assessing the reserve.

Iron ore

Iron ore deposits occur in Chandardinga Hills, Tangsapara and Mahadeoh of Goalpara district and also in Hebim of Kamrup district. Chandardinga has a reserve of 10 million tonnes in Archaean complex consisting of amphibolite, banded ferruginous quartzites and micaceous metapelites. The thickness ranges from 30-74 metres. Iron ore deposits in Assam are presented in table 10.3.

Table 10.3
Total reserve of iron ore deposits in Assam

Location	Latitude Longitude	District	Reserve	Associated Rocks	Types of Ore
Chandardinga Hills	26°12'30"N 90°26'30"E	Goalpara	10 million tonnes	Banded Quartzite & ferruginous phyllite	Haematite Magnetite
Hebim	25°51'15"N 91°10'0"E	Kamrup	Indicated reserve 0.54 million tonnes	Banded haematite quartzite	Haematite
Tangsapara	26°3'55"N 90°28'30"E	Goalpara	9 million tonnes	Banded Ironstone, Magnetite Quartzite	Haematite Magnetite

Clay

Various types of clay deposits occur in Assam but these have not been exploited properly. Clay is used mostly in brick-making and cement manufacture. The clay deposits occur at Sheelakunti and Kukijan of Karbi Anglong district. The total reserve is 55,000 tonnes.

Kaolin or china clay which is a soft white residual clay produced by the weathering of granite rocks in Upper Deopani, Sheelvera and Soonitian area of Karbi Anglong district. The quality of Deopani china clay makes it a fine taste mass within the granite gneiss. It is mainly used in the manufacture of porcelain, tiles, paper and insulators etc. The total reserve of Deopani, Salonijan and Sheelvera deposits are 0.01 million tonnes, 0.17 million tonnes and 58,300 tonnes respectively.

Fuller's Earth

In Assam, Fuller's earth deposit of clayey rock is located on the left bank of river Dipaldia at Subenkhata. The total reserve is estimated at 12 million tonnes. The deposit is intercalated with lignite sandstone and overlain by gravel bed.

Glass sand and Quartz

Glass sands suitable for optical use have been reported from Jinkyeshang of Karbi Anglong district, Lajori and Tharo, area of Nagaon district. These glass sands are associated with clay and silt. The total reserves of Jinkyeshang, Jiaduri and Thangori deposits are 11,700 tonnes, 2 million tonnes and 1.78 million tonnes respectively.

Good quality quartz is deposited at Hebim of Kamrup district, Sheelvera and Rangsali of Karbi Anglong district. Most of the quartz deposits occur in association with felspar. The total reserves of Hebim, Sheelvera and Rangsali deposits are 30,500 tonnes, 45,200 tonnes and 19,500 tonnes respectively. As regard felspar, the deposits of good quality felspar occur at Hebim and Pulibamuna. The felspar contains large crystals.

Placer Gold

Assam was a producer of placer gold since time immemorial. All the river sands of Assam used to bear gold in varying quantity. The river Subansiri in Upper Assam was a rich producer. The Geological Survey of India (GSI) and Directorate of Geology and Mining carried out geological survey during 1989-90 at Suwansiri, Gerukamukh, Pellukhati and Chandubi area where 18 bore holes were drilled. Out of 18 bore hole samples collected by the geoscientists of DGM, Assam, 13 indicated the presence of gold.

Lithomarge, Ochre and Silica

Lithomarge (white clay) occurs at Namdang Nadi valley. The total reserve of Lithomarge is estimated at 15 lakh tonnes. Ochre occurs in the foothills of Kamrup district. Ochre is yellow earth used mainly for colouring matter. Small amount of mica occurs in Barapani in Kamrup district. Near Tin Tilla village on the bank of Dhir river, mica is found, but it is not economical and thus economic value.

Silica Sand

Silica sand deposits are located at Rajuri Hills and Chanajuri Hills of Nagaon district. The total reserve of Rajuri is 10 million tonnes, while at Tranajuri the reserve is 1.78 million tonnes. The glass sand can be used for manufacturing of low grade glasswares.

Environmental Impact of Mineral Exploration

The environmental impact of mineral resources development covering the whole spectrum of operations ranging from exploration through development and mining to beneficiation and utilization of minerals, needs accurate resource assessment and serious consideration for proper planning due to the pollution impact on the surrounding environment. Certain negative effects on the surrounding environment through many physico-chemical and biological changes during exploration, production and refining can easily have major pollution impact on the surroundings. Coal is a major source of pollution. When it is burnt in crude coal huge quantity of SO_2 is released into the air which damages the atmospheric condition. Coal is mined in two methods: open cast mining and underground mining. The former causes more damage to the surrounding ecology, but it has limitations in Assam's soil conditions. Open cast mining causes grave scars on nature. Open cast mining in the Margherita area is being opposed by individuals as well as several other organizations due to deforestation and impact on environment. The ecosystem is also hazardously affected by coal mining of Makum coal field adversely affects the surrounding ecosystem. The environmental degradation due to the oil based industry is also severe. Release of refinery waste from Lakwa and Geleki locally known as 'gaspani' has damaged thousands of acres of crop fields rendering it unfit for cultivation.

Mineral Resources and Economic Development of Assam

The Directorate of Geology and Mining has brought to light the existence of promising mineral wealth in the form of coal, oil and limestone. In addition to these, there are huge deposits of kaolin, fireclay, glass sand, iron and huge quantities of decorative stones. These resources play an important role in the economic development of Assam.

The petroleum resources play an important role in economic growth of Assam. With an annual natural gas production of 2.5 billion cubic feet, it is termed as 'liquid' gold. The petroleum consumption in the household sector, transport sector and industrial sector are respectively 30% (18% and 32%). The national income coming from mining and quarrying sector increased from Rs. 11,245 crore in 1980-81 to 12,598 crore in 1990-91. The value of mineral production in Assam is Rs. 1262 crores. In the value of mineral production Assam ranks 5th. During 1990-91 Assam contributed 7% of the total value of mineral production in the country. Petroleum (crude) is the principal mineral produced in the state contributing 90% value of minerals produced during 1990-91. Oil and Natural Gas Commission (ONGC) is the most profitable public sector organization. The annual profit of ONGC is about 15,000 crore and it has employment capacity of around 30,000. The Government of Assam gets Rs. 250 crores of royalty per year. Besides petroleum and natural gas, coal contributes royalty, which becomes the main source of revenue of the state. It provides enormous employment generation.

Conclusion

During the pre-independence period search for economic as well as strategic group of mineral was carried out in Assam. After the Second World War detailed mineral deposits in the early states. The results are remarkable, attracted by mineral deposits in the early states. The results are remarkable, attracted by mineral deposits in the early states. The results are remarkable, attracted by

industries, such as manufacture of shoe polish, insecticide and furniture etc based on the products of Assam's forest. Besides other minerals like asbestos, iron, copper, corundum, gold, graphite, ochre, kaolin, salt etc., however, occur in small quantities without much potential significance at the moment.

The Mines and Minerals Regulation Act, 1957 was amended through an ordinance by the President of India on 25 January, 1958. The main objective of this amendment was to encourage the private entrepreneurs as well as the foreign investments and technology for exploitation of minerals.

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11

Industries

Introduction

In the sphere of industrialization Assam is yet to make much headway. Although the base for industrial development in Assam was created more than a century ago with the establishment of tea, coal, oil and plywood industries, it could hardly accelerate the pace of industrial development during the subsequent period. Assam has the distinction of having the first oil refinery, first plywood factory and also the first tea industry in the country. But due to several factors the state continues to remain industrially backward even after more than four decades of economic planning.

At present, Assam has 3 oil refineries, 9 tea factories (848 tea estates), 10 plywood and wood factories, 3 cement plants, 3 paper mills and several silk factories, of which one, Silkworm seed factory, is again in the process of being revived. There are three sugar mills, three jute mills and one rubber mill. A few Central Government public sector undertakings have also been established in the region. Moreover, there are a number of steel re-rolling mills. Recently a number of engineering industries have also been set up in the state.

According to the publication of Annual Survey of Industries (ASI) 1989-90, Assam had a total number of 1581 registered factories which contributed only 1.4 per cent of the total factories in the country. The number of persons employed in the state's factory sector totalled 1.17 lakhs (or 1.6 per cent of the country) during 1989-90. The value of output and net value added during the year were to the tune of Rs. 1746.7 crores and Rs. 458.7 crores, the percentages to the country's total being 1.9 and 2.0 respectively.

It is, however, encouraging to note that a few efforts are being made from different quarters for setting up industrial activities and to create a favourable industrial environment in the state through proper use of various resources. Besides, steps for revival of existing infrastructural inadequacies. It is hoped that these efforts would bear fruits and promote the industrial growth in the state in near future.

Type of Industry

Industry refers, as in common usage, to manufacturing sector and excludes agriculture and mining and most services, but may include building and public utilities (Florence, 1964). In this sense, tea and other plantation industry, coal mining, oil extracting etc. cannot be termed as industries. But in a wide sense, the term 'industry' is quite flexible and includes all those activities whereby (i) desirable goods are extracted from the earth; (ii) they are manufactured into finished products and given more useful form; (iii) they are taken away from one place to another, (iv) they are kept in warehouses in order to provide them time utility and then ultimately, (v) they are placed in the hands of those who pay for them. To be more precise, industrialisation implies-

(a) the use of power, machinery, modern techniques and organisation;

(b) capital investment on a large scale;

(c) division of labour and exchange and distribution of goods with the help of developed monetary system;

(d) the transformation of the whole economy; and

(e) also industrialisation of agriculture, i.e. production of implements for agriculture to facilitate intensive agriculture, manufacture of fertilizers, modern irrigation and artificial rains, etc. (Sharma & Chauhan, 1986).

In short, an industry may basically be defined as an enterprise involved in activities for manufacturing goods, processing of materials and rendering some specified services to others[2]. The value addition is another important aspect of an industry.

Industrial units can be classified on the basis of their investment limit on plant and machinery, types of organisation and basic raw materials processed:

a. Small-scale industries, ancillary units and export oriented units with investment in plant and machinery upto Rs. five lakhs (irrespective of their location) are termed as Tiny Enterprises.

b. The fixed investment in plant and machinery (original value) whether held on ownership terms or on lease or by hire purchase that does not exceed Rs. sixty lakhs is termed as Small Scale Industry.

In case of an industrial undertaking reffered to in (b), the limit of investment in fixed assests in plant and machinery shall be Rs. seventy five lakhs provided the unit undertakes to export at least 30 per cent of the annual production by the end of third year from the date of its commencing production[3].

c. The limit of investment in fixed assests in plant and machinery will be less than Rs. seventy five lakhs for ancillary units. These units manufacture parts, components and should render services to some other small, medium and large-scale industries at least 50 per cent of their production for making the final products[4].

d. Industrial units having its investment on plant and machinery more than Rs. seventy five lakhs but less than Rs. five crores are termed as Medium Scale Sector Industries.

e. Industrial units whose investment on plant and machinery is more than Rs. five crores are termed as Large Scale Sector Industries[5].

On the basis of type of organisation the industries of Assam can be classified into four categories -

1. Central Public Sector Undertaking (Industries)
2. State Sector (Joint Sector Project)
3. Industrial Unit under Co-operative Sector
4. Private Sector.

The Techno-Economic Survey of Assam (1962) conducted by National Council of Applied Economic Research (NCAER) has classified the industries into the following groups according to the basic raw materials processed[6].

1. Agro-based industry :	(a)	Tea industry
	(b)	Food processing industry
	(c)	Sugar industry
	(d)	Textile
2. Mineral-based industry :	(a)	Metallic industry
	(b)	Non-metallic industry
	(c)	Chemical industry
3. Forest - based industry :	(a)	Saw milling
	(b)	Plywood industry
	(c)	Pulp industry

4. Miscellaneous industries

In recent years various types of industries have been set up in the state. Encompassing all the industries, a seperate classifcation can be made. It is based on the basic raw materials processed and their nature. Assam's industries can be classified as follows -

I Agro-based industry :	(a) Tea (b) Sugar (c) Refine and Edible Oil (d) Jute (e) Rice mills (f) Flour mills (g) Fruit and Food Processing (h) Packaging of Food Products (i) Manufacture of Beverage, Soft drink (j) Tobacco and Tobacco Products (k) Rice - bran Oil (l) Caffaine (m) Grain - mill, Spice grinding mills etc.
II Mineral - based industry :	(a) Coal (b) Petroleum (Crude) and Natural Gas (utilised) (c) Limestone
III Forest-based industry :	(a) Plywood (b) Paper and Pulp (c) Saw mills (d) Match Factory (e) Hard Board (f) Wood products, furniture and fixture.
IV Chemical-based industry :	(a) Fertilizer (b) Synthetic Fibre (c) Industrial Gases (d) Plastic (e) Rubber (f) Pharmaceuticals.
V Textile-based industry :	(a) Cotton and Synthetic Yarn (b) Spun Silk (c) Power loom (d) Weaving and Manufacturing (e) Processing, Dying, etc.
VI Animal-based industry :	(a) Tannery (b) Leather and Fur goods (c) Woolen mills.
VII Engineering and allied :	(a) Tea processing machineries (b) Sewing machines.
VIII Building materials :	(a) Cement (b) Asbestos (c) Basic Metal and Alloys (d) Dolomite (e) C.I. Sheet (f) Pipes and Wires

	(g) Brick and Tile (h) Metal Products and parts.
IX Electrical-based industry :	(a) Electrical machinery (b) Apparatus and appliances (c) Electrical consumer durable (d) Electronic goods.
X Miscellaneous industry :	(a) Paper products, Printing, Publishing and allied (b) Railway bulk fitting (c) Non-metallic mineral products (d) Agricultural implements (e) Manufactures of transport equipments (f) Education, Scientific and Research Services, (g) Repair Services (h) Welding, Servicing (i) Confectionery and Bakery etc.
XI Cottage industries :	(a) Cotton and Silk, handloom (b) Bamboo and cane products (c) Handicrafts (d) Bell-metal (e) Black-smithy (f) Pottery etc.

Registered Factories

Assam had a total of 2438 number of registered factories (i.e. factories registered under the Factories Act, 1948) during 1993 which was, however, lower than the figure of 2670 in 1991. The decline in number of registered factories during 1991-93 was mainly evident in respect of industrial groups like manufacture of food products, wood and wood products, non-metallic mineral products, basic metal and alloys industries, metal products and parts, electrical machineries, apparatus, appliances etc. along with repair of capital goods and repair services. Table 11.1 shows the growth of registered factories and their employment pattern in Assam over the past few years.

Finance and Employment

According to the Annual Survey of Industries (ASI) 1987-88, Assam had a total number of 1598 registered factories during that year and the fixed capital was Rs. 629.76 crores. The total amount of working and investor capital was Rs. 344.74 crores and Rs. 1018.19 crores respectively. The number of workers employed in these industries was 84.916.

Table 11.1

Number of registered factories and their employment in Assam

Year	Number of factories	Average number of workers employed daily
1980	1877	87,695
1988	2523	98,126
1990	2577	N.A.
1991	2570	N.A.
1992	2402	N.A.

Source : Chief Inspector of Factories, Assam
Note : N.A. means not available

A detailed picture of the capital employed, persons engaged and net income in the factory sector Assam from the Assam 1986-87 and 1987-88 is given in Table 11.2.

Table 11.2

Annual survey of industries (summary results) in Assam

Item	Unit	1986-87	1987-88
Factories	Number	1693	1598
Fixed Capital	Rs. Crores	741.41	629.76
Working Capital	do	259.14	344.74
Invested Capital	do	1126.70	1018.19
Outstanding Capital	do	595.04	546.94
Total Workers	Number	84495	84916
Total Employees	do	108177	102722
Wages to Workers	Rs. Crores	53.45	54.10
Total Emoluments	do	80.49	82.32
Total Input	do	1325.41	1399.51
Value of Products	do	1797.37	1895.41
Value of Output	do	1867.53	1927.89
Depreciation	do	60.29	64.09
Value Added	do	477.87	464.29
Net Income	do	436.23	421.37

Source : *Statistical Handbook*, Assam, 1993

It appears from Table 11.2 that capital investment in industries of

Assam is too meagre and it decreased during 1987-88 as compared to previous year investment. The same is the case for employment too.

Growth of Large and Medium Scale Industry

Assam had four large and medium scale industries (LMSI) at the beginning of planning viz. one of refinery at Digboi, a match factory at Dhubri, a plywood factory at Margherita and a tea processing machinery manufacturing unit at Thisulai. Till 1980 there were only 62 LMSI units. But during the last four decades the number of LMSI units has increased upto 124 (1995). The sectoral distribution of the units is given in table 11.3.

Table 11.3

Number of large and medium scale industries in Assam (sectorwise, excluding plantation industries)

Sector	Number of LMSI Units (as on 31st March)		
	1980	1991	1995
Central Public Sector	7	14	12 (9.7%)
State Unit Sector	6	12	14 (11.3%)
Co-operative Sector	2	6	7 (5.6%)
Private Sector	47	84	91 (73.4%)
Total	62	116	124 (100%)

Source : The Directorate of Industries, Assam
Note : Figures within bracket indicate the percentage of total LMSI units in 1995.

Table 11.3 shows that there are 33 LMSI units under the central public, state joint and co-operative sectors (1995) which constitute 26.6 per cent of the total number of LMSI units in the State. The remainder 91 (73.4 per cent) are in the private sector. The number of units under the central public sector is only 12 (9.7 per cent). The two industries viz. The Cachar Sugar Mill and Assam Spun Silk Mill have been closed down due to sickness. Only two namely Assam Petrochemicals Ltd. and Assam Gas Company Ltd. are running in profit, the rest are loss making[2].

It is evident from table 11.4 that the chemical-based industries are the largest in number (24.1 per cent) followed by forest-based units (21.9 per cent) and agro-based units (20.7 per cent). There are altogether 17 engineering and allied industries. The number of textile-based industries is 13. The percentage of other units is less. The spatial growth of LMSI units is shown in table 11.5.

Table 11.4
Categorywise distribution of LMSI units in Assam
(as on 31st March 1991)

Category	Number	Percentage
Agro-Based	24	20.7
Forest-Based	25	21.9
Textile Based	13	11.2
Engineering and Allied	15	14.7
Building Materials	2	1.7
Chemical Based	28	24.1
Animal Husbandry-Based	1	0.9
Others	6	5.1
Total	116	100.0

Source: Mali, D.D., *Economic Problems and Planning in Assam*, 1993, p. App. IX-4

Table 11.5
Districtwise growth of LMSI units in Assam (as on 31st March 1991)

District	Number of unit	Percentage
Kamrup	48	41.4
Dibrugarh	16	13.8
Tinsukia	15	12.9
Sibsagar	6	5.2
Sonapur	5	4.3
Nagaon	4	3.4
Bongaigaon	4	3.4
Morigaon	3	2.6
Goalpara	3	2.6
Jorhat	2	1.7
Goalpara	2	1.7
Karbi Anglong	2	1.7
N.C. Hills	2	1.7
Barpeta	1	0.9
Dhubri	1	0.9
Dhalgaon	1	0.9
Kokrajhar	1	0.9
Total	116	100.0

Source: Ibid

As can be seen from table 11.5, Kamrup District has the highest concentration of LMSI units (41.4) followed by Dibrugarh (13.8) and Tinsukia (12.9). All together these three districts constitute 68.1 per cent. Darrang, Nalbari, Hailakandi and Karanganj districts have one LMSI unit each. Two districts of the state (Lakhimpur and Dhemaji) do not have any LMSI unit.

Over the last couple of years a number of LMSI units have been established in the state and a few more are in the offing. Some such projects under various stages of implementation in the state are Industrial Papers (Assam) Ltd. at Dhing, galvanised plant and corrugated sheet project at Changsari, the first third refinery at Namaligarh and the massive gas-cum-rantha cracker project at Kathalguri (Fig. 11.1).

Growth of Small-Scale Industry

The growth of the small scale industries (SSI) has been one of the most significant features of the industrial development in the state. The small scale industries are playing a key role in the process of industrial growth.

Though there has been a rapid growth of small scale industries in the country, yet the growth in Assam is comparatively slow. In 1961, Assam had only 197 registered SSI against 35,783 in India. The number went up to 3,708 in 1981 against 1,39,577 in the country. The number of small scale industries in Assam is 15,048 (1995). The growth of SSI in the state is shown in Table 11.5.

Table 11.6
Growth of small-scale industries in Assam

Year	Assam	Unit registered during the year	India	Percentage
1961	197		35,783	0.55
1971	1,048	-	1,39,577	1.18
1981	3,708	-	5,23,185	0.71
1985	15,192	-	11,58,785	1.30
1992	21,280	3855	-	-
1994	17,948	1.25	-	

Source: Mali, D.D., *Economic Problems and Planning in Assam*, 1993, p. 1-5 and *Statistical Handbook*, Assam, 1995.

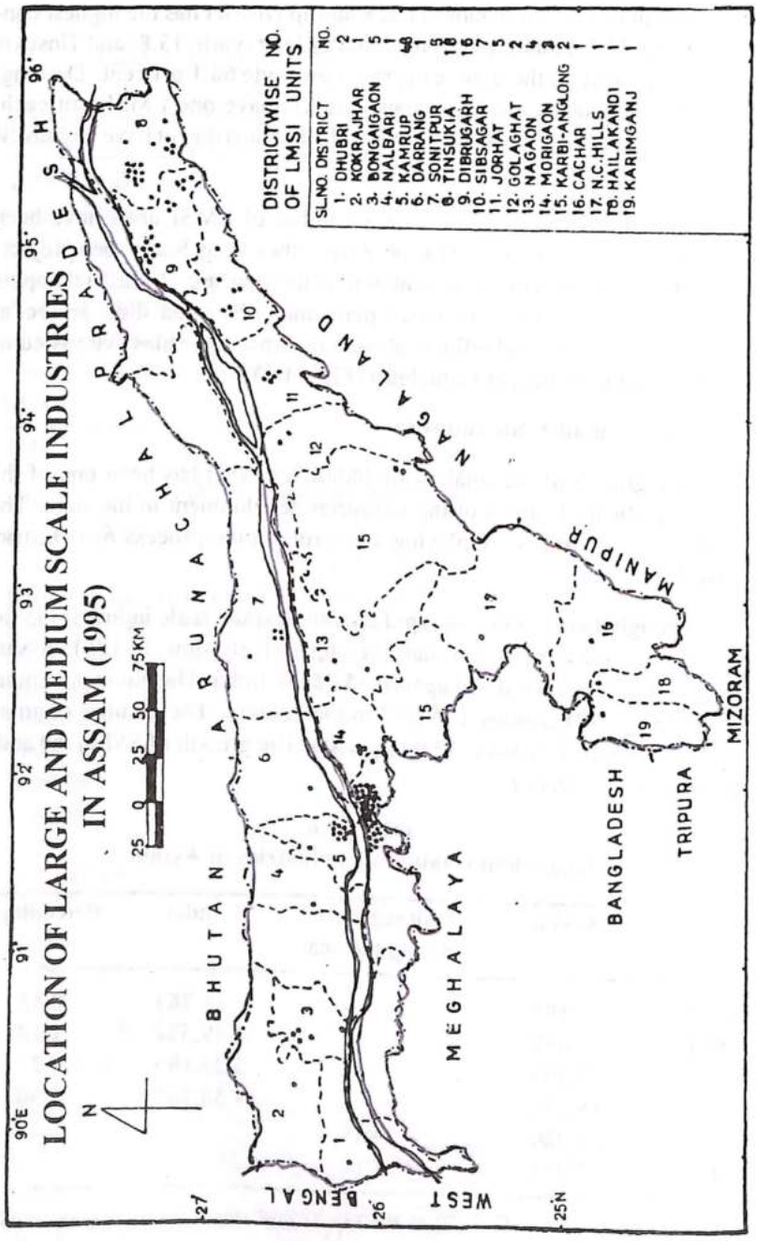

Fig. 11.1

It appears from Table 11.6 that Assam accounts for less than 2 per cent of the total number of SSI in the country. The number of registered units was 2,885 in 1992 and 1,751 in 1994. According to the last SSI census, generally 45 per cent of the units are either closed or untraceable[8].

The type of products manufactured in the small sector in Assam has also undergone a change over the years. Industrial units for the production of electronic goods, pharmaceuticals, plastics, electrical consumer durables, sewing machines etc. have come up in the small sector in the state (Mali, 1989, p. 116).

As SSI products, Assam can export commercial plywood, tea processing machineries, caffeine anhydrous and citrate, cane and wooden products along with decorated items, veneer, black board, laminates (sheets) etc[9].

Growth of Ancillary Units

In Assam, only 34 SSI units have been functioning as ancillary units, as per record with the Small Industries Service Institute (SISI). Of the 34 units, only 3 have been declared officially by Hindustan Fertilizer Corporation as its ancillaries; while the others are supplying their products to some other large scale units. In addition, another 25 units promoted by Assam State Electricity Board (ASEB) are under consideration for declaration as ancillaries. Though there is an ample scope for setting up ancillaries, its progress so far has not been satisfactory (Bari, 1987, p. 57). At least two hundred and twenty types of ancillaries can be grown on the basis of tea undustry alone in the state (Neog, 1997, p. 142.).

Some Important Industries

As mentioned earlier tea, coal and petroleum were the only large scale industries in Assam till 1950, and of them only the tea industry employs a large labour force. In real sense, none of them were a 'manufacturing' industry. The tea is essentially an agro-based industry and coal and petroleum are mining-based industries. Of course, the principal manufacturing industries in Assam were a few plywood factories, a cement and a match factory, whilst all other industries could be identified as small scale and cottage industries (Fig 11.2) Now, the picture has changed and diversified LMSI and SSI units are growing in the state.

Tea Industry

The tea industry of Assam is the largest export-oriented sector and

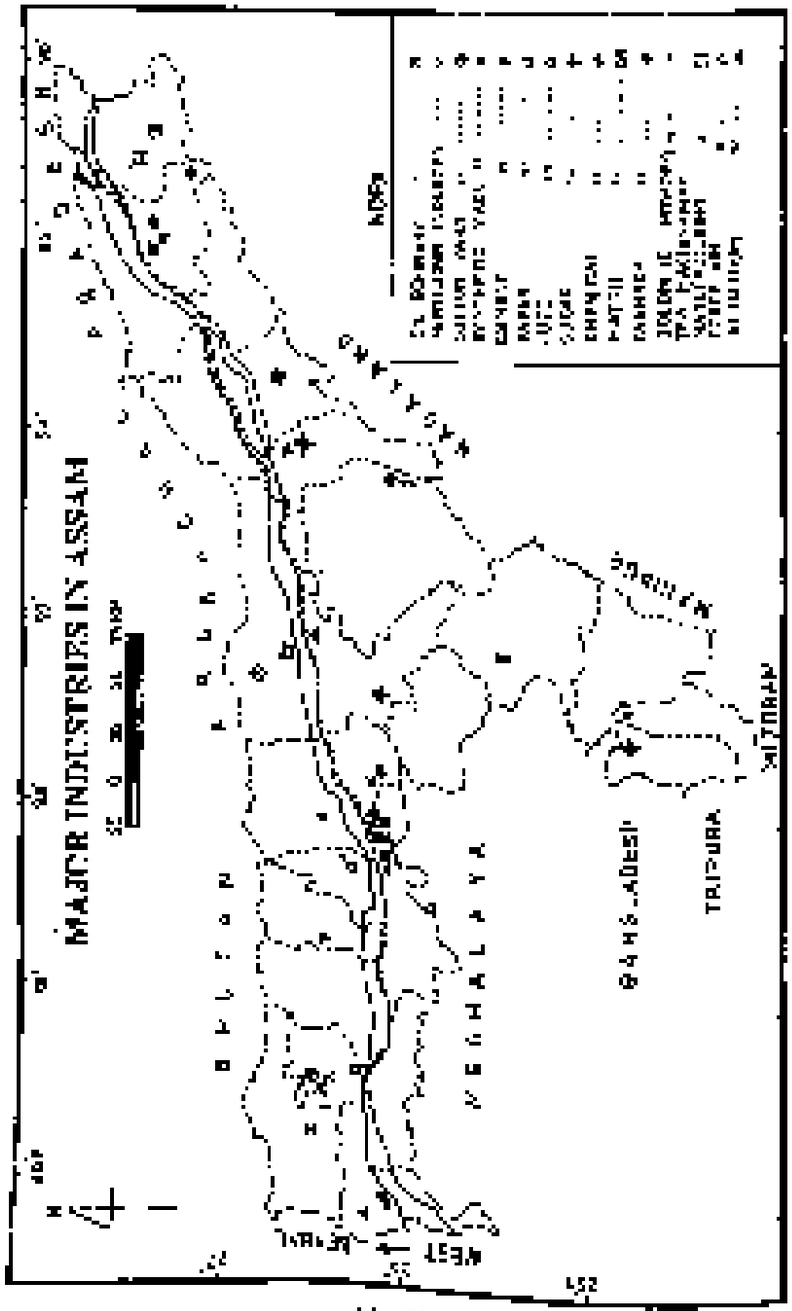

Fig. 11.2

the biggest foreign exchange earner employing about 5.5 lakhs workers. Assam occupies a prominent position in tea industry. It accounted for 55.5 per cent of the total area and 51.9 per cent of the total production of tea in India (1990). The Assam tea industry was the first capitalist enterprise introduced by the British in the early part of the nineteenth century. The plant was first discovered in Assam by Major Robert Bruce, brother of A.A. Bruce in 1823 at Bar pura near Teapur. But the cultivation was started in a systematic manner in 1835.

In 1838, the first commercial sample of 8 chests of tea was sent to London and sold at prices ranging from 21 Shillings 8 pences to 34 Shillings per lb. The first tea concern The Assam Tea Company was formed in 1839 with a capital of $ 2,20,000 and the government tea estate at Jaipur was handed over to it in 1840 (Goswami, 1963, p. 141). Under the Assam Company the growth of the tea plantation was very slow. When plantations were opened as private enterprises in 1859, it expanded rapidly. There was a tremendous growth of tea industry during the last three decades of the nineteenth century. The total amount of capital invested in the industry increased from $ 1 million (Rs. 15 million) or even less than that in 1892 to an estimated $ 14 million (Rs. 210 million) by 1904.

Table 11.7 shows the progress of tea industry in Assam from the year 1850 to 1990.

Table 11.7

The progress of tea industry in Assam

Year	Number of tea estates	Area under cultivation (in hectare)	Production (in '000 kg)
1850	1	800	99
1900	804	1,35,379	14,017
1950	990	1,56,208	1,33,439
1990	848	2,30,363	3,88,181
India 1990	13821	4,16,561	7,30,338

Source: *Statistical Handbook*, Assam, 1993.

It appears in Table 11.7 that in 1850 the number of tea estate was only 1 with 800 hectares of land. But the number went up to 804 at the end of the nineteenth century and the area under tea cultivation rose to 1,35,379 hectares. The number of tea estates in the state decreased to 848 in 1990

as against 999 in 1956, as tea cultivation had been severely affected by drought after 1960. It is also partly the result of industrial sickness and merger of small tea estates. Some large tea companies had put closed small tea estates to increase their hectareages and some other tea estates were declared as sick and unviable.

Distribution of Tea Industry : Tea is grown almost all over Assam in both the valleys, the Brahmaputra and the Barak. About 75 per cent of the total tea estates and tea hectareages are concentrated in Upper Assam comprising the districts of Lakhimpur, Dhemaji, Dibrugarh, Tinsukia, Sibsagar, Jorhat, Golaghat, Darrang and Sonitpur, 19 per cent in the Barak valley, N.C. Hills, Karbi Anglong districts and 6 per cent in lower Assam (Fig. 11.3).

Ownership Pattern : In the teething period, tea industry was dominated by the British planters. Upto 1953, 70 per cent of the total capital invested in tea in Assam were sterling capital, about 13 per cent non Indian rupee capital and only 11 per cent Indian rupee capital.

The ownership pattern of the tea industry of Assam has undergone basic changes since 1947. A large chunk of the capital invested in the tea estates had passed from British to Indian hands. Before that the entry of the Indian enterprenuers was few partly because of lack of capital and partly because of non-patronizing character of the colonial government for the Indian. After independence, some Indian enterprenuers have been purchasing tea estates in Assam. A number of native Assamese enterprenuers also took up tea cultivation. Many of the reputed industrial houses of India like the Tatas, Birlas, Khaitan, Dodlars, Pals, Seth as well have become the main producers of tea in Assam. The formation of Assam Tea Corporation Ltd. (ATC, Ltd) in 1972 is also an important landmark in the history of the industry of Assam. The Government of Assam constituted ACT with an authorised capital of Rs. 2 crores to look after the weak tea estate. The organisation has purchased 15 tea estates so far.

Hectareage and Production : Assam has the unique distinction of having the largest area under the plantation producing a little more than half of the total tea production in India. Generally the tea estates in Assam are bigger than those elsewhere in India. The average size of an estate in Assam is 268.5 hectares while it is only 90.5 hectares for India. With an area of 2.33 lakh hectares under cultivation, Assam produced 395 million kg. tea in 1991. The average yield is 1700 kg per hectare in Assam which is the highest among all the estates of northern India. But it occupies the

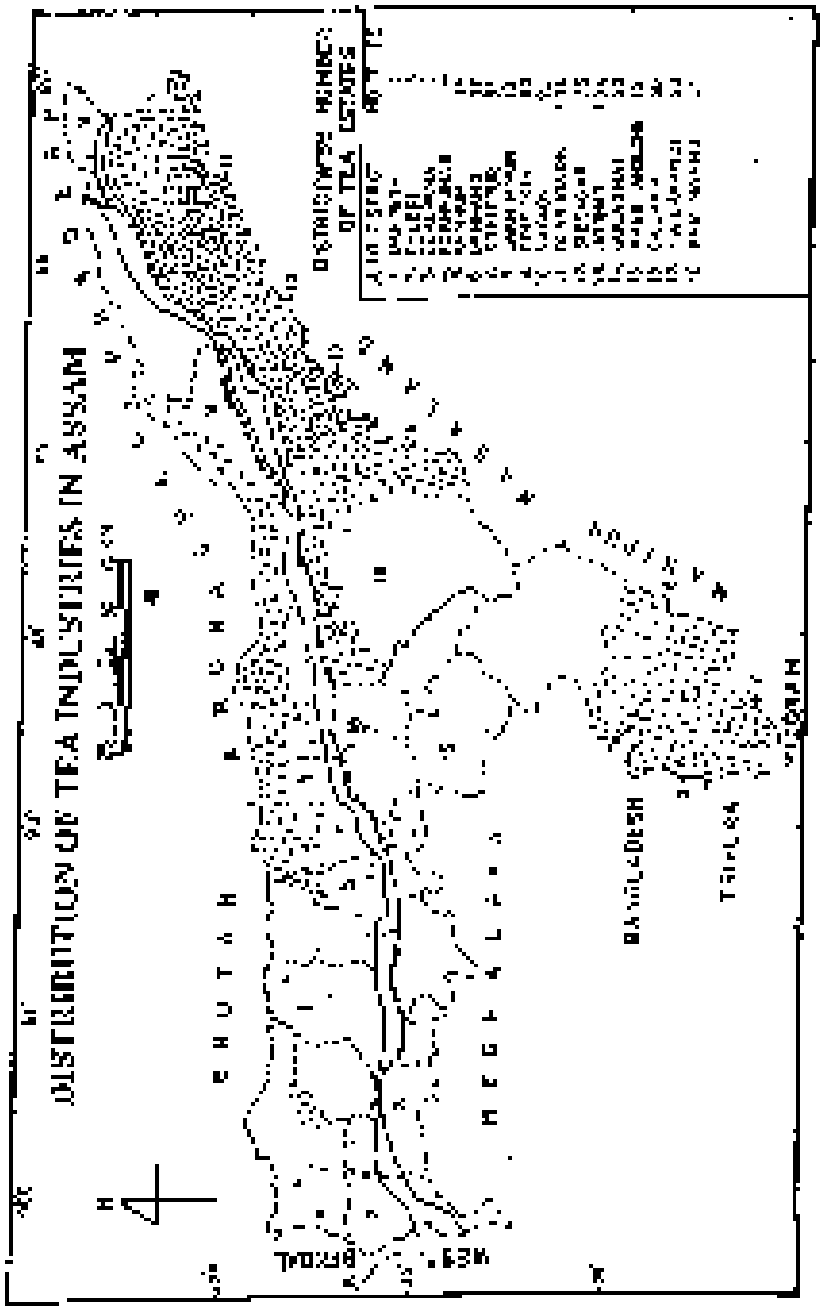

Fig. 11.3

fourth place in India after Tamil Nadu, Karnataka and Kerala. The average yield of Assam was reduced to a great extent due to a very low level of production in the Barak valley.

Cost of Production : While the yield per hectare and quality mainly depend upon climate, soil, topography, cultivation, plucking practices etc. the cost of production is influenced by some other factors like labour, adoption of modern techniques, etc. The cost of production includes the establishment, cultivation, plucking, manufacturing, packing, freight and transport, duties and taxes, general overhead and selling expenses.

The cost of production has been quite appreciably low in almost all industries and tea industry is no exception. According to an estimation of Tea Board of Indian Tea Association, Guwahati the average production per worker is 0230 kg, annually and production cost per kg. is about Rs. 20.00 to Rs. 10.00.

Employment : Tea as an industry is a major employer of labour and it is highly labour intensive. It provides both direct and indirect employment. In respect of direct labour employment, Assam employs 55.61 per cent of the total labour employed in the plantation of India in 1991.

The average daily number of labourers actually employed in the tea industry in Assam was 534536 in 1991. One of the most important features of tea industry is that the female and child labour constitute a significant portion of the total labour force. In 1990, out of the total strength of the labour force, the firms in adolescent and child labourers were 9,938, 13,170 and 41,494 respectively.

Apart from direct employment, a large number of persons find employment in a range of ancillary industries linked with the tea plantation. A number of ancillary industries and services have developed due to the industries e.g. plywood, tea chests, aluminium foil, metal, fertilizers, insecticides, transport, warehousing, cane and bamboo trade, trade and business connected etc.

Contribution of Tea Industry : The contribution of the industry to the economy of Assam can not be ignored. The production of tea in Assam during 1990-91 was estimated to be 358 million kg. and with an average auction price of Rs. 42 per kg. commanded the maximum of all the states. At an annual average rate of Rs. 7.05 per kg. as sales tax, the total profit of the tea industry of Assam may not be less than Rs. 72 crores, being an important source of foreign exchange through export of its produce nearly

Rs. 600 crores are earned by the industry annually (Saikia, 1996, p. 138).

The Government of Assam collected Rs. 104 crores approximately by way of agricultural income tax, 16 crores as sales tax from the Guwahati Tea Auction Centre (GTAC) and 20 lakhs as land revenue in the assessment year of 1990-91. But the Assam Government had reduced the rate of agricultural income tax for the year 95 per cent to 60 per cent in 1994. However, this has created the state exchequer.

The GTAC (established in Sept., 1970) is now the world's second largest auction centre in terms of production. In 1989, the centre handled 151.3 million kg. of tea valued Rs. 555 crores.

Petroleum and Petrochemical Industry

Oil is known as liquid gold of Assam. Its existence in upper Assam was recorded as far back as 1825. Oil and petroleum fields in Assam are concentrated at several places of hilly south Tirap, Sibsagar and Jorhat districts - viz. Digboi, Naharkatiya, Hugrijan, Deban, Borhat, Moran, Rudrasagar, Lakowa, Tipak and Geleki. Till 1949 oil was not commercially extracted though attempts were made to drill in a few oil wells during 1866–68 near Margherita and Sibsagar in Dibrugarh District, but drilling could not continue due to transport difficulties. It was only in 1889 the exploration of oil was started by the Assam Railway and Trading Company, when oil fields in Digboi was discovered during the construction of railway line from Dibrugarh to Ledo. The first oil refinery in the country was set up at Digboi in 1901 by the same company.

During 1952-54, new oil fields were discovered at Naharkatiya, Hugrijan and Moran near the Digboi fields. To process the newly found crude, a second refinery in Assam was set up in 1962 at Nunmati (Guwahati) in the public sector, which was started with the assistance of the Government of Rumania. Recently several oil companies were formed. In 1956, the Oil and Natural Gas Commission (ONGC) was established to explore and search out new oil fields. The ONGC has drilled (as on January'87) 18,83,926 metres and completed 369 wells of which 321 are oil wells and 9 are gas wells (Mali, 1989, p. 135).

The fertilizer industry and petrochemical complex was set up at Namrup (BRPL) in 1979. The BRPL became fully operational in 1984. The fourth one is also being constructed at Numaligarh of Golaghat District with a capacity of 3 million tonnes annually, the foundation stone of which was laid on 3rd July, 1994.

Assam produces about 5 million tonnes of crude petroleum, which accounts for half of the production of oil in India. Table 11.8 shows the production of crude oil in Assam and India as a whole in several years since 1974.

Table 11.8
Production of crude oil (in million tonnes)

Year	Assam	India
1974	3.91	7.49
1975	4.19	8.22
1976	4.29	8.15
1977	4.47	11.59
1978	4.78	11.27
1979	4.67	12.84
1980	1.66	7.90
1981	4.39	-
1982	5.14	-
1983	5.77	-
1984	5.58	-
1985	4.74	

Source : Bowara, S., 'Assam's Tel Sampad', Asomiya Jonbeyog, 1976; Bordoloi, Gunaram, 1987, p. 137 and Statistical Handbook, Assam, 1984.

Oil output in Assam registered a growth of 5.3 per cent in production in 1982 as compared to 1981. Its production stood at 5.77 million tonnes in 1983 as against 5.14 million tonnes in the previous year. In 1976, the production of crude petroleum decreased to 4.04 million tonnes.

The production performance of the various oilfields of the state was very encouraging during 1989. The total volume of output stood at 7.5 million tonnes in 1989 as against 5.45 million tonnes in 1988 which showed an increase of 1.6 per cent. The estimated reserves of crude oil in Assam are 144.95 million tonnes (as on 1992). About 26 oil bearing structures so far have been identified by ONGC in association with Oil India Ltd. (OIL).

Natural Gas : Along with the discovery of oil, rich natural gas reserves have also been discovered in Assam. The estimated availability of associated gas from the Oil India Ltd. and ONGC oil fields is 92.8 billion cubic metres. As per the Gas Task Force Report (June, 1994), the unassociated gas reserves in Assam are around 40 million cubic metres (Mall, 1989, p. 161).

The natural gas is a boon for the people of Assam, but the state is not in a position to utilise it fully. An estimated 2 million cubic metres of gas are being literally flared up (as on 1994). The Oil India Ltd. (OIL), ONGC and Assam Gas Company are responsible for production of Liquid Petroleum Gas (LPG) at Nahorkatiya and Duliajan whereas ONGC is responsible for production of both LPG and compressed natural gas at Jorajan.

On the basis of locally available natural gas LPG bottling plants have been set up - one at Changsari by Bora (Assam) Industry (P) Ltd. and another at Pathsalagaon by North Eastern Cylinder (P) Ltd.

The production of natural gas (utilised) in 1992 was 2026 million cubic metres as against 838 million cubic metres in 1993 which shows a reduction of 58.6 per cent. The current production of associated gas in Assam is estimated at around 3.5 million standard cubic meters per day.

Petrochemical Industry : Based on petroleum and natural gas several petrochemical industries have been established in Assam. The natural gas contains high composition of plastic products which provides raw materials for the plastic industry. The natural gas can also be used for the production of nitrogenous fertilizers. In Dec. 31 1969, the first natural gas based fertilizer plant in Assam was established in Namrup by the Hindustan Fertilizer Corporation (HFC) Ltd. Two more units, Fertilizer and Chemical Ltd. were established in 1976 and 1987 respectively. The production of these units during 1988-89 and 1989-90 is shown in Tables 11.9, 11.10 and 11.11 respectively.

Table 11.9
Production of fertilizers (No. 1 unit)

Year	Production (in tonnes)			
	Ammonium sulphate	Sulphuric acid	Ammonia	Nitrogen
1988-89	19,405	18,570	20,010	4,086
1989-90	11,178	1,970	14,690	2,367

Table 11.10
Production of fertilizers (No. 2 unit)

Year	Production (in tonnes)		
	Urea	Nitrogen	Ammonia
1988-89	1,14,440	53,642	64,425
1989-90	1,41,020	66,859	80,215

Table 11.11
Production of fertilizers (Nos. Tonne)

Year	Production (in tonnes)		
	Urea	Nitrogen	Ammonia
1988-89	1,06,806	90,551	1,15,120
1989-90	2,55,959	1,13,141	1,56,560

Source: Dutta, Dr. P., "Abhilaksh o Dirghamyadi Jibar Taila Udyog - Ek Samiksha Khasari", *ICFAI Journal*, 1994-95, p. 75

It is evident from the table that though the production of fertilizers in the first unit had declined in the year 1989-90 the production in other two units had increased. But interestingly enough, the Board of Industrial and Financial Reconstruction (BIFR) has registered it as a sick industry.

However, besides fertilizer, several thermal power projects have also been established on the basis of natural gas of Assam. The Thermal Power Project of Namrup had started its production in 1965-66. This power station receives about 8,87,000 standard cubic metre natural gas daily from OIL. Its productive capacity is 119.3 Megawatt and this power supplies electricity to nearby areas of Upper Assam.

For the exploitation of natural gas, the Assam Petrochemical Ltd. was set up in Namrup and it started its production in June 1970. The Assam Gas Company supplied about 6.14 million standard cubic metre of gas to this industry. Its products are Industrial L. A. Powder (Urea formaldehyde Moulding Powder) etc. Almost all the plywood industries of Assam use Formalin and U.F. as adhesives which are being produced in this industry. Based on natural gas a massive Ghee-cum-Nafta Cracker Project has been set up at Tengakhat.

Moreover, a number of petrochemical-based industries have been growing in the state. Using the products of NRL, several synthetic yarn producing industries have been developed. Besides H.F.C., a joint sector fertilizer industry (Assam State Fertilizer Corporation) has been established at Chandrapur where sulphuric acid etc. are produced. Another fertilizer industry been has established in Bongaigaon (Goalpara District), which is now declared as sick. Several minor small and medium scale industries viz. - plastic, paraffin, pesticides, soap factories etc. are growing in the state.

Coal Industry

The coal industry is a material - based industry. Coal is one of the important minerals found in Assam. Though the existence of coal in Assam was known as early as 1825, lack of its demand and transport facilities stood in the way of its commercial production till 1882.

Assam has vast reserves of coal but its sulphur content is higher (about 2.0 to 7.0 percent) in comparison to other coal fields. So, it is not suitable for metallurgical purposes except for smelting fields. So, it is not suitable for metallurgical purposes except for smelting industries. On the other hand, the very low ash content, 2.04 percent as compared to 15 per cent in Jharia is a distinctive quality of Assam's coal. The main important and potentially rich coal deposits are found in the Sibsagar and Dhansiri districts adjoining Nagaland and in the hills of Karbi Anglong. The notable coalfields of Assam are Jaipur, Dilli (Dibrugarh District), Margherita, Makum, Tikak, Tipam, Borgolai (Tinsukia District), Sibsagar, Kuthjan (Karbi Anglong District), Dangtpani, Nazira (Sivsagar District), Silchar, Kalinjan (Karbi Anglong District), Dangtpani, Nazira (North Cachar Hills District) and Singimari (Goalpara District). These coal fields were formed in different geological periods. The Lakhi, Dilli, Jaipur coalfields of North Cachar and Karbi Anglong districts are much older systems of Tertiary (Eocene Epoch), but the Makum coalfields, which is also Eocene Epoch, 260 million years old. The coal beds of the region lie in Changpan District.

The Jaipur - Lakhipani region along with hill tracts region of Karbi Anglong together produced on an average 4 lakh tonnes coal annually. The estimated reserves of coal in Assam is 864 million tonnes, out of which 206 million tonnes are proved reserves, 58 m tonnes indicated reserves and 600 million tonnes are inferred reserves.

Assam accounts less than 1 per cent of the all India coal production. During 1987, Assam produced 1.02 million tonnes of coal. In 91 crores. The production went up from 1.07 million tonnes in 1992 to 1.75 million tonnes in 1993 showing thus by an increase of 0.7 per cent.

Plywood Industry

The term 'plywood' denotes fabricated wood in which thin layers of wood called 'veneers' or 'plies' are cemented together with the grains of each layer more or less at right angles to the grains of the layer above and below it. The veneers are thin sheets of wood varying in thickness from .039" to 1/4" (0.25 mm to 6.35 cm) and at varying angles to the axis of tree growth (Required Data 1973, pp. 106-107).

For the manufacturing of plywood light but solid wood is required.

The plywood industry is a forest - based industry and advantageous for the state in terms of both raw material and market. Timber is the most important raw material for this industry and suitable timbers are available in the jungles of Assam. The main demand for plywood in Assam is for making the chests.

Till 1960, plywood was known for packaging purposes. But diversification of plywood products started since sixties. With the innovation of processing techniques the plywood industry started production of all commercial grades of plywood and other allied products like black boards, flush doors etc.

The first plywood factory was set up in the state in 1862. The number of factories went up from merely 2 in 1918 to 45 in 1986. Assam accounts for 64.75 percent of the total production of India, with an annual turnover of Rs. 150 crores. In 1991, Assam produced 42.72 million sq. metres of plywood as against 38.59 million sq. metres in 1985. The industry is now facing the problem of raw materials. It has to depend on raw materials of other states.

Paper and Pulp Industry

The paper and pulp is another forest - based industry which has considerable natural advantages in Assam. From the point of view of raw materials there is a vast scope for the development of this industry. At present, Assam has four paper mills, out of which two were set up in public sector, one at state joint sector and one in private sector.

The first paper industry, the Ashok Paper Mills was established in Jogighopa in the Bongaigaon District as a state joint sector enterprise. But the mill became sick during 1981-82. The production declined from 14,000 million tonnes in 1981 to 5,000 million tonnes in 1982. The mill was closed down for more than a decade. In 1995, the Government of Assam negotiated with a private company for reopening of the mill.

The other two big paper mills - one at Jagiroad in the Morigaon District and one at Panchgram in the Hailakandi District were established in public sector by the Hindusthan Paper Corporation.

The Kamrup Paper Mills (P) Ltd., a private sector factory is located in Amingaon.

Jute Industry

Jute milling is an agro-based industry. Assam provides suitable agro-

climatic condition for the cultivation of jute. In jute production, Assam occupied second position. Its production in 1992-93 was 10.3 lakh bales (one bales means 180 kg.). Jute cultivation in the State is mainly concentrated in Nagaon, Morigaon, Darrang, Barpeta, Kamrup and Nalbari districts which cover slab area of about 1 lakh hectares.

The first jute mill in the state was established under the co-operative sector in 1970 at Silghat in Nagaon District with 100 looms for the production of sacks and 50 looms for hessians. The mill could not successfully till 1991. During this year it produced 5000 tonnes of jute textile. But later on by 1983-84 the mill became sick and had to close down its operation in 1984. It is only in 1986 the mill was reopened and started production. Its production was 5548 tonnes in 1991. Two more jute mills (Jute Mill at Bhaynagar, Palashbari and Brahmaputra Jute Mill at Kalapahar, Guwahati) in the private sector were established in the state, the production of which is, however, not significant.

Sugar Industry

Like jute, sugar is also an agro-based industry. The climatic condition of Assam is suitable for the cultivation of sugarcane, and it is widely grown in almost all areas of Assam. But sugarcane fields are not concentrated in certain localities which is a major drawback for the development of this industry. Sugarcane cultivation occupies about 40.5 thousand hectares of land. It produced 1.5 million tonnes of sugarcane during 1992-93.

The first sugar mill was established under the co-operative sector in 1965 at Hargaon, but its operation started in December, 1958, with a crushing capacity of 800 tonnes per day. There are other two sugar industries - one in state joint sector at Chanyala in Karimganj District and another in co-operative sector at Kampur (Nagaon). The Cachar Sugar Mill (Chanyala) was closed down and the Nagaon Co-operative Sugar Mill is also facing trouble from its inception. The total production of sugar in the state was 1.6 thousand tonnes in 1991.

Cement Industry

Assam possesses favourable condition for the development of cement industry in terms of raw materials and market. In several places of North-East India good quality limestone deposits are available. Locally available limestone and coal can also be used in this industry. The state has 100 million tonnes of limestone. The production of this mineral want

up from 2.12 lakh tonnes in 1988 to 3.13 lakh tonnes in 1989 showing an increase of 9.9 per cent over the year.

There are two cement factories in Assam. The Lakhajan Cement Factory of Karbi Anglong was set up in central public sector with a capacity of 600 tonnes per day and its production started in 1976. The production of this factory in 1982 was 1.75 lakh metric tonnes. A other mini cement plant is being set up at North Cachar Hill District. The total production of cement in Assam is about 2.84 lakh tonnes annually (1993).

Handloom and Silk Industry

Handloom weaving is a traditional and the largest cottage industry in Assam which occupies a place next to agriculture. It has both cultural and economic impact on the people of Assam. About 8 lakh persons both male and female are engaged in this industry. This is practised both as a part time and a full time activity.

There are more than 7 lakhs looms of different kinds in Assam. Table 11.12 shows the type-wise number of looms.

Table 11.12
Number and types of looms

Type of loom	Number	Percentage
Fly Shuttle	1,57,304	22.45
Throw Shuttle	5,20,402	74.35
Chittranjan	1,058	0.15
Loin and other looms	21,046	3.05
Total	7,00,200	100.00

Source: Mali, D.D., *Economic Problems and Planning in Assam*, Omsons Publications, New Delhi, 1993, p. 166.

Though handloom weaving industries are distributed in almost all parts of the state, undivided Kamrup District occupies the top position in number of weavers as well as production of fabrics. This is because of the fact that besides part time weavers, there are a large number of full time professional weavers. The important centres are Sualkuhi, Nalbari, Hajo, Rampur, etc.

The total production of handloom clothes was 65 million metres in

1983, out of which 8.42 lakhs metres are Eri, 5.31 lakh metres Muga, 6.97 lakh metres pat silk and the remaining portion is cotton fabrics.

Khadi and Village Industries

The khadi and village industries (KVI) play an important role in the economy of Assam. The KVI are very much diversified in nature and include the production of cotton, silk and woolen khadi, bee-keeping, village oil, non-edible oil, soap, pottery, processing of cereals and pulses gur and khandsari (molasses), carpentry and blacksmithy, cane and bamboo work, lime, fibre, handmade paper, cottage starch, village leather, medicinal plant, fruit preservation, etc.

The contribution of KVI to production and employment is significant. According to information available from the state Directorate of Sericulture, as many as 8127 villages of the state practised sericulture during 1993-94. The number of families engaged in sericultural activities totalled nearly 1.95 lakhs during the year comprising engagement of 1.78 lakhs families under eri-culture, 28.49 thousand families under muga-culture and about 38.26 thousand families under pat-culture. So far as the yield of cocoons is concerned, the achievements during 1993-94 were as follows: eri-cocoons 5.83 lakh kg., muga-cocoons - 4316.8 lakh numbers and mulberry reeling cocoons - 2.87 lakh kg. As regards the production of silk yarn during the year 1988-89, it has been recorded as 1.32 lakh kg. in respect of eri raw silk, 9.45 lakh kg. in respect of muga raw silk and 5.12 lakh kg. in respect of pat raw silk (Economic Survey, Assam, 1989-90). Table 11.13 shows the KVI commission's achievement at a glance.

Table 11.13
Khadi and village industries commission achievement at a glance (1993-93)

Item	Unit	Khadi	Village industry
Production	Rs. in lakhs	265.36	1986.02
Sales	" "	285.00	2132.50
Employment	Number	23,455	93,718

Source: *Statistical Handbook*, Assam, 1993, p. 174.

During 1992-93, the value of production of khadi industries was Rs. 265.36 lakhs and it generated employment for 23,465 persons. The value of production of village industries was Rs. 1986.02 lakhs and it generated

employment for 93,778 persons.

Though the SVI are distributed in almost all parts of the state, the main places of concentration. Generally cotton khadi is concentrated in Kamrup, Darrang and Nagaon districts. Village oil industry and village pottery are concentrated in Goalpara, Kamrup and Nagaon districts. In Sibsagar district, as in the case of village oil industry. Processing of cereals and pulses is confined to Kamrup, Darrang, Nagaon and Sibsagar districts. Likewise, cane and bamboo work is concentrated in Kamrup, Nagaon and Sibsagar districts. Cane and bamboo work is concentrated in Kamrup, Nagaon and Cachar districts and khanikari is concentrated in Darrang and Cachar districts (Mali, 1995, p. 109).

District-wise Distribution of Industries

The industrial establishments in Assam are unevenly distributed. The distribution of establishments both factories and SSI in Assam are heavily concentrated in Kamrup district. Table 11.14 shows the distribution of registered factories and SSI in different districts of Assam in 1993-94.

Among all the districts of Assam, Kamrup district appears as the most industrialised area of Assam with largest number of registered factories (463) and SSI units (3977). The districts like Jorhat, Nagaon, Sibsagar, Cachar, Darrang, Goalpara, Dibrugarh, Tinsukia, Kokrajhar, Karbi Anglong, N.C. Hills, Dhubri, Sonitpur, Lakhimpur, Bongaigaon, Barpeta, Nalbari, Morigaon, Golaghat, Dhemaji, Karimganj, Hailakandi, Udalguri, Chirang, Kamrup (Metro) and Kamrup (Rural) have also been industrialised to a certain extent. The principal industries are manufacturing, engineering, chemical, food processing, electrical, building-material producing, etc. The factories are largely concentrated in and around Guwahati because of its suitable location in respect of transport and communication. Besides this, Guwahati is a capital city and headquarters of almost all offices and establishments.

The district has one oil refinery (Noonmati), one fertiliser plant (Amingaon), one tea and petroleum coke unit, several tea and steel rolling plants, one corrugated asbestos producing industry, a chemical and a spinning unit in Chandrapur, two atta and jute mills, one paper mill, one calcium powder producing unit, a methanol producing unit, two woollen mills, one polyester mill, a weaving and processing unit, one LPG cylinder bottling plant, one railway bulk filling fixture, a multiple pesticide oil and oil based producing industry, a dye house, a rice and flour mill, one cattle feed unit and a number of flour and saw mills.

The only tobacco industry of the state is also located in this district. It has also 14 tea estates. The district is very well developed in regard to agricultural processing and small scale metal-wood industries. Hajo is the traditional centre of the bell-metal industry.

Table 11.14

District-wise distribution of registered factories and small scale industries registered under the Directorate of Industries, Assam (1993-94)

District	Number of registered SSI (in 1994)	Number of registered factories (1992)
Dhubri	482	56
Kokrajhar	399	46
Bongaigaon	87	37
Goalpara	904	31
Barpeta	417	36
Nalbari	550	59
Kamrup	3971	463
Nagaon	1401	134
Morigaon	50	11
Darrang	276	31
Sonitpur	1135	132
Lakhimpur	924	38
Dhemaji	151	12
Dibrugarh	3247	296
Tinsukia	450	135
Sibsagar	840	138
Jorhat	668	145
Golaghat	90	105
Cachar	1150	129
Hailakandi	7	29
Karimganj	351	45
Karbi Anglong	426	36
N.C. Hills	172	18
Assam	17048	2438

Source : *Statistical Handbook, Assam, 1995*, pp. 116-17, 121.

Dibrugarh District is well known for tea industry. The highest number of tea estates (134) of the state is concentrated in this district. Moreover, the important centre of tea industry. Besides tea industry, the district has 10 jute mill units. The district is also rich in mineral. The oil fields of the district are located at Moran and Naharkatiya and coal is found at Dilli and

Jaipur area. On the other hand, Digboi is known for natural gas. In and around Dibrugarh, Jorpar, Nahorkatiya plywood factories are growing. The important industrial centres of this district are Dibrugarh, Nahorkatiya, Duliajan, Namrup, etc.

The third important area for factory concentration is Tinsukia District. This district specializes in plywood (Margherita, Tinsukia), tea and engineering and allied industries. Mining is also an important industry of this district. The coal mines are located at Ledo, Tipam, Lekhapani, Jhanjhi and Margherita. The oldest oil refinery of the state (Digboi) is located in this district. The important oil-fields of the district are Deom Dooma and Hapjan. Deom Dooma is also an important centre of tea industry. The district has a tea processing and manufacturing unit. Digboi, Tinsukia, Makum are important industrial centres the district.

Sibsagar District is very rich in tea industry. Besides tea, there are 9 LMSI units. The district is endowed with mineral resources - coal, petroleum and natural gas. Fields, Sonari, Namti, Hokwa are notable oil fields. Coal fields are found in Nazira. Natural gas is available in Amguri, Rudrasagar, Lakwa, and Sonari.

Jorhat is also a leading industrial town of upper Assam. The oldest industry of Jorhat district is tea. The district has oil and natural gas reserves in Barbeta. Plywood industries are concentrated at Mariani. Titabar is known for hand-made brass, copper and bell-metal industries.

Golaghat District is rich in tea industry. It has 68 tea estates. The oldest sugar mill of the state is located in this district. Recently two oil fields- Kathalguri and Dhansiri have been discovered at this region. A polyester viscose blended yarn mill has been set up at the district.

Sonitpur District is also famous for tea industry. There are five LMSI units in the district. The notable industries are cotton yarn mill, weaving factory, rice bran oil mill, saw mills, flour mills, tea mills and brick industries.

Agriculture - based industries are predominant in Nagaon District. There are four LMSI units. The oldest jute mill of the state is located in this district. One sugar mill has been set up at Kampur. Other industries of the district are engineering workshops, power generation, rice mills and handloom

Industries

Marigaon District has three LMSI units. These are Hindusthan Paper Mill, Spun Silk Mill and Polyester Yarn Unit (Assam Polytex Ltd.).

Dhemaji is an important industrial district of lower Assam. The district has four LMSI units. The notable industries of the district are Petro-Chemical Complex (BSPCL), Ashok Paper Mill, Neepco spinning Mill, caustic soda, chlorine producing unit, railway repairing centre and aluminium casting factory.

In industrial sector Kokrajhar District is not very developed. It has one Polyester Viscose Blended Yarn (PVB) yarn producing unit at Mahkuchi, Chirang and one processing unit at Bhangnapur. The district is rich in cottage industries (KVI) and handloom weaving.

Dhubri, Kokrajhar and Goalpara districts are industrially backward. The oldest small factory of the state is located in Dhubri District. The district has also an aluminium industry at Salakati. A cotton yarn mill (Bationali) and a few saw mills, rice mills, oil mills are operating in Goalpara District.

The two hill districts of the state-Karbi Anglong and North Cachar Hills have one cement factory each. There is also a concentration of tea industry (12 T.Es) in the former. The only paper mill industry of the state is located in Karbi Anglong district.

Nagaon District is also industrially backward. Not a single LMSI unit has been established in the district till today. But the district is famous for ivory products and bell-metal industry.

The three districts of Barak Valley are rich in agro based industries. Cachar District has 60 tea estates whereas other two districts Karimganj and Hailakandi have 31 and 22 tea estates respectively. There is a paper mill at Panchgram in Hailakandi District. One sugar mill is located at Chargola in Karimganj District. Crude oil and natural gas have been discovered recently in the district of Hailakandi and Karimganj.

Darrang District is predominantly an agricultural region. It has 30 tea estates. Only one LMSI unit (Pragbeshwari Synthetics Ltd.) has been set up at Sipajhar.

The other two districts of upper Assam viz - Lakhimpur and Dhemaji are industrially more backward. Not a single LMSI unit is found in these districts. Some tea estates (13) are located in Lakhimpur District.

Problems of Industrial Development

Though nature has been bounteous to Assam in respect of natural resources, yet the industrial growth in this region is very much sluggish. According to Das (1970, p. 102), the industrial development of the state is mainly handicapped by her isolation from the rest of India, a bad transport system, a very small local market and lack of sufficient capital and labour. It is true that the geographical isolation and poor transport system are still a major constraint but the condition of other three hurdles has been ameliorated to some extent. With a population of 31.6 million (1991) the North East India comprising seven states provides a vast local market. Besides growing a meagre local capital, the avenue for tapping money from different financial institutions and outside agencies has been widening. There are more than 1200 bank branches in the state in addition to the regional offices of all the leading nationalised banks, although the credit deposit ratio is still low in Assam (51.6 per cent) as against 61.0 per cent in the country in 1987. And so far as labour is concerned, there is no dearth of unskilled and semi-skilled labour in this region, yet the problem of skilled labour is still an unsolved question.

In this regard Mali and Bandopadhyay (1993) noticed that the industrial backwardness of this region is reflected in the fact that the contribution of the manufacturing sector to the state domestic product of the region is much smaller than the contribution of this sector to the national product in the country. The industrial backwardness is still prevailing in spite of the fact that the region has rich potential for industrial development and there is also good market, both internal and external.

However, Mali (1993, p. 124) observed that the problems are mainly geographical, infrastructural, financial, marketing, entrepreneurial etc. particularly as regards small scale industries.

Geographically Assam is located in the north-east corner of India and connected with the rest of India through a bottleneck of about 16 km. It is exposed to foreign countries only through Bhutan and Bangladesh. In true sense, Assam is a landlocked state. The only outlet is the mighty river Brahmaputra which is passing through a foreign country (Bangladesh). Moreover, about two-thirds of the total boundary of the state are mountainous. The great physical distances from the main consuming centres of India have been multiplied by the bad transport system to and from and within the state.

In industrial facilities refer to power, government and administrative assistance, technical education and institution etc. The state has experienced often unexpected power failures. The unscheduled load shedding has caused great problem to industrial units. The total power available to the state at present is around 315 MW which is less than the peak demand of 375-400 MW.

From time to time the Government of Assam has been formulating industrial policies for the growth of industries in the state, but sincere effort is lacking. It is the failure on the part of the Government to create a conducive industrial climate. Moreover, red topism, corruption etc. are major hindrances in the path of development. Unfortunately until now the state is not in a position to cater to the needs of the skilled labour with excellent quality due to inadequate technical educational facility.

Another chronic problem for industrialisation in Assam is the lack of local capital. Assam is mainly an agricultural region. Agriculture is the main stay of the local people. As mentioned earlier, the ownership of the principal industry - the tea industry, were under the hands of the British colonialists and live on in the hands of the big industrial houses of India, who were not interested to invest money for other industries of the state. So, the local capital formation is very much meagre. Without the assistance and generosity of the Central Government it is difficult to establish heavy and large scale industry. But at present a number of financial institutions have been set up in this region to tie pond forward financial assistance to interested entrepreneurs at least for the development of medium and SSI.

For centuries the state continues to remain a trader's paradise. Assam is a good importer of industrial finished products and consumer goods. The local products can hardly compete with the goods coming from other parts of the country. For a prolonged period of time, the nearest industrial giant Calcutta has been capturing the market of this region. With meagre capital and age-old technology it is difficult to capture market. So long the government does not take effective measures to protect the interest of the entrepreneurs, healthy industrial growth will not be possible in the state.

Another most conducive factor for the growth of industries in the state is insufficient supply of skilled manpower. Modern industries require skilled labour and excellent technicians. The age old ITIs of Assam could not satisfy the demand of the day. So, entrepreneurs very often take pressure to supply of skilled manpower from outside Assam.

Last but not least is the problem of entrepreneurship. Local entrepreneurship is developing very slowly. The numbers of entrepreneurs is few who are coming willingly to this sector of economy. Rather it will not be incorrect to say that local people come to this sector not by choice but by compulsion.

Prospects of Industrial Development

In the mid-decade many ads, there are some glimpses of hope. Firstly, Assam has unique location by which it may be termed as 'gateway' of North East India. All sorts of transport of goods and services to other states of North East India are made through Assam. Moreover, Assam is situated at a position which be mercantile point of view to straddle world trade is centered. It is only two hour distance by airways from Assam to South-East Asian countries which incorporate more than 50 per cent of the world's population and include some of the fastest developing economies. The access to the large market of these countries is possible from Assam as the state is close to these rapidly growing economies. So, Assam can take advantage of this situation.

Secondly, Assam is endowed with various resources, both renewable and non-renewable like agricultural, forest, mineral, livestock, etc. Abundant natural resources along with cheap manpower makes the region most lucrative for industrial investors.

The possibilities of industrial growth and development are immense. These can be considered under two heads: establishment of (i) resource-based and (ii) non-resource based industries. Again resource-based industries can be grouped into four categories on the basis of type of raw materials processed. Such as (a) agro-resource based (particularly on the) (b) forest resource-based (c) animal resource-based and (d) mineral resource-based. Non-resource-based industries are chiefly: (a) metal manufacturing and (b) engineering goods, etc.

Agro-resource-based industries may be developed on the basis of agricultural products such as rice, sugarcane, jute, rubber, cotton and various nuts, viz. rice mills, tea mills, mustard oil mills, oil seed mill etc. based on sugarcane manufacturing products such as sugar, paints, industrial liquor, preparation of fruit wines, ethyl acetate, chloroform, ether etc. can be produced. In jute production Assam has second position in the country. On the basis of this, one or two jute mills can be developed. There is a vast diversity of jute products such as sacks, hessians etc. A number of items can be produced locally viz., gloves, foam rubber, tyres, rubber mats, two cotton mills based on cotton, a number of fruit processing industries e.g., mango, pineapple etc. based on fruits can be developed.

Although number of forest-based industries have already been established in the state, yet there is a possibility to grow industries for the production of newsprint, manufacturing of sports materials, electrical appliances, wooden materials, chemicals etc.

There is a vast demand for leather products in the state. Animal resource-based industries such as tanning, prepared fodder, glue, industrial leather, production of footwears, sports materials can be developed. Along with these industries several SSI units such as confectionery, dairying, bone mill, caffeine manufacturing can also be grown.

Assam is endowed with different resources such as coal, petroleum and natural gas, limestone, dolomite, kaolin, glass sand, fuse and refractory clay, fire clay, earth etc. Surprisingly enough, till 1971, the development of minerals was confined mainly to coal and petroleum. After the establishment of the Directorate of Geology and Mining, Assam in 1972, a number of important mineral deposits of the state have been delineated. These are important mineral deposits of the state have been delineated. These are important coal deposits of Saraipung, Garampani and Kolajan, fire clay deposits of Chandardinga and Lengpara, glass sand deposits of Jhajiri, Tezpur, Chandardinga and Lengpara, glass sand deposits of Jhajiri, Tezpur, China clay deposits of Dilli and Sheelbeel, china clay of Kooipani and Sheelbeel and limestone deposits of Sahark etc.

As regards the minor minerals, the Directorate has delineated four ajor pink and black varieties of granite deposits in the districts of Nagaon, Kamrup, Goalpara, Kokrajhar, Dergaigaon, Dhubri and Karbi Anglong. which have good use in the manufacture of decorative tiles, slabs etc. which have good use in the manufacture of decorative tiles, slabs etc. polished block. The granites have a good demand in domestic as well as in world market (Dutta, 1991).

It is obvious that various mineral-based industries can be developed in the state. Besides production of cement, mineral products such as refractories, fused calcium carbonate, bleaching powder, lime kiln, sodium silicate, fuel, mineral colour, carbonate, bleaching powder, lime kiln, sodium silicate, fuel, mineral colour, carbonate, bleaching powder, lime kiln, sodium silicate, fuel, mineral colour, fertilizers etc. can be produced. Likewise from coal, several products viz., fertilizers etc. can be produced. Likewise from coal, several products viz., fuel oil, fenol, ammonical liquor, volatile gases, pitch, urea, black fuel oil, fenol, ammonical liquor, volatile gases, pitch, urea, black etc. can be found. Dolomite powder, refractories can be produced from etc. can be found. Dolomite powder, refractories can be produced from dolomite. Based on bauxite, aluminium sulphate, plaster of paris products dolomite. Based on bauxite, aluminium sulphate, plaster of paris products by fertilizers can be developed. Assam can support a few cement industries by fertilizers can be developed. Assam can support a few cement industries based on her clay deposits.

Using the chemical products of N.E.I., a number of downstream industries can be developed. From the by-products of the oil refinery, polyester clothes, tetraethyl lead, can be produced. The other items such as sleeping bag, tarpaulin, rain-coat, polythene film, insecticides, etc. can also be produced from P.V.C. and caterpillar oil[3]. Assam has good scope for the development of plastic industries.

Apart from resource - based industries several footloose industries can be established. Though Assam is deficient in metallic minerals, yet various industries may be set up in different parts viz. milling mini wire drawing units, spun - pipe plant, manufacturing of agricultural implements, atomic wires, electrical motors, diesel generating sets, etc.

Conclusion

At present, industrialization is the cornerstone of economic growth. Almost all countries of the world are trying to strengthen their economies through industrialization. Assam is no exception. But as the modern industrial culture being alien to the indigenous people of Assam, the knowhow of the local people about the recent development in the field of modern industries is developing very slowly. On the other hand, the industrialists of outside are less enthusiastic to invest money for the industrial development of this region. Any way, the situation is changing to some extent due to initiatives and efforts of both government and non-government organisations.

It is worth remembering that the process of industrialization is not confined to the establishment of manufacturing industries alone, but involves a change in the whole economic structure of the country. In an underdeveloped state like Assam, the process of industrialization goes hand in hand with the development of agriculture. A well developed agricultural sector can provide a good market and raw materials for manufacturing. Therefore, to achieve a balanced economic development a comprehensive planning combining both the sectors should be launched.

Notes

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12

Transport and Communication

Introduction

Assam is a state in the extreme north-eastern part of India with diversities not only in its physical setting, but also in social and economic characteristics. The state represents 2.38 per cent and 2.04 per cent of the national total geographical area and population respectively. The present geographical size of Assam is almost one-third of the size of which it was at the time of Independence because after 1947, Nagaland, Meghalaya, Arunachal Pradesh and Mizoram have been separated. Manipur and Tripura, which were princely states merged into the Indian Union in 1949. Thus, there are seven states in North East India popularly known as the Seven Sisters, of which Assam is the biggest in terms of population. Since the state is endowed with a variety of natural resources, an efficient transport system is essential for their proper utilization and speedy development.

Since transport is a basic prerequisite, no specific elaboration is required here to highlight the role played by it in any region's socio-economic change. The close connection between the development of various sectors of economy and a good transport network is, in fact, well established. The movement of goods, people and services and also the messages from one part to another would have not been possible had there been no evolution of transport and communication system. Lavarishchev (1966) remarks that, its effects in interfaces connections between production and consumption, between industry and agriculture, between the extractive and manufacturing industries and ensures production connections between economic areas and various branches of the national economy. In Europe for example, the freight transport which increases rapidly between 1950 and 1980, encouraged significantly the establishment of new industries in a number of formerly backward areas. Similarly, the North Eastern Industrial Region of the United States (Pittsburgh-Wheeling-Cleveland district, New York-Philadelphia-Baltimore district, Southern New England and Detroit districts etc.) would

not have come into existence had there been an excellent transport facilities provided by the Great Lake system, rivers, man-made canals, roads and railways. In India, the dispersal of cotton textile industry, for instance, from its original centres of Bombay and Ahmedabad to many other states like West Bengal, Uttar Pradesh, Bihar, Orissa, etc. can also be attributed mainly to the development of transport, specifically the railways. The growth of iron and steel industry in Durgapur and Asansol in the Damodar Valley which is expected to be the future 'Ruhr' of India, is not only determined by the locally available cooking coal and iron-ores but also by its favourable location on the Calcutta-Delhi rail route plus a navigable canal connecting Durgapur with the river Hooghly providing facilities for the movement of heavy steel goods to Calcutta market. Considering these few instances, it can safely be stated that the transport and communication is as important for the smooth functioning of a region's economy as the 'circulation of blood through human body'. Against this background, the existing transport and communication system of Assam covering its quantitative and qualitative dimensions has been attempted here.

Existing System

Although Assam is still much lagging behind in transport and communication compared to other parts of the country, it is now served by all the modern means of transportation, viz. roads, railways, waterways and airways. They are contributing, more or less, towards internal growth by consolidating the places located in various corners. They help in bringing villages and towns and the remote and more developed regions closer to one another and enhancing productivity, widening the market and introducing new stimuli to economic activity (Medhi, 1998). Of course, the achievement which can be expected from this sector is yet to reach an optimum level. Under these circumstances, it seems relevant to make an investigation of the present transport system along with the factors operating against its expansion. The quantitative change and qualitative (i.e. efficiency of operation) improvement seem an elaboration in relation to all the modern means of transportation in the state. Since Assam is a gateway to other states of the North Eastern Region, viz. Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland and Tripura, an efficient transport system of the state is directly related not only to the development of Assam, but also to the development of the entire region. Considering this specific importance of transport and communication in Assam, various means of transportation have been discussed below.

Water Transport

Cheapness is a special quality of water transport. It provides opportunities to move bulky goods over the seas and big rivers, and since it is natural as well as nearly-made, heavy dependence on it either at the national or international level remains unavoidable from time immemorial. Before the invention of auto-mobiles or steam engines, waterways were the only means of transportation and the discovery of different parts of the world by the explorers during the medieval period was possible only through it. Coming quickly to the regional level, it has been observed that whatever little communication existed in Assam in the early period was through the rivers and the area is endowed with navigable waterways provided by the Brahmaputra and the Barak and their numerous tributaries. Thus, the inland waterways of the state enjoyed and continues to enjoy significant position in the field of transport, communication and trade.

Historical records reveal that the waterways provided by the main rivers of Assam were utilized by the Ahom kings not only for the purpose of trade and movement but also for warfare. Surprisingly, for the convenience of transport and communication, the kings also dug several artificial canals by diverting the original course of the river. For instance, King Ramdeswar Singh dug the Bhogdoi river by diverting the course of Disoi at the upper course of the river. Similarly, the Kuteln, Sonai, Khanjan and many other in Sibsagar division were dug by different Ahom kings so as to make short cuts to the Brahmaputra river and to some other places (District Gazetteer, Sibsagar, 1967). Besides this, it is also found that "Assam's trade with the neighbouring provinces was mainly carried by river transport, the main route to Bengal, Bihar and Orissa being the Brahmaputra and the Ganga" (Medhi, 1978). During the early British period, it was the only means of transport but with the passage of time, the traditional boats used by the kings for communication had been replaced and steamers were used for the first time to ply between Calcutta and Guwahati in 1848. Subsequently, the steam navigation began to expand and by 1884 the steamer started plying between Dibrugarh and Dhubri, besides connecting Guwahati. What is more important that the direct steamer service from Dibrugarh to Calcutta via Sundarban was also opened in the following years and all these together influenced a great deal in minimising transport difficulties between Assam and the outside world (District Gazetteer, Sibsagar, 1967).

The introduction of steam navigation was a major turning point in the

history of water transport and communication in Assam. It was estimated that when Calcutta ranked first in the origin and destination of Assam traffic in 1889-90, the total volume of trade of Assam with Calcutta was 71 per cent of the whole province. It was further estimated that steamer "practically monopolised the whole trade with Calcutta block, 94 per cent of the inward and 95 per cent of the outward traffic being carried by them" (Medhi, 1978). This status continued till Independence and the role of water transport remained unique for the state.

Quite a number of perceptible changes had taken place in the state's water transport system after 1947 and in this connection, three notable events can be considered responsible. These are, firstly, the earthquake of 1950 caused considerable changes in the course of the Brahmaputra resulting in deterioration of the navigable channel, particularly in the upper reaches resulting in closures of river services by the joint steamer companies from 1954 onwards. Secondly, the construction of the Calcutta bad Bridge known as Saraugat Bridge across the Brahmaputra at Pandu in 1962 greatly improved the overland road and railway transport system, and thus it dealt a great blow to river services. Thirdly, due to Indo-Pak hostilities in 1965, the inland steamer service connecting Assam with the rest of the country was closed down (District Gazetteer, Darrang, 1978). All these events together badly affected the intra and inter-state navigation in Assam. It is found that between 1953 and 1956, the steamer services under the joint steamer companies between Amingaon-Guwahati, Tezpur-Neemati, Dhubri-Goalpara, Disangmukh-Dibrugarh, Badati-Jamler service, Barkhpur-Loobe feeder service (in Cachar) were closed one by one (Medhi, 1978). However, in spite of having a host of shortcomings, the Government of Assam did not remain silent, but attempted to rejuvenate the inland water transport system and set up a Directorate of Inland Water Transport (IWT) under the transport department in 1959 and entrusted it to look after the development of waterways along with the training of IWT personnels. Similarly, the Central Inland Water Transport Corporation Limited (CIWTC), a Government of India undertaking was also established in 1967 to resume water services in various parts of the country including Assam. Currently, both these public sector organisations are operating in the state on commercial basis. The operation area of the former organisation is limited to the state itself while the latter is operating between Assam and Calcutta via Bangladesh (Economic Survey, Assam, 1989).

At present, there are a large number of ferryghats on the other banks

of the Brahmaputra and the Barak and a huge number of cargos and passengers are handled by them. The composition and capacity of waterways fleet and ferries under IWT in Assam is given in Table 12.1.

Table 12.1
Composition and capacity of waterways fleet and ferries under IWT, 1990-93

Composition	Number		Capacity (metric tonnes)	
	1990-91	1992-93	1990-91	1992-93
Ramp powered				
Lighter vessels	-	10	-	-
Modern steel vessels	34	34	1110	215
Mo boat	29	17	522	185
Single boat	57	58	586	318
Pontoon	7	9	20	-
Relief boat	4	14	20	20
Total	131	142	2358	888

Source : Statistical Handbook, Directorate of Economics and Statistics, Govt. of Assam, 1992 and 1994.

Cargos and passengers handled by ferries on either side of the Brahmaputra river are given in Table - 12.2.

Table 12.2
Cargos and passengers handled by ferries on the Brahmaputra, 1990-93

Item	1990-91	1992-93
1. Passenger (100)	5,306	5,471
2. Goods (tonnes)	11,814	10,464
3. Vehicles (scooter, motor cycles & cycles)	650,258	643,679
4. Animals (nos.)	526,775	90,87[illegible]
5. Total Receipts (Rs. '000)	6,680	5,70[illegible]

Source : Statistical Handbook, Directorate of Economics and Statistics, Govt. of Assam, 1992 and 1994.

Both the tables reflect two important features regarding the water transport of the state : firstly, the composition (in terms of number) of waterways fleets and ferries has been increasing, but the total capacity of all these fleets has been reduced from 2358 metric tonnes to 888 metric tonnes, secondly, the number of passengers travelled in ferries has slightly increased from 5,306 thousand to 5,471 thousand between 1990-91 and 1992-93, but the quantity of goods involved in water transport has dropped down (Table 12.2). Now, two probable explanations can be given for this. Firstly, the crossing of the major rivers of the state through various ghats by ferries is still unavoidable because adequate number of bridges connecting either banks of the major rivers are not there. Secondly, although the water transport is steeper than others in monetary terms, it is time-consuming and since the rivers of the state became unsuitable for navigation after the earthquake of 1950, the role of the waterways fleets has been declining over the years. Besides these, the development of roads and railways also provided quick means of transportation and reduced the role of water transport during the last few decades. One of the recent events, however, in the sphere of water transport is the resumption of cargo service (December, 1996) between Assam and Bangladesh after a gap of six years. The state IWT has already entered into an agreement with Pandan Cement Authority Limited (PCAL) of Bhutan to transport the boulders to Bangladesh. The IWT vessels are already engaged in transhipment of Bhutanese boulders from Dhubri to Jogighopa under contract with PCAL. The most striking feature is that Inostate IWT, at present, has a 30,000 MT capacity fleet of barges along with high powered tugs to carry out cargo operations on the Brahmaputra. It has also been reported that four 500 MT capacity charges and a 750 MT self-propelled barge are currently under construction, which when completed will strengthen the capacity of water transport to handle more volume of cargo within and outside the state (The Assam Tribune, Dec., 3, 1996).

Road Transport

The present layout of the road transport network of the state, more or less, has developed over the framework laid down by the colonial rulers during their regime. Ahom rulers contributed a lot towards the development of road transport but except for a few of them these roads became useless to the British who were only concerned with the extraction of natural resources from this territory. Consequently, with the annexation of Assam to the British rule through the Treaty of Yandaban in 1826, the erstwhile road transport structure of the state began to change

slowly. The creation of the Public Works Department in 1868 and the Local Boards in Assam in 1880 was a significant step taken by the British to expand and develop the road network of Assam with a view to collecting resources of the state and then to despatching the same to their own land through Calcutta. Yet, the road development in respect of the construction of new roads did not take place until the establishment of the Road Board in 1925-27. A scheme of classification of roads into metalled, gravelled and unsurfaced was prepared by the Board and at the same time recommended for the adoption of mechanical means of construction of roads in the state. In 1928, the Road Development Committee called for a structural change of the road policy of the government and suggested taking over a bigger share of the road building activities. On the basis of recommendations of the committee, the government of India set up a Central Road Fund (1939) which subsequently provided substantial amount towards the development of roads in the state. Towards the end of 1942, Assam Transport Organization was set up and subsequently the organization attempted with full vigour to expand the road transport system of the state by materialising the suggestions worked out at the conference of Nagpur in 1943. Thus, prior to independence an extensive network of road development plan had been prepared, but the main lacuna was that roads were planned to connect only those places which were rich in resources or useful to the colonial rulers. No systematic attempt was made towards the development of the interior areas and as a result indigenous people had to suffer a lot from lack of transport and communication facilities. During this period, roads were constructed as linkages between the centres of commercial importance and the resource producing regions, e.g. between the tea gardens and the railway stations or river ports.

After independence, the Government of Independent India has been emphasizing more on the development of transport and communication facilities within the state in order to expand the British laid network so that the passengers and goods can be transported even from the interior areas. A significant proportion of investment alloted for the development of transport system during the first and the second Five Year Plans (25.4 per cent and 27.0 per cent respectively) indicates the government's seriousness towards the improvement of this sector. The Government of Assam also paid similar attention to change the inefficient means of transportation of the state and consequently, the outlay in transport sector which was just 3.82 per cent of the total expenditure during the first Five Year Plan increased to about 13 per cent in the next plan. During the last

five decades, the Government of Assam has also been stressing more on the creation of new links between the interior and main centres, besides improving the existing network of transport in the state. It is seen that during the first Five Year Plan period (1951-56), altogether 9,130 km of motorable roads were completed under the road development programme of the state (this included Mizoram and Meghalaya also). On the other hand, 7,696 km of new roads were constructed in the hill areas and the total nationalized road length increased to about 960 km during the said plan period. Slowly but steadily, the transport and communication scenario of the state has been changing covering almost all parts of the state irrespective of the resource consideration. As a result, the road transport has been emerging as a significant mode of communication in recent years with growing involvement of both inter- and intra-state flow of goods and passengers traffic. Statistical records reveal that the total length of the road under Public Works Department (PWD) in Assam increased to above 30,086 km in 1976-77, the annual rate of increase being 4 per cent. The surfaced and unsurfaced roads which were first 4,276 km and 16,046 km respectively in 1975-77 increased significantly to 6,839 km and 21,243 km in 1989-90. Of course, the proportions of surfaced and unsurfaced roads to the total road length have also been remaining constant during the said period. It is clear that the share of surfaced road to the total road length in 1976-77 was nearly 21 per cent which increased to 22.71 per cent in 1989-90 (less than two per cent increase over a period of thirteen years). On the other hand, the expansion of National Highway in the state has been rapid. It has gone up from 1,383 km in 1976-77 to 2,076 km in 1988-89 and further to 2,[illegible] km in 1989-90. Contrary to this, the length of the state highway in Assam has been declining from 2,131 km in 1976-77 to 2,106 km in 1989-90. The nationalization of a few kms of state highway might be the cause of reduction of this category of road in Assam. However, the district and other PWD roads of the state witnessed a large scale expansion over the last few years. Thus, for instance, has increased from 11,417 km in 1976-77 to 24,953 km in 1988-89 and further to 25,947 km in 1989-90, the annual rate of expansion being 137 per cent between the said periods. This indicates that to improve the transport and communication system in rural areas of the state, more than thousand kms of roads have been constructed by the Government of Assam each year. The types of road, the categories of roads and road length per lakh of population and per hundred sq.km of geographical area of Assam have been shown in Tables 12.3, 12.4 and 12.5 respectively.

Table 12.3
Types of road under PWD in Assam

Year	Surfaced (in km)	Unsurfaced (in km) Gravelled	Earthen	Total	Total road length (km)
1976-77	4276	14261	1784	20045	20321
1988-89	6601	21432	1024	23247	29035
1989-90	6839	22223	1024	23247	30086

Source : *Statistical Hand Book*, Assam, 1980 and 1992

Table 12.4
Categories of roads under PWD in Assam

Year	National Highway (km)	State Highway (km)	Other PWD roads (km)	Total (km)
1976-77	1383	2191	16807	20321
1988-89	2026	2056	24953	29035
1989-90	2037	2106	25947	30086

Source : *Statistical Hand Book*, Assam, 1980 and 1992

Table 12.5
Road length (in km) per lakh of population and per 100 sq. km of area in Assam

Year	Per lakh population	Per 100 sq. km of area
1976-77	218	25
1988-89	136	37
1989-90	137	38

Source : *Statistical Hand Book*, Assam 1980 and 1992

So far as the types of road are concerned (as shown in Table 12.3), it is clear that the proportion of surfaced roads to the total road length was only 22.7 per cent in 1989-90 against the national average of about 48 per cent. On the other hand, the proportion of unsurfaced roads is still more in

the state (nearly 88 per cent) than that of the nation as a whole (nearly 51 per cent). Whatever may be the quantitative dimension of the total road length, the most staggering point is that the condition of unsurfaced roads is not satisfactory in many parts of the state. Since most of them are confined mainly to the rural parts and acting as feeder lines either to the national or state highways, they need considerable qualitative improvement.

Categorywise, the proportions of National Highway, State Highway and other PWD roads to total road length are 6.75, 6.99 and 86.26 per cent respectively. The share of National Highway in the state is higher than the national average of only 2 per cent. Although the National Highway constitutes only 2 per cent of the total road length, they carry nearly 40 per cent of the road traffic of the country. Similarly, in Assam the contribution of National Highway to the total road traffic is most significant. From the view point of industrial development, the role of National Highway is more pronounced because the link between Assam and the rest of the country is provided by the National Highway No 31. Realizing the special role played by the National Highways the Government of India set up a National Highway Authority in June, 1989 with a view to expanding roads to almost all areas of the country. In Assam, at present, national highways have been extended to cover all the districts (Table 12.6 and Fig. 12.1).

The existing state highways and other PWD and rural roads are under the state government and they altogether cover nearly 93 per cent of the total road length. In the rural areas, roads are being developed under the Minimum Needs Programme (MNP), the objective of it being to link all villages with a population of 1,500 and above and 50 per cent of the villages with a population of 1000 – 1,500 by all weather roads by 1990 (India, 1993). The contribution of this programme to the development of rural roads in Assam is no doubt substantial. Even then, the need of quantitative expansion of roads to serve fully the entire rural areas is still profound. On the other hand, the more construction of new roads in the rural areas cannot serve the needs of the people if it is not all-weathered road. Therefore, required efficiency in terms of construction and management of all-weathered roads in the interior areas is indispensable. Another important aspect is that the road length per lakh of population and per 100 sq. km. of geographical area in the state is 137 km and 38 km respectively. This is lower than the national average of 221 km and 53 km respectively. Thus, it is clear that the state's road transport system is yet to reach even the minimum national standard.

Table 12.6
Districts covered by National Highways

National Highway No.	Areas/ Sites connected	District covered
31	Guwahati to Barahi (Bihar) via Siliguri and Koch Bihar	Kamrup, Nalbari, Barpeta, Kokrajhar, Dongaigaon and Dhubri
31.D	North Salmara to Jaraghopa	Bongaigaon
31.C	Chapaguri via Srirampur to West Bengal	Kokrajhar
36	Nagaon via Dabaka to Dimapur	Nagaon, Morigaon and Karbi Anglong
37	Panchayans via Guwahati Nagaon, Jorhat, Sibsagar to Saishawaghat (Dibrugarh)	Dhubri, Goalpara, Kamrup, Nagaon, Jorhat, Sibsagar, Dibrugarh, Tinsukia
38	Makum, Jaipur to Lekhapani	Tinsukia
39	Numaligarh via Golaghat Dimapur to Kohima	Golaghat and Karbi Anglong
40	Guwahati to Shillong	Kamrup
44	Shillong via Badarpur, Karimganj to Agartala	Cachar and Karimganj
51	Palkan (Goalpara) to Tura	Goalpara
52	Baihata Gurjali via Mangaldai, Tezpur, Lakhimpur to Jorhat	Kamrup, Darrang, Sonitpur, Lakhimpur and Dhemaji
53	Silchar via Lakhimpur to Lupbai	Cachar
54	Silchar to Aizawl	Cachar

Railway Transport

Rail transport is one of the biggest nationalised undertakings in India with a total route length of more than 62,000 km, of which nearly 6.0 per cent (3,858.15 km) is represented by the North East Frontier Railway serving basically the north-eastern states of India. It is the largest railway system in Asia and fourth largest in the world. The total railway route

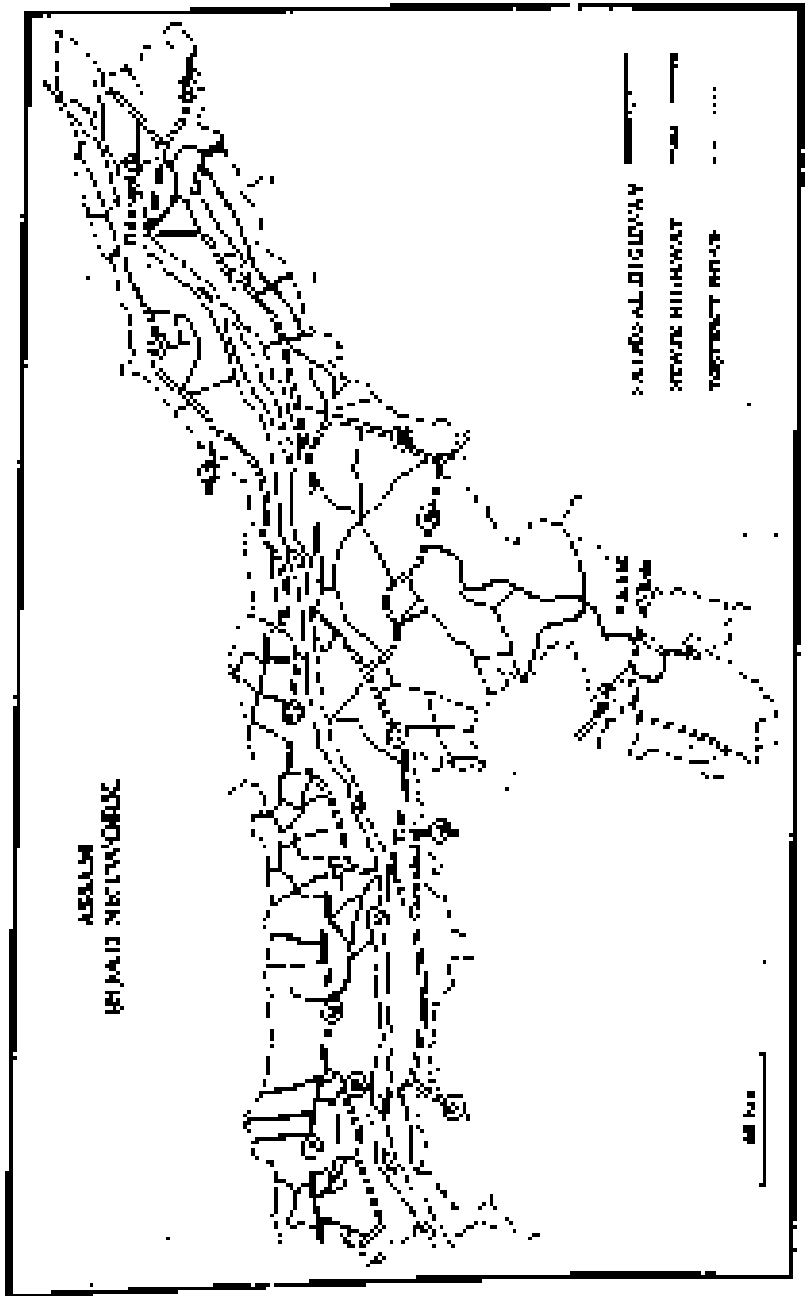

Fig. 12.1

length of N.F. Railway in 1991-92 was 2,854.14 km, of which about 60 per cent (1,646.85 km) lies within the state of Assam. The total broad gauge route length in Assam in 1991-92 was 260.41 km and the length of metre gauge was 2,200.42 km representing nearly 6.76 km and 5 per cent of the total broad gauge and metre gauge lines of the nation respectively. The proportion of broad gauge route length to the total route length of railway in Assam is worked out to be around 11 per cent against the national average of 55 per cent. However, the state was favourably placed in respect of the railway route length per 100 sq. km. It was about 30.3 km against national average of only 19 km by the end of 1990-91.

The age of the rail transport system of the state is now 100 years. Its history opened with the construction of a 80 km long Dibru-Sadiya narrow gauge railway line constructed by the Assam Railway and Trading Company in 1882. The state also witnessed the construction of another 50 km long and 2 feet wide state railway running from Amgurighat on the river Brahmaputra in Morigaon and Tezpur of Darrang district in 1885. Both these lines were originally built for the convenience of tea gardens located in the districts of Sibsagar and Lakhimpur as the unmetalled roads in the rivers became impassable to wheeled traffic in rainy (Dimri Gazetteer, Sibsagar). These were the feeder lines of the river transport because they had no link or contact with any railway system outside the region (Mallik, 1998). Another feeder line was constructed between Pandu and Jamunamukh in 1897. Similarly the completion of Rangia-Rangapara feeder line in 1899 and Chaparmukh-Silghat in 1930 had finally added to the growth of rail transport in Assam.

Since the beginning of the present century rail transport has been getting changed in its structure. It is observed that "Since 1903 railway development in Assam was meaningful in the sense that Assam was connected with the two gateways in two lines, one the Eastern Bengal Railway (EB Railway) extended from Calcutta to Dhubri in 1902 and the other the Assam Bengal Railway (A B Railway) extended from Chittagong to Lumding in 1904. Five years later the E.B Railway came as far as Amingaon and the total railway length increased to about 1,000 km" (Mishi, 1978). Considering the importance of railway in the province as well as to improve the earnings of the A.B Railway, the Government of India subsequently paid greater attention to the construction of few branch lines in the state. Consequently, the Silghat-Nagaimara line (16 km) of 1917, the Chaparmukh-Silghat line, the Katakhal-Lalabazar line of 1924, the Lumding-Badarpur-Jatinga line, the Karimganj-Longai Valley line,

and Sonabil-Mahendiganj line, etc. began to operate in the state. Another significant development was taking place in the north bank of the Brahmaputra river. The E.B Railway extended its metregauge line from Rangia to Tezpur in 1948-49 and subsequently to Rangapara in 1952-53. The railway network in the state took a new turn after 1947 when the Assam Railway, with a route length of about 1130 miles, was amalgamated with the E.B Railway and named as the Bengal and Assam Railway (Medhi, 1978). But after independence, the organizational set up of the B.A. Railway received a change. Due to the partition of the country, Assam had to lose direct links with Chittagong and Calcutta ports. As a result, the creation of a link route with the rest of the country for Assam became indispensable. Across critical juncture the Assam Rail Link was started in 1948 and completed in 1949 which was then handed over to the Assam Railway. It is essential to note as well as unfortunate after independence there prevailed a complicated system of movement and control of railway in India. As this system was found unsatisfactory from the economic and defence point of view, the entire administrative and organizational set up of the railway system in the country was reorganised in 1951 and a proposal of the railway system in the country was reorganised in 1951 and a proposal to implement the new scheme in 1952. The important reorganisation was evident in the Assam Railway which with some minor adjustments was brought under the jurisdiction of the North East Frontier Railway on 15th January, 1958 and Maligaon as its headquarters. The total route length of the N.F Railway in 1991-92 was 3,858.14 km of which 772.67 km was metregauge (MG), 2,596.19 km was broadgauge (BG) and 37.48 km. was broadgauge (BG). The major portion of this zone falls within the state of Assam (nearly 60 per cent). The length of broadgauge and metregauge in the state is 260.41 km and 2,200.42 km respectively. After the creation of this state in 26th January, 1972 various developmental activities have been undertaken by Assam. Various developmental activities have been undertaken by Assam. Various developmental activities have been undertaken by Assam.

already been completed and opened for traffic. Besides this the conversion work of Guwahati-Tinsukia-Dibrugarh (550 km) line has been in progress. The surveys for the construction of an alternative broadgauge connection between Jogighopa and Rangiya (296 km) and Chaparmukh and Dibrugarh (230 km) have been completed by the railway department. The most significant development in the railway transport is the construction of the third rail connectivity across the river Brahmaputra connecting Jogighopa and Pancharatna and very recently the foundation stone for a fourth bridge has also been laid at Bogibeel (Dibrugarh). On the other hand, plans for the construction of a few feeder lines (MG) like Harmati-Silghat (24 km), Lakhipur-Khaspur (26 km), Mukungpukuri-Pasighat (181 km) etc. have been undertaken by the railway department. During the 80s, Rangiya-Barnagar (34 km), Amingaon-Dudhnoi (26 km), Lakhipur-Dhalabari (30 km) and Amguri-Tuli (18 km) MG lines have been completed and opened for both passenger and traffic (Fig. 12.2).

It is now obvious that the rail transport system of the state has been expanding steadily and if the proposed plans and projects mentioned above are completed in scheduled time, it would definitely be able to meet a long-felt necessity of the people of the state. In table 12.6, a statistical profile of the NF Railway (major part lies within Assam) for the period of 1961-62, 1986-87 and 1989-90 has been presented to highlight the role of rail transport in the fields of passengers and goods movement. The following characteristics can be observed from the data shown in table 12.7.

1. The gross earnings of the NF Railway have been increasing at a rate of nearly 17 per cent per year. Unfortunately, the net earnings have been remaining negative over the years. It is due to the higher working expenses resulting from the construction of new feeder lines and conversion of MG to BG in the same. However, if the entire projects completed, the railway transport would reach a level of saturation after which the net earnings could be expected to be positive.

2. Passengers originating and passengers carried by the NF Railway had slightly declined during the periods as shown in the table 12.6. But the passenger kilometre and average journey per passenger has been increasing. Generally people prefer long-distance journey by train avoiding the short distance journey. It indicates that the movement of people within the state by train has been declining day by day. Although the intra-state movement might be declined, the inter-state movement increased. Thus, the rail transport has been playing a positive role in bringing the

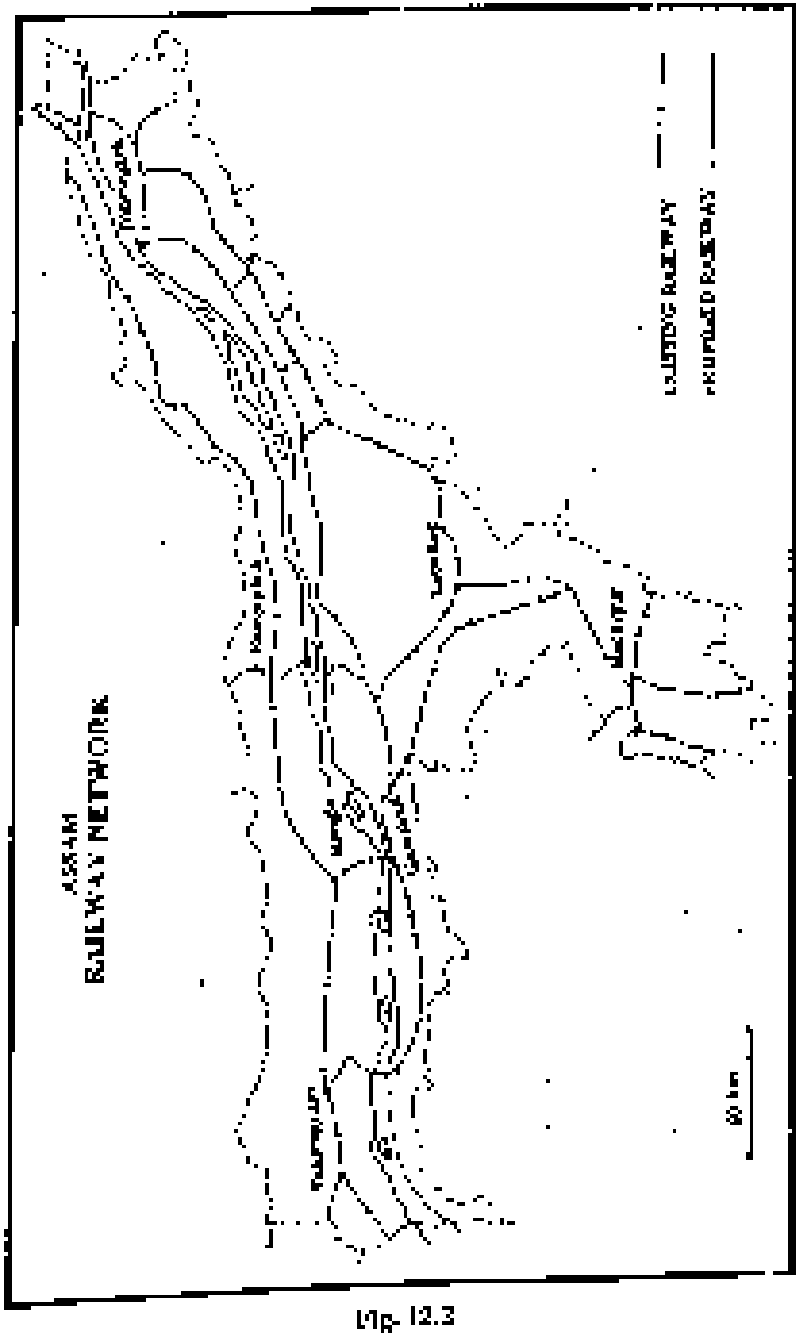

Fig. 12.2

people of this region to the national mainstream.

3 Since the flow of commodities to and from the state has been going up both the freight tonnes km. and the earnings from it have been increasing steadily. Therefore the dependence on the rail transport for the development of the entire northeast is increasing day by day.

Table 12.7
Statistical profile of NF Railway

Particulars	Units	1987-88	1988-89	1989-90
A. Financial Position				
a) Gross earnings	(Rs. crores)	301.59	227.09	302.84
b) Working expenses	-do-	396.45	441.00	536.84
c) Net earnings	-do-	(-)94.86	(-)213.90	(-)233.00
B. Passengers				
a) Passengers originating	(millions)	30.22	27.26	30.77
b) Passenger carried	-do-	32.05	29.83	33.09
c) Passenger km	-do-	3124.4	3148.6	3597.3
d) Earnings from passenger	(Rs. crores)	40.52	55.04	70.21
e) Average earning per passenger km.	Paise	9.13	13.59	17.54
f) Average length of passenger journey	km	199.4	194.9	175.5
C. Freight				
a) Freight originating (in. tonnes)		9.41	9.11	9.84
b) Freight carried	-do-	11.30	11.13	11.16
c) Freight tonnes km (million km)		5858.6	5910.2	6237.1
d) Earning from goods carried	(in crore Rs.)	164.12	152.51	207.39

Source : *Statistical Hand Book, 1993* and *Economic Survey of Assam, 1989-90.*

Air Transport

Air transport has a special role to play for the movement of passengers and goods in an area like Assam with peculiar topography and geographic location. Of course, its potentiality came to light only after 1949 when Pakistan prohibited transhipment of cargo to Assam by waterways.

Consequently, the government of India became more attentive towards the expansion of the air transport in the state. At present, Assam is well-connected with the other parts of the country through air link. The Indian Airlines are instrumental in establishing air connections between Assam and the rest of the country. They are operating regular Air Bus and Boeing services to and from Guwahati, Calcutta and Delhi. Besides these, there are regular air transport services connecting six civil airports located at Dibrugarh (Begleigarh), Tezpur (Salonibari), Jorhat (Rowriah), Dibrugarh (Mohanbari), Tezpur (Salonibari) and Silchar (Kumbhirgram). Guwahati is served by three kinds of air services viz. Air Bus, Boeing and Bayidoot. All the capital towns of the states of North Eastern India have been well connected by Vayudoot services. Since most of the areas of the state is comparatively recent, it has still a long way to cater to the needs of the people of the state.

Conclusion

Considering the present position of the various means of transportation in the state, the following conclusions can be drawn.

1 The inland water transport system of the state is providing facility basically for the mineral flow of goods and people. The glorious tradition of the state transport linking the state with the rest of the country has been affected by the mighty Brahmaputra and its tributaries. The annual spillover of the beds of the majestic rivers of the state due to silting every year has badly affected the waterways.

Besides this, the expansion of the roads over the railways in the state has also reduced the importance of the water transport. The declining trends of the growth of the through water transport during the last decades, as indicated in the preceding table, can be used as an index to test the decline of the transport system. However, the steps recently taken by the Government of Assam in order to improve the water transport system are quite impressive. Since the communication between the people on the opposite banks of the major rivers is inescapable both from the social and economic points of view, the regularity and modernisation of water transport services connecting the banks are necessary not only for the qualitative improvement but also to regain its glorious tradition.

2 So far as the road transport system of the state is concerned, there is abnormal gap between the existing and expected lengths of roads of the state. In view of the fact that the density of roads per hundred sq km. in the

of area and the road length per lakh of population in the state are lower than the national average, the expansion of road network should be more rapid than what it is currently. Greater emphasis is needed to expand the surfaced roads in the rural areas. It should be noted that mere expansion of road network will not fulfil the demands of the people unless it is upgraded through some qualitative improvement. Quite a large number of villages are yet to be connected by all-weathered roads. Whatever road extension program not is going on in the state, it is seen that most of them are guided by political considerations rather than the needs of the villages. As a result, the systematic mobilisation of resources including agricultural are in the state is yet to make much headway. Thus, the need of the hour is to make a structural improvement of the existing road transport system keeping in view the state's prospects for future growth and development.

3. It is the rail transport system of the state which is instrumental in channelizing the flow of farm products and people at inter-state level. Unfortunately, this system of transport has been operating with negative net earnings since a long period of time. However, the negative trend is expected to get improved after the completion of various projects currently under progress. But still there is a problem. The major railway tracks of the state were constructed before independence and were oriented basically towards the growth of oil and tea industries. The creation of lines between other production and consumption centres was not properly looked into. However, the recent addition of feeder lines in the state is expected to fulfil these shortcomings.

4. The air transport system of the state is yet to reach the expected level. As this system of transport is costly and require constant monitoring, it has covered only a smaller section of the society. Its expansion as well as improvement, especially in the hilly parts, needs due attention.

However, the existing means of transport in the state need better co-ordination and management in order to optimise the flow of goods and people for integrated growth and development of the state.

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13

Tourism

Introduction

Although tourism means travel, in the present day context it stands for the totality of activities and phenomena arising from travel and 'stay' of strangers. However, it excludes commercial activity and establishment of permanent residence by the strangers. The term includes all interconnected processes, especially as some that came into play through the temporary movement of strangers into withdrawal from a certain district, state or country. India has adopted the definition of tourist as a person who temporarily travels to an area other than that in which he has his usual residence and the main purpose of whose visit is other than the exercise of an activity remunerated in some state to a way.

The potential economic benefit continues to be the driving force behind tourism industry and its development. In 1950, 25 million tourists (international arrivals) were recorded world-wide, and it has grown to 500 million in 1990. Thus tourism has become the second largest economic activity in internal merchandise with an annual growth rate of 6%. Considering the importance of tourism, developing countries like India, have made attempts to attract international tourists to their countries. This is because the amount spent by tourist in a country goes to the exchequer of that country. Besides job opportunities, India with its well known cultural heritage and natural beauty, can certainly attract foreign tourists. But tourism is not developed much in India in comparison to some neighbouring countries like Thailand. Thailand received about 2% of world's total income from tourism (in 1993-94 the total receipt from tourism in the world was 3,05,816) whereas the share of India continues to be only 0.4%.

Tourism in Assam : Assam is a pioneer state in not the eastern part of India to introduce a state tourism department in 1958 to promote tourism activities in the state. But the progress is far below expectation. In 1979, Assam was visited by 2320 foreign tourists accounting for 0.2% of foreign tourism to India. Unfortunately, the number declined to 476 in 1995 due

a decade-long social political instability, starting with the Assam agitation in 1978-79. As a result of this, the U.A.P. regulation (Restricted Area Permit-for foreign visitors introduced since 1962, having been lifted only in the later part of 1995) was made stringent for foreign visitors.

Table 13.3
Tourist arrivals in Assam (1979-1997)

Year	Foreign tourist	Domestic tourist
1979	2320	N.A.
1980	1000	5190
1981	50	8686
1982	137	10172
1983	32	7038
1984	23	8481
1985	40	10,383
1986	149	14,775
1987	430	18,722
1988	595	18,470
1989	219	17,097
1990	425	15,382
1991	252	15,016
1992	431	19,262
1993	440	20,154
1994	350	17,648
1995	479	16,256
1996	1000	14,730
1997	723	14,281

Source : Directorate of Tourism, Assam
Note : Figures represent recorded Government Tourist Lodge, Assam.

In the domestic sphere also, the trend is not so impressive as Assam witnessed only 0.01% of the domestic tourists (17,648) of India (Total domestic tourist in India 100,036,261) in 1994. Table 13.1 in present shows trend of tourist arrivals in Assam, which reveals a more state of affairs in tourism in Assam. Kaziranga is the prime destination in Assam as well as North-Eastern India which has been hosting foreign and domestic tourists consistently. During the period from 1951-52 to 1994-95, it has recorded an eleven fold increase of foreign tourists, from 71 to 781 in number and 487 fold increase in domestic tourists from 100 to 48,501 in number

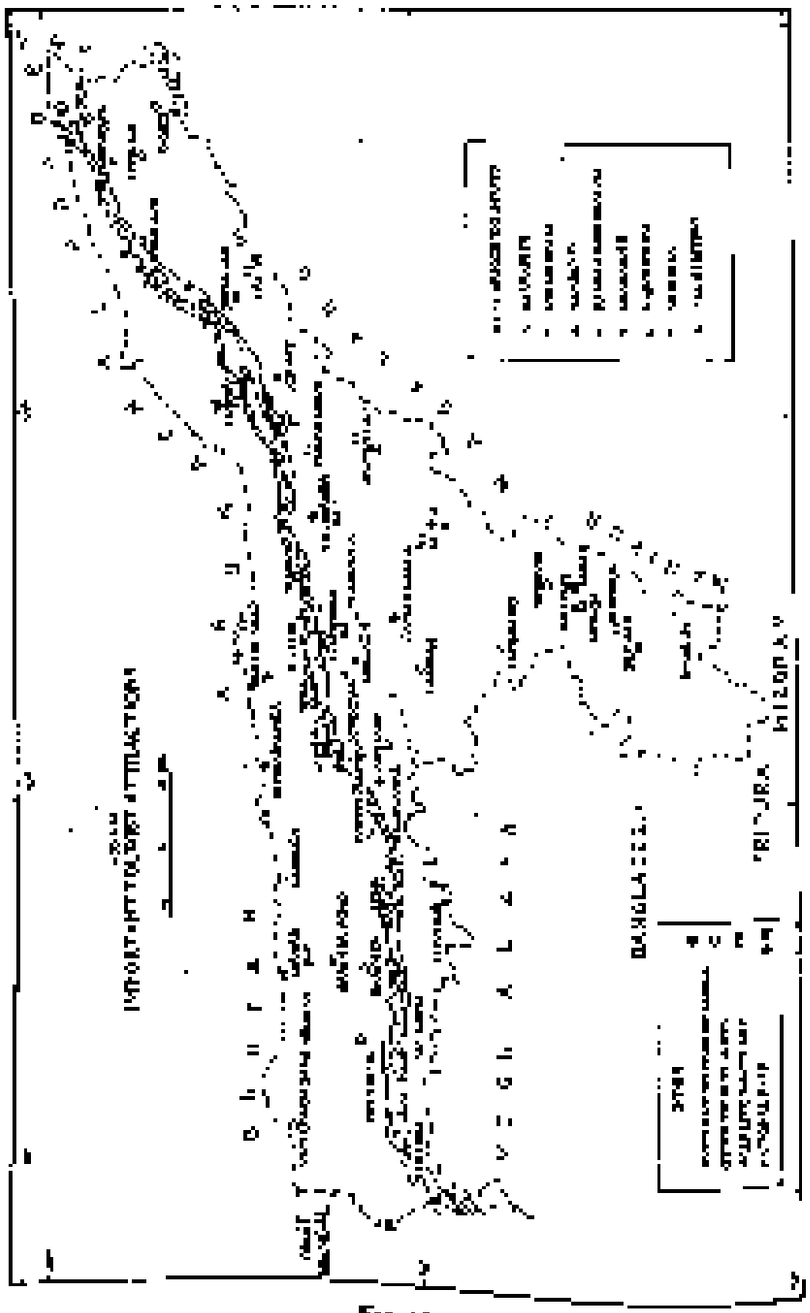

Fig. 13.1

including extraordinary with an average of 274 tourists per day (Source: Department of Tourist, Govt. of Assam). The premier tourism agency of Assam, the Department of Tourism has so far developed 2 destinations (Fig. 13.1) along with accommodation facilities having altogether 350 bed capacity (Table 13.2).

Table 13.2

Tourist centres and government accommodation facilities in Assam, 1993

S. No.	Destination	District	Significance	Accommodation unit	Bed-capacity
1.	Guwahati	Kamrup	Gateway to N.E. Region, capital of the state, organisations, shopping of handicrafts, sight seeing facilities, accommodation and entertainment facility, historic and pilgrimage sites, air link etc.	1	56
2.	Chandubi	Kamrup	Around 64 km from Guwahati, ideal picnic site, potentiality for trekking and jungle exploration, tribal life of Rabha people, boating facility etc.	1	16
3.	Barpeta Road	Barpeta	Business centre of the district, gateway to Manas, only tiger reserve in Assam (National Park and World Heritage site)	1	10
4.	Tezpur	Sonitpur	Headquarters of the district, historical monuments, pilgrimage and archaeological site, one of the beautiful township of Assam with recreational parks, boating facility, air link etc.	1	15
5.	Bhalukpong	Sonapur	Around 60 km. north of Tezpur.		

	(Lower)		are of the important gateways to Arunachal Pradesh, natural beauty, ideal for nature and angling in the Dhansiri river, Addl. Access to Nambor National Park, hot spring (Bong) etc.	1	17
6.	Kaziranga	Golaghat	Important National Park, especially of one horned rhino, elephant safari, kaziranga, Khat Ali of Karbi people, potential site for trekking in Karbi Hills & Deopahar Archaeological site, etc.	4	108
7.	Nagaon	Nagaon	District headquarters, secular and pilgrimage site Bordowa at a distance of 12 km, Kaliabhomora Archaeological park and pilgrimage site of Dakaka is located at a distance of 42 km.	1	17
8.	Sivasagar	Sivasagar	District headquarters, socio-cultural organisations, Ahom age tanks (Sagar), temples and palaces, Ajan pir 'Dargah', A celebrated pilgrimage site both for Hindus and Muslims.	2	14
9.	Jorhat	Jorhat	District headquarters, important township of upper Assam, Tea factories, tea research centre, Regional Research Laboratory, fresh point for glacial river Brahmaputra, Majuli and its 'Satra' Institutions along with beautiful riverscape, air link.	3	24
10.	Diphu	Karbi Anglong	District headquarters, Silbheta rock dam on Jatinga river 20 km from Diphu, tribal life of Karbi people, potential site for trekking and jungle exploration.	1	20
11.	Haflong	N.C.Hills	District headquarters, socio-cultural organisations, only hill station of Assam, potential		

			trekking site in the Barail hills, nearby important sites, viz. Jatinga (Skin for hair weaving and natural beauty, Maibar (Zeliang) picnic and nature spot, Maibang (Dimasa) archaeological site		
12.	Silchar	Cachar	District headquarters, socio-cultural organisations, airlink, important township in Barak valley, Kanakpur archaeological site (24 km), Bhuban hill piger range site (45 km), tea gardens etc.	1	26

* It is recommended that regional tourist accommodation facilities should be developed.

Sources of Tourist Attraction

The state has a rich natural, cultural resource for the promotion of tourism. It has also enjoying physical, social and socio-cultural potentiality in this regard. Spatial, aesthetic and ecological beauty of the Himalayan ranges in the north and north-east, the state's surrounding mountains south by hills. The plains of the river Brahmaputra and Barak account for 81% of the total geographical area. The plains with numerous cross cutting tributaries have provided beautiful landscape. There are also two hill districts (North Cachar Hill Dt. Anglong) ranging from 150m to about 1400m in altitude with unique landscape. Hill destinations like Haflong, Jatinga, Diphu and Haflong can also a lot in the field of adventure tourism. Viz. walking, trekking, jungle safari, rock climbing, etc. Hot water springs like Garampani (Golaghat district), water bodies in Umrangso (N.C. Hills) water falls at Chepanadi (Nagaon district), rapids along the courses of the river Jamuna at Silliguri (Karbi Anglong dist) and almy Kapili river are prominent have tremendous potentiality to attract tourists. As the whole range of natural infrastructure for tourism is present so, Assam has a unique the rainfree and cold season, viz. Autumn (Oct-Nov.) Winter (Dec-Jan-Feb) and early Spring (Mar-April) are regarded as valuable periods for tourists. It is found that around 70% of the tourists visit the state within these seasons.

Assam is well known for its exotic flora and fauna. It forms a part of global bio-diversity hot spot characterised by variety of habitats

ranging from swamps and savannah grasslands in the plain to sub-tropical broad leaved forest in the high Barail range. About 180 species of mammals and more than 800 species of birds are found here which is the highest among individual states in India. The greenery of Assam consists of evergreen, semi evergreen, mixed deciduous, riperian, moist savannah and miscellaneaus types of vegetation. It also has ornamental plants like orchids, both common and rare varieties. Though Assam has small coverage of protected area (about 3 per cent of total geographical area of the state), it still possesses 13 important wildlife areas (Table 13.3), which provide room for 31 types of endangered and rare species of mammals and 14 types of amphibians and reptiles . Hence the state can be said to have all the natural infrastructure to develop tourism.

In cultural front, the state is rich enough to attract the attention of tourist. It is a meeting ground of Austro-Asiatic, Tibeto- Burman and Indo-Aryan groups of people. Hence human variety is reflected through each and every sphere of life of its residents. The colourful life of people, their traditional customs, festivals and dances are some of such important sources of tourist attraction. Assam has the tradition of weaving which is rich also among the tribal people. Assam also practices 'muga' 'endi', and 'pat' silk, worm rearing and weaving. It has also the tradition of folk and classical dance forms, mask making, puppetry, wood and ivory curving, bamboo and cane craft, etc. Besides, various forms of performing art of 'Satra' institutions like 'bhawna', 'Jatra', etc. are worth mentioning in this regard.

Assam is also rich in antiquity assets like ruins and monuments. The existing archaeological ruins of Assam go as far back as Gupta period (5th-6th century AD), though their numbers are very few. Ruins of the Post-Gupta period are also to be found in different parts of the state. Stylistically all the remains belong to different north Indian art tradition with local influences. There are as many as 12 archaeological sites (Table 13. 4) and about 25 major monuments dating back from 7th to 17th century AD (Table 13.5).

Despite the variety of attractions the focal point of tourism in Assam continues to be only the wild life covering internationally famous Kaziranga and Manas National Parks along with ruins and monuments, especially the pilgrimage trail to the age -old 'Sakti' shrine Kamakhya. Fairs and festivals, adventure activities, ethnic culture, cuisine are other relatively new segments with potentiality for development of overall tourism scenario of the state.

Table 13.3
Protected areas in Assam

Sl. No.	Name and category	Area in sq. km	Rare and endangered animals and birds
1.	Kaziranga National Park	430	Rhinoceros, Asiatic water buffalo, swamp deer, elephant, tiger, florican, hoolock gibboon, capped langur.
2.	Manas National Park	500	Tiger, goldenlangur, pigmyhog, hispid hare, elephant, gaur florican.
3.	Barnadi Wild Life Sanctuary	26	Pigmy hog,hispid hare, Gaur, elephant, florican hornbil.
4.	Laokhowa Wild Life Sanctuary	70	Rhinoceros, aquatic and migratory birds.
5.	Orang Wild Life Sanctuary	72	Rhinoceros, Spotbilled pelican, greater adjutant stork.
6.	Pobitara Wild Life Sancturay	18	Rhinoceros
7.	Garampani Wild Life Sancturay	6	Elephant, gaur, hollock gibbon and varities of birds.
8.	Dibru- Saikhowa Sanctuary	640	Elephant, white winged, wood duck, aquatic avifauna.
9.	Nameri Wild Life Sanctuary	130	Elephant, gaur, capped langur, golden mahsheer.
10.	Sonairupa Wild Life Sanctuary	175	Tiger, elephant, hornbill.
11.	Pobha Buffalo Sanctuary	49	Asiatic water buffalo.
12.	Deepar Beel Wild Life Sanctuary	4	Aquatic and migratory birds.
13.	Kachu gaon Game Reserve	214	Elephant, gaur, golden langur, spotted deer.

Source: Forest of Assam, 1992, Dept. of Forest, Govt. of Assam
N.B. Nameri and Dibru Saikhowa have been declared as National Park.

Table 13.4
Major archaeological sites of Assam

Sl. no.	Name of the sites	District	Nearest town	Period
1.	Da-Parbatia ruins	Sonitpur	Tezpur	5th-6th century A.D
2.	Sringapatheruins	Goalpara	Goalpara	8-9th "
3.	Madan Kamdev ruins	Kamrup	Guwahati	11th-12th "
4.	Pandunath ruins	Kamrup	Guwahati	11th-12th "
5.	Cole park ruins	Sonitpur	Tezpur	7th-12th "
6.	Ramani Pahar ruins	Sonitpur	Tezpur	11th-12th "
7.	Silpeshwar ruins	Sonitpur	Dhekiajuli	10th-12th "
8.	Na-Navil ruins	Nagaon	Raha	7th-8th "
9.	Sankha Devi ruins	Nagaon	Raha	10th-11th "
10.	Ahoy ruins	Dhemaji	Ahoy	11th "
11.	Rangachory ruins	Nagaon	Hojai	10th-11th "
12.	Nimatighat ruins	Golaghat	Bokakhat	12th "

Source: Directorate of Archaeology, Assam.

Despite the decades long developmental efforts by government agencies, tourism activities of the state are concentrated in some selected pockets, viz. Guwahati and Kaziranga. The tourist demands of both overseas gateway in the entire north-eastern region and a tourist usually prefers to have an overseas holiday to the proximity of Kaziranga, Shillong and other parts of the region. Apart from this, various government and private agencies of the city provide package tour facilities to these regions like Kaziranga, Manas, Shillong (Meghalaya), etc.

Table 13.5
Major historical monuments of Assam

Sl. No.	Name of monument	District	Nearest town	Period
1.	Rudrasagar Dol	Sibsagar	Sibsagar	18th cent. AD
2.	Rajmai Dol	Sibsagar	Sibsagar	18th cent. AD
3.	Bhimasagar Dol	Sibsagar	Sibsagar	1699-1681 AD

4.	Siva Dol	"	"	17th AD
5.	Rang Ghar	"	"	18th century AD
6.	Joi-Dol	"	"	1698 AD
7.	Kareng Ghar	"	Nazira	17th-18th Century AD
8.	Pisa-phukuri Dol	"	Nazira	19th Century AD
9.	Rudrasagar Dol	"	Sibsagar	1788 AD
10.	Gaurisagar Dol	Golaghat	Sibsagar	1734 AD
11.	Negheritiny Dol	Golaghat	Dergaon	19th Century AD
12.	Meghdoot Dol	Lakhimpur	Narayanpur	17th Century AD
13.	Boxadev Dol	Sonitpur	Golapur	18th Century AD
14.	Bar Dol	Sonitpur	Biswanath Charali	1730 cem AD
15.	Kamakhya Mandir	Nagaon	Silghat	748-66 AD
16.	Tripurasundari Mandir	Nalbari	Dakshinpat	12th century AD
17.	Kamakhya Mandir	Kamrup	Guwahati	1565 AD
18.	Ayodhya Mandir	"	"	16th AD
19.	Hayagriva Mandir	"	Hajo	15th AD
20.	Billeswar Mandir	Nalbari	Nalbari	1521 AD
21.	Vishnu nath Mandir	Barpeta	Barpeta	18th C. AD
22.	Parbati Mandir	Dhubri	Gauripur	13th-16th C. AD
23.	Majitar Mandir	N.C. Hills	Maibang	1761 AD
24.	Kareng Mandir	Garo	Sikhia	8th C. AD
25.	Kamakhya Palace	"	"	1565-87 AD
26.	Sonai Mandir	"	"	1865-87 AD

After Guwahati, Kaziranga continues to witness the bulk of the share of tourists as well as foreign tourists (around 25% of domestic and 21% of foreign tour). Due to gradually growing demand for conservation of foreign tour, due to gradually growing demand for conservation of environment and associated tourist resources (Table 13.5). As the government and associated tourist resources (Table 13.5). As the government and associated tourist resources (Table 13.5). As the government

presence in the areas of wildernesses found to be less than that of the foreign tourists. Moreover, the interest of domestic tourists is diverted to Shillong (Meghalaya) for their present inclination towards hill stations, and a couple of important pilgrimage sites of Assam, viz. Kamakhya, Umananda (both in Guwahati), Baidyanath and Mahabhairab (both in Tezpur). Rest of the destinations have very negligible share of tourist arrival. However, lack of publicity and proper line and room situation continue to be the main reasons of such retarded nature of tourism development, though the state possesses fairly developed road-transport service, especially in private sector for efficient, quick and comfortable travel, as many as six airports located in Guwahati, Dibrugarh, Jorhat, Tezpur, Silchar and Lakhimpur (none unused) and well connected railway network (8,675 km) with major centres concerning centres of India along with international trading (Mariani) at their gates through a hilly district (namely 37 tunnels) with length varying from 26.5 m to 366 m. Such infrastructures are not properly oriented to provide tourism. In the state only around 648 tea gardens, with their attractive human appeal, especially in centre and upper Assam along with well-known Digboi oil refinery, Duars of Lakhimpur are yet to receive attention in tourism front.

Table 15.6

Period pattern of domestic and foreign tourist, 1995 (in some selected destinations)

Sl. No.	Destination	% of domestic tourist	% of foreign tourist
1.	Guwahati	19.0	14
2.	Kaziranga	20	41
3.	Manas	2	11
4.	Sibsagar	5	9
5.	Tezpur (Tawang)	5	8
6.	Dhalukpung	2	
7.	Haflong	2	2
8.	Silchar	2	4
9.	Jorhat		4
10.	Majuli	-	6
11.	Nagaon	-	2
12.	Haflong	4	2
13.	Orang	-	-
14.	Mailenkamdev	3	2

Source : Based on Survey conducted by the author

Problems and Prospects

Though the state has a lot of tourist resources, it has not been able to give due publicity in national and international arena. As a result of this, tourist mobility is restricted to only a couple of destinations, viz. Guwahati and Kaziranga. Other destinations like standard government tourist accommodations as well as way side amenities to the demands of foreign and domestic tourists. Even the well publicized destination Kaziranga, has only 108 beds under Tourism Department as accommodation. In the private sector Assam has only 36 approved hotels, with 370 rooms accounting for 1.03% of total room capacity (1,036 approved hotels) of the country (as on 1995, Dept. of Tourism, Govt. of India). These approved hotels of the state are located in four destinations, viz. Guwahati, Jorhat, Kaziranga and Tezpur. However, besides these centrally approved hotels, there are over 48 hotels recognised by the State Tourist Department to meet the demand of tourists coming in different seasonal rush. However, even if the total accommodation present scenario is taken in terms of bed capacity, in all respects of hotels proper (excluding tourist lodges) 63 per cent is concentrated in Guwahati itself (leased or field surveyed by Researcher). Other important places like Dibrugarh, Tinsukia, Tezpur, Silchar and Jorhat owing to the grade of restaurants having around 23 per cent share of bed accommodation. As most of the accommodations of the state are still sub-normal from tourist point of view it is one of the causes of slow pace of expansion of tourism in the state. In the same way, package tours organised by government and private agencies are running to limited number of destinations, like places without significant tourist attraction. Besides, the tourists have to make their own arrangement regularly. So, bulk of the tourists have to make their own arrangement up. It is a difficult job.

It is found that the government initiative in tourism sector is far below expectation in the context of modern day tourism. Forecastedly, in the nature tourism segment, only two spots, viz. Kaziranga and Manas have elephant safari facility. Though we have a three tuskers to be the major source of attraction in Kaziranga, there are other four protected areas (Table 15.7) having characteristics along with a variety of attractive species of animals and birds which are found to attract relatively less number of tourists. Regarding cultural tourism segment, only a couple of archaeological spots and monuments have been represented so far. Practically nothing to be mentioned as sell to the folk and cultural heritage as well as a pillar of the state through tourism. Even the Bihu and Tea-Tourism festivals (recognised by Government of India in festival calendar of tourism) organised by State Tourism Department annually since 1995. In

a multifaceted way, have been initiated to attract both domestic and foreign tourists. These well planned projects both at centre level and national spheres is an urgent need to attract more tourists in near future. Construction of development projects along with environmental understanding as well as coordination between government and private agencies will certainly open a new phase of tourism development in the state. Tourism is a seasonal activity of the state. Therefore, in order to overcome the shortage of required accommodation, government and private agencies should pay their attention to alternative accommodations. In general accommodation, tourist guest system, home stay of local people, tea garden managements and others. Apart from government and private agencies can build wood houses in rural areas especially in some areas in order to meet the seasonal demand in small budget options have for building.

By well-planned publicity initiatives, improved service quality, informative tourist literature, tourist can be geared up in the state. The process of diffusion of positive information regarding the state is an urgent prerequisite to be initiated by government agencies. Restoration of major monuments, while preserving the unique and natural atmosphere, protection of crafts and preservation of folk and classical dances in the cities as in the rural areas will not only help in promotion of tourism value but will also provide economic benefit to local people and craftsmen as well as re-evaluate their own cultural root. In fine on a small scale and limited portion of it can be encouraged. Considering all these aspects one can say that, though tourism is a budding activity but a well planned strategy can make it a major income generating activity of the state and will help in the development of the state.

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14

Geopolitics

Geopolitics of Assam can be indicated on the basis of the dialectical relationship between geography, society and politics. The land of Assam with its mighty river the Brahmaputra and its Barak possesses enviable fertile plains surrounded by densely forested hills and plateaus. Medieval Assam and its adjoining areas which covered most parts of the present northeast Indian states had various political phases at history which developed and reshaped its geography and politics. In fact, the geopolitical forces have been the resultants of the interplay of various reactions of people with land and its developmental processes.

Geo-Ethnic Base

Assam was known as Pragjyotisha and later as Kamrupa in the pre-historic and medieval periods. Even then the mid twelfth century onward historic and medieval periods. Even then the mid twelfth century onward historical documents. The diverse physiography base and ethnic character of population facilitated the growth of numerous but independent principalities in the Brahmaputra valley. Rivers and hills acted as boundaries of different kingdoms. Till the advent of the Ahoms in 1228, boundaries of kingdoms were there at Asurar, of which the Chutiyas, the Barahis, various kingdoms were important. During this period around the Morans and the Bhuyans were important. During this period around Muslim invasions was taking place. Two themes which could reach upto central Assam i.e. Nowgong. Most of the land areas were from upto central Assam i.e. Nowgong. Most of the land areas were from pre-historic-western part through Mayurbhanj-Sylhet uplands the south bank of the Brahmaputra via Kanjarmati above Dhubri (Barua, 1973). The location of Kamrupa at that time can be ascertained from the composite location of Kamrupa at that time can be ascertained from the composite area of local indigenous principalities which occupied the core of the area of local indigenous principalities which occupied the core of the Brahmaputra valley. It was extending from the east of the territory of Sadiya Brahmaputra valley. It was extending from the east of the territory of Sadiya along the north and south of the river Brahmaputra in the west bordered along the north and south of the river Brahmaputra in the west bordered by the Manas river in the north at Goalpara on the south. The society was by the Manas river in the north at Goalpara on the south. The society was practising was in a state of initial primitiveness which paved the way for the practising was in a state of initial primitiveness which paved the way for the Ahom conquering from the east to establish the kingdom and later became Ahom conquering from the east to establish the kingdom and later became a land of the land and also become one with the indigenous population. land of the land and also become one with the indigenous population.

in their fight against invaders from the west.

The Ahoms gradually subjugated all princely rivers of the Brahmaputra valley and became the unchallenged master of the land by 1618. During the Ahom period Aryan culture got special privilege and a privileged class consisting of Brahmins was formed and Hinduism got prominence in the Ahom Court. In the western part of Kamrup was the kingdom of Koch-Behar which accepted Mughal vassalage in 1609, which paved the way for the Mughals to occupy Kamrupa Kingdom. The Ahom-Mughal war continued for a long time (1616-1671). The Ahom-Mughal wars had important contribution in unifying different tribal chiefs of the Brahmaputra valley under the overlordship of Ahom to fight against foreign mortal enemy, the Mughals. Out of this identity of interests, there sprung up gradually a civil society, a state, with a common overlord (Baruah, 1985). It is under these circumstances that a state called "Asam" or "Assam", with a common overlord in the person of the Ahom king and a civil society which identified as "Assamese" grew up. The growth of the community, facing started with the Bhakti or Neo-Vaishnavite movement launched by Sankaradeva and the foundation of a developing feudal society started with the introduction of *Paik* or *Mel* system. The vaishnavite institution of the Sutras later became very powerful to challenge the Ahom monarchy and conscription. Moamaria uprisings invited the circumstances leading to Burmese invasions in Assam. In 1826, the British power was invited by the Ahoms to drive out the Burmese invaders which helped to establish the colonial rule for 120 years. Thus ended the glorious 600 years of Ahom rule in Assam.

Social Formation - First Phase

The adoption of Hinduism by the Ahom kings made the land open for "Brahminic Hindu Civilisation" through the settlement of Brahmins, nobles and other officers of the royal court and making fine gifts of land. In other words, the Hindu Brahmin and artisan castes were encouraged by the Ahom royal families to practise settled cultivation which opened a new mode of production. These non-tribal people became the major instrument of change from shifting to settled plough cultivation. The self-subsistence economy of the tribal peasantry became stratified as it was being transformed to feudalism. This broke the compactness of the tribal territory and a multi-caste and multi-community village organisation and settled communal system of production relation emerged (Census of Assam, 1971). The new state acted as the agent of Brahminic culture and the tribal was undergoing a process of peasantisation. Thus the blue line of cleavage

between tribal and non-tribal peasants and landlords, underdeveloped and developing emerged in a nascent form at the threshold of the British take over of Assam. In the later period of British rule, this cleavage became more consolidated on the basis of tribes and non-tribes plains and the hill people as determined by respective geography of the land. The geographical forces can be said to have developed from this dialectic in the early phase of this state making.

Formation of Assam and Adjoining Areas

The period of the British take over in 1826 for about 120 years gave a clearcut geographical identity to its various whole elements. During the decade and a half following 1826, the kingdom of Assam and other neighbouring kingdoms along with their dependencies and the petty independent tribal state of the Khasi hills were annexed to the British administration. The North Cachar Hills were organised into a separate administrative unit in 1875. The Garo hills was made a separate district in 1869 and the Lushai hills district was formed in 1898 (Hazarika, 1995). By 1874, the territories of Govind Chandra of Cachar, Ram Singh of Jaintia, Bar Sengpar of Mattock, Sadiya Khowa Gohain, the Khamti Chief and the hills inhabited by the Garos, Khasis, Jaintias, Nagas and Lushais were tagged to Assam administration (Bose, 1979). Nevertheless, the British province that came to be known as Assam, took shape more or less by 1873 and the whole area afterwards was officially known as Assam and adjoining areas.

The British province of Assam was divided into fourteen districts viz., the six districts of the Brahmaputra valley, the two districts of Surma valley, the four hill districts and the two frontier tracts (Table 14.1).

Policy of Exclusion- Formation of Geopolitical Structures

The clearcut geopolitical units so formed started expressing their political ideas in purely geographical terms as we shall see later. Moreover, Assam's all areas were kept by and large outside the scope of provincial autonomy and thereby denied political participation. They were classified under the 1935 Act into two categories (a) excluded areas and (b) partially excluded areas. They were denied the ordinary competence of provincial legislature. The Balipara and Sadia Frontier Tracts, the Naga Hills district, the Lushai Hills district and North Cachar Hills subdivision were classified as "excluded areas" and were unrepresented in the legislature. On the other hand, the Garo Hills district, the Khasi-Jaintia Hills district (excluding Shillong) and Mishir Hills were classified as "partially excluded

areas'. These areas enjoyed franchise to elect members to the legislature. These exclusions in political participation which were not there in the Brahmaputra Valley started the hill people in political awareness for several decades till 1946. These exclusions can be attributed the genesis of feelings of separation and aspiration for autonomy in most of the hill areas of Assam as evident from the subsequent developments.

Table 14.1
The Untoward territory of Assam

1 Name of District	2 Headquarters	3 Sub-divisions	4 Area in sq. miles	5 Population
Surma Valley	Silchar	Silchar	660	354,472
Cachar Plains		Hailakandi	287	141,012
Sylhet	Sylhet	North Sylhet	1,005	536,523
		Karimganj	1,004	480,968
		South Sylhet	1,046	418,022
		Habiganj	1,089	592,559
		Sunamganj	1,425	511,191
Total of Surma Valley			7,038	2,514,341
Brahmaputra Valley				
Goalpara	Dhubri	Dhubri	2,865	551,451
		Goalpara	1,889	211,172
Kamrup	Gauhati	Gauhati	2,589	575,159
		Barpeta	1,274	186,515
Darrang	Tezpur	Tezpur	1,838	286,463
		Mangaldai	1,369	191,471
Nowgong	Nowgong	..	3,659	399,921
Sibsagar	Jorhat	Jorhat	1,661	301,752
		Sibsagar	1,628	295,291
		Golaghat	3,114	272,154
Lakhimpur	Dibrugarh	Dibrugarh	2,591	446,305
		North Lakhimpur	1,766	122,900

Total of Brahmaputra Valley			23,679	3,883,269
Hill Districts				
Garo Hills	Tura	—	3,180	129,141
Khasi and Jaintia Hills	Shillong	Shillong	2,378	72,640
		Jowai	2,186	72,640
Naga Hills	Kohima	Kohima	—	99,048
		Mokok Chung	—	75,042
North Cachar Hills	Haflong	—	1,956	29,747
Lushai Hills	Aijal	Aijal	1,761	99,096
		Lungleh	2,526	88,276
Total of Hills Districts			11,910	708,611
Frontier Tracts	—	—	—	—
Sadiya	Sadiya	Sadiya	—	25,959
		Pasighat		13,583
Balipara	Tezpur	—	159	3,819
Total of Frontier Tracts			911	43,361
Grand Total			36,421	7,605,210

Source : Report on the Administration of North East India (1921-22), Mittal Publication, Delhi, 1984, pp. 71-73.

The Garo National Council was formed in March 1946 and in the same year a Khasi-Jaintia political association was set up mainly with the backing of the Seng Khasi in the Khasi hills, the first political organisation of the Mikir (now Karbi Anglong) people, the Karbi Durbar was formed in early 1947 with a modest programme of promotion of local interests, consolidation of Mikir areas into a single administrative unit and extension of franchise. Thus all over the partially excluded areas the post-war manifestation was one of a growing desire for local autonomy within Assam and more so of a growing desire for local autonomy within Assam and India (Kotia, 1977). In the excluded areas of Naga Hills District, Tribal Council was officially sponsored quite ahead of other hill areas in April,

1945. It later became Naga National Council (NNC), a federation of several tribal councils under the leadership of T Aliba Imti Ao with its headquarters at the Naga National. In June 1946 the NNC took a resolution demanding autonomy within Assam and by the end of the year in February 1947, it formally demanded an Interim Government for Nagaland with financial provisions initially for a period of ten years, at the expiry of which the Nagas would be free to reconsider their political status. Likewise in the Lushai Hills, the Mizo Union was formed in April 1946. It urged for the consolidation of all Mizo areas into a single administrative unit and its right to self-determination within Assam. Moreover, Assam became a Governor's province from 1921, but the hill districts and frontier tracts were declared as "backward areas" through the codification of Govt. of India Act (Fig 14.1). The path for political participation was opened with the introduction of legislative council in December 1938. In this process of political participation all the hill areas together got only two member provision against thirty nine member provision acquired

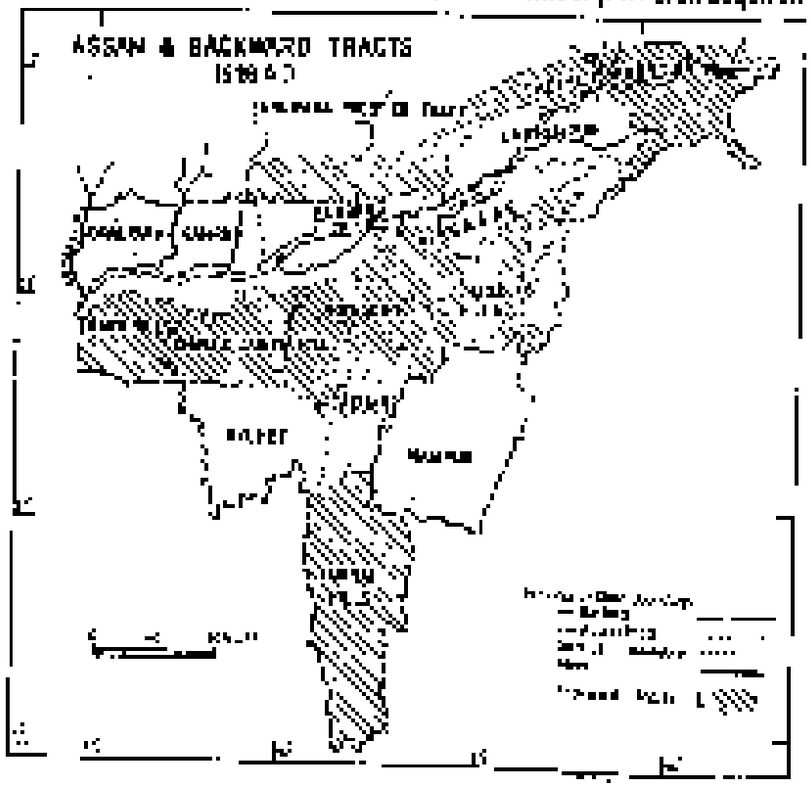

Fig. 14.1

by the plains district of Assam. Thus, the divide between the hill and the plains became more distinct and permanent in geopolitics. Like, as the political aspirations for independence and self-rule were crystallized on the basis of some tribal identity such as Nagaland, Mizoland and in the post-independence period, the Bodoland.

Social Formation—Second Phase

The societal consequences of the colonial rule is also noteworthy. The colonial policies greatly transformed Assam's pre-capitalist economy into a colonial phase. The starting of plantation economy and mineral resource extractions created new sectors of production which brought in

BALKANISATION OF ASSAM

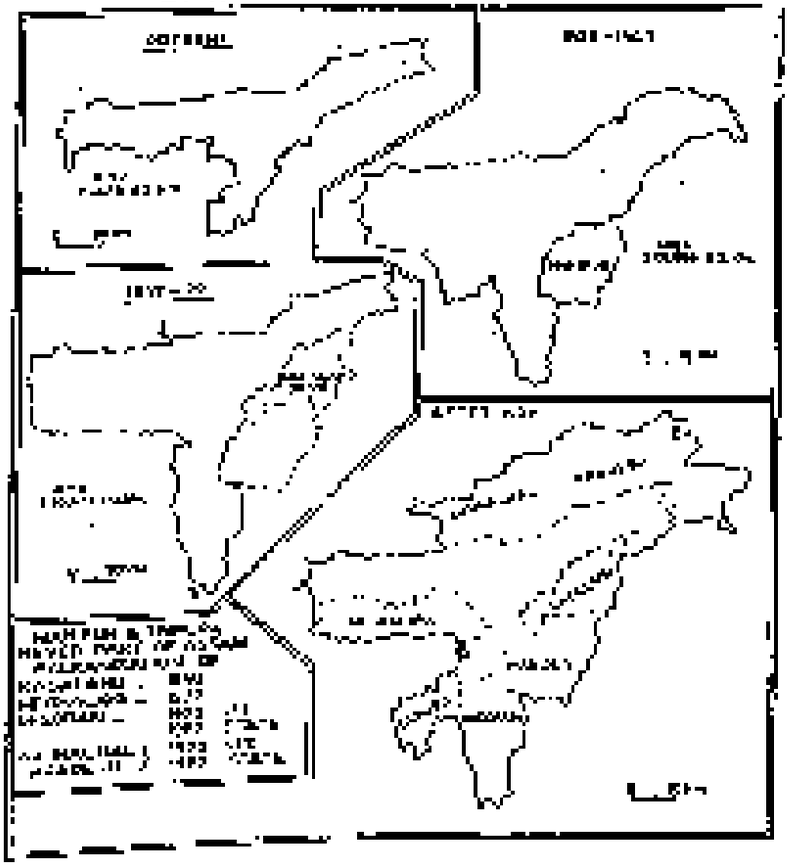

Fig. 14.2

the surface a conflict of interest between semi-feudal rulers and the mercantile bourgeois. The breakdown of communal system of production and the introduction of private ownership of land ultimately alienated most of the tribal from masses. Moreover, the new technology of wet and dry land farming, commercial jute cultivation etc. to generate surplus agricultural production made the colonialists to bring the land hungry agricultural peasants from the then East Bangal. This "inflow" of peasants paved the way for uncontrolable immigration with far reaching politico-demographic consequences for the next centuries. The political reign of the region went to the hands of Assamese middle class formed by the land owning and/or service holders and "lawyers" families. The bourgeois stratum that was emerging was enlightened as well as enterprising, and it provided leadership, however tenuous it might have been, to the Assamese society in every field (Guha, 1977, p.59). The hill areas and the areas of plains tribal people of Assam lagged behind in this development of a guiding middle class which ultimately affected and alienated them. The formation of the urban elite and the rural poor, which ultimately formed the political super– structure of the region is impregnated with this distinctions which proved very hard to erode. Because of these inherent differences in social and economic formations, the hills and valleys could not coordinate in the developmental processes in the post-independence period of India for a unified geographical entity. The root of various geopolitical forces can be said to have emerged from this geographical bearing of political development. (Fig. 14.2).

Epilogue

The Inner Line Regulation which was introduced in 1873 to prevent clashes between colonial rulers and native tribal people of the hills of Assam ultimately alienated the hill people from the mainstream of society, politics and developmental processes. In the post-independence period, when these Inner Lines were transformed to boundaries of newly created states, the problem of inter-state boundary dispute started owing to the under-estimation of economic viability of hill states in defining their own boundaries. In a similar way the undefined Outer Line policy in the northern hill region of Assam (present Arunachal Pradesh), which later in 1914 became the British defined Mc Mahon Line, also drew the two Asian giants- China and India into a boundary war in 1962. This can also be attributed to the following of colonial British boundary policy by the national governments after independence.

The Bodoland movement, the Karbi autonomy and other demands

for politico-territorial autonomy status of various insurgent groups are the reflections of relative deprivation, ideology and ethnic class conflict which are crystalised along geographically distinct areas of the lands of Assam. Unless inequality, injustice and exploitation of people are checked the geopolitics of Assam will take its own course, shaping and reshaping history, politics and geography of its people and the land.

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Note :

Paik system : During Ahom period (medieval period) vast majority of the population consisted of Paiks, who were the labour class. They formed the peasantry and also the militia of the kingdom. The Paiks were bondsmen by birth, enjoyed limited freedom earned by fulfilling their duties to the state ; a type of feudal system.

15

Place Names

Toponymy is an important branch of Onomastics. It is the combination of Greek words 'Topos' (means 'place') and 'Onoma' (means 'name'). So Toponymy is a discipline, which deals with the study of all aspects of place-name. It has various names such as: Hydronymy (study of water bodies), Oronymy (study of hills and mountains), Hodonymy (study of roads, ramparts and embankments), Choronymy (study of names of things), Micro-toponymy (study of smaller places), Anthroponymy (study of personal names) and so on. This branch of science flourished in our country as early as 600 B.C. by Sanskrit grammarian Panini in his work 'Ashtadhyayi'. Panini dealt in length about the nomenclature, classification of place names from Afganistan to Magadh. But the subject 'nama' in Sanskrit flourished in India since the days of Rig Veda (VIII. 93;VIII. 43.1; X 11.1, X 62.2), Aitareya Aranyaka (II 1.6), Satapatha-Brahmana (II.4.2.1). Ramayana and Mahabharata etc. Later it developed in Greece and people like Aristotle, Plato and others were the pioneers in the subject. In our next door China, toponymy was studied by the Chinese scholars in 221 B.C. in the regime of Emperor Huwang-ti, prior to that also, in Chin rule this branch of study could draw certain amount of attention in the reign of Emperor Phu-sii. During the modern period, in the western world, this branch was scientifically started by Freed William Leibnitz in A.D. 1708, who is also popularly known as the father of modern toponymy. Leibnitz was followed by J.J. Egli, who is known as doyen of English place name studies. In the last two centuries this discipline had expanded to a great extent in the U.K., the U.S.A., Canada, Norway, Sweeden, Germany, Australia, Belgium etc.

In modern India, the work progressed with Ramkamal Sen (1834), B.C. Law, S.K. Chatterjee (1926), H.D. Sankalia, K.P. Goswami etc.

In Assam the important works are of Surendra Kakati (Assamese, its formation and development, 1941), B.N. Nadi (The background of Assamese culture, 1948), T.K. Barua (A cultural history of Assam, 1951), Banikanta Sarmah (The Tungkhungia Buranji, 1958), Satkhanande Ba'simar (Likhon-tai, 1966), Bhuban Chandra Nandigue (Guide to Rangpur), Thana

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According to the United Nations and Geographical Names (UNGN) names are important to each of us be-

Names identify our landscape.
Names express our national identity, our cultural heritage.
Names create our framework of orientation, our keys to the electronic age.
Names promote our awareness of the world around us.

The study of toponymy is worthwhile only when it is studied through inter disciplinary approach including geography, history, geography, linguistics, folk-literature etc. Again any study on history, geography, linguistics, ethno sciences etc. is incomplete without the study of toponymy as this discipline is important source materials for most of the disciplines. So toponymy is called 'the key of history and roots of archaeology'.

The source materials for place name study are varied in nature. In the case of prehistoric period one has to depend on legendary accounts, folk materials and for the subsequent periods early literatures, archaeological records, inscriptions, manuscripts, chronicles, contemporary coins, temple records, inscriptions, manuscripts, chronicles, contemporary

foreign travellers' accounts and so on. For the modern period the maps in atlas, revenue records, gazetteers, district manuals, census reports, land books, imperial gazetteers, post office, hospital, and police records etc. can be utilized as source material for place name studies.

The most important process or nomenclature of place is important in place name study and in fact that is the basis of place name study. According to Mahabharata (I. 2.8) "a place must be named after any of its peculiar features". The naming pattern varies from region to region and from place to place. In studying the naming process one will always confront with the following queries:

a. When an explorer discovers a new geographical feature, or colonist finds a new settlement- what is to be named?
b. When there is already a name, as that juncture, whether a colonist will retain the native or give a new name?
c. If native, whether the letters are beautiful to decay?
d. Whether it is understood by many?
e. Whether it is grandiloquence from original one?
f. Whether they were taken over in slightly adopted form?
g. Whether they are prefixed or suffixed to the new name or some other additions?

In this context it will be relevant to mention about the Canadian Permanent Committee on Geographic Names (CPCGN) and various provincial and territorial names authorities rarely include the naming of geographical features. Almost all names are submitted by the public or have been gathered through field survey programmes. In 1898, a primary task for Geographic Board of Canada was to set up standards and guidelines. Originally, the Board approved a set of 11 rules of nomenclature. Changing attitudes and perceptions in personal, commercial, cultural, name duplication, language item and the handling of native names, have led to periodic revision and updating of the principles.

The following are the guiding principles and procedures for geographical naming drawn up by CPCGN which are universally adopted by a number of countries:

1. Names governed by statutory authority-The names of municipalities, territorial divisions, reserves, parks, and other legal entities are governed by or resulting from, legislation by the appropriate government shall be accepted, e.g., the name Newfoundland is statutory, as is the French form Terre-Terre-Neuve. Its capital's name St. John's is also official, but the

French form Saint-Jean, is not authorized.

2. Names in general public use- First priority shall be given to names with long standing local usage by the general public, unless there are good reasons to the contrary, this principle should prevail.

3. Names given by other agencies- Names for facilities established by post, railroads, railway companies and major public utilities shall be accepted, if they are in keeping with place principles. Names established for local divisions by federal, provincial, territorial departments shall be accepted if they conform to the other principles. Native group names may be accepted if they conform to the other principles. Native group names may be given to such agencies to have open communication agreement should be given to such agencies to have open communication with the appropriate name authorities.

4. Naming of quite feature and classifying its term – A decision or name proposal for a physical or cultural feature should satisfy the geographical limits of the feature. For example avoid of different names with the same generic for a part of what is deemed to be the same feature should be avoided.

5. Use of personal names—A personal name should not be given to a geographical feature unless such a place or is in the public interest. The person commemorated should have outstanding significance in the area where the feature is located. When such a name is applied, it should normally be given posthumously. The adoption of personal name during the lifetime of the person concerned should be applied in exceptional circumstances. Ownership of the land should not in itself be names already in existence. Name duplication should not be allowed. Other living of common local use derived from the names of persons, either living or deceased, item Principle 2 takes precedence.

6. Approving names for unnamed feature— In approving names for previously unnamed features for which no local names are found to be in use, the following principles are recommended. Descriptive names appropriate to the features; names of pioneers, names of persons who died during war or service, names associated with historical events connected with the area; names, names associated with historical events connected with the area; names from native language namely identified with the general area.

7. Form and characteristics of name- Geographical names should be made up of words, acceptable combination of words, and should be a good choice words.

8. Language forms and transformation- A name should be adopted in a stan-

glo language form, although accents may be accepted where a local use when sanctioned by the appropriate name authority. A name should, where possible, be written in the Roman alphabet. When a name is derived from languages other than English or French, it should be written according to the considered opinion of linguistic specialists acceptable to the appropriate name authority and to the language communities concerned. Names of selected geographical entities of non-Canadian significance, as established by Treasury Board in 1953, are recognized in both English and French for use on federal maps and in federal texts.

9. Spelling standards in English and French -- The spelling and pronunciation of names should be according to the rules of the language in which they are written. In English, hyphenation and generic apostrophe should be approved only when well established and in current use.

10. Uniformity in the spelling of names -- Names of same origin applying to various service facilities in a community should agree in spelling with the official name of the community. Names with the same specific associated features should agree in form and spelling.

11. Duplication -- Where established names are duplicated or are similar in sound or spelling, and confusion can result, local assistance should be obtained to achieve distinction among them. In giving new names, duplication to the extent that they could confuse in a local community should be avoided.

12. Generic terminology -- A geographical name usually includes both a specific and generic element. The generic term in newly approved geographical names should be appropriate to the nature of the feature. Its position in the name should be dictated by customs and usage. The generic term will be recorded in English or in French, by the name authority concerned.

13. Use of qualifying terminology -- Qualifying words may be used to distinguish between two or more similar features with identical specific forms. Such words may be derived from other local names or features or may be terms such as 'Upper', 'Lower', 'West', 'North', 'Nouveau', 'Petit' and 'Grand'. Whenever possible, however, new names should be distinctive.

14. Names of small features -- Except where local and historic importance dictates the official approval of a name, primary stress should be guided by the relative significance of the feature, to be used solely with the name, and the scale of mapping available.

General Procedures (UNGEGN, 1990).

How to propose a new name or name change? The following information will facilitate proper decisions: 1. reason for proposal; 2. location information by latitude and longitude, either by geographical coordinates or Universal Transverse Mercator grid coordinates; 3. identification or description, preferably on an accurate, large-scale map; 4. principal or standard spelling and meaning of name proposed.

15. Where to inquire about policies and principles on naming and about information on the origin and use of names and terminology? -- Secretariat of the Canadian Permanent Committee on Geographical Names (Department of Natural Resources, Canada) and UNGEGN members.

Every language has its own style of naming and name-changing process. The Permanent Committee on the Nomenclature of the Netherlands (Permanente commissie voor de nomenclatuur der Nederlanden) has published a dictionary of world place names derived from British names (1955, pp. 196-207) giving several hundred examples of naming patterns and it used the following classification of English place names alone:

1. Place categories - Towns, Counties and Villages etc. 2. Aristocratic titles- Earl, Baron etc. 3. Royal names and titles- Adelaide, Albert, Prince, King, Queen etc. 4. Forename and given names, officers- Albion, Alberta, Isabella, etc. 5. Family names: Wapiti Windfall, etc. 6. Structural basis or sponsor - Burrow, Grenfell, Hut, Lancaster, Smith etc. 7. Topographic terms and other bodies- Barrens Coast, Bellingham, Society Islands etc. 8. Water terminology- Archipelago, Back River, Lawford Islands, Lawrence, Waterbury etc. 9. Tribal names - Amuneville, Bingham, Dover, Tyne, Sydney etc. 10. Battle names- Waterloo, Vimy, Campbellton etc. 11. Explorers and discoverers- Arthur's pass, Hudson Bay, Sun, Dover, Wake Island etc. 12. Ship names etc. 13. Ships captains- Blunt Island, Parrell Coast, etc. 14. Ships' officials -Akimiski Island, Bernier Bay, Griper Bay etc. 15. Explorers and settlers - Abitibi, Hazlehurst, Moffat, Peace Church, Wakefield etc. 16. Colonial officials -Baillie Islands, Jesuit, Port Darwin etc. 15. Literary names - Ayolin, Bild, Selma, Wheatsheaf etc. 16. Name of buildings - Coronet, Mitford, Scarsdale etc. 17. Other names as places which do not fit in any of the above categories such as in Delhi, Invermere, St. George, Union Jack etc.

George R. Stewart in his 'American Place Names', New York, 1970, pp. xviii-xxvii, made elaborate explanation on another pattern of American place names. They are briefly as:

1. Specific question--Generic river, mountain etc. village, city etc. Specific

-blue, castle, London etc. II. The article 'The Gulf of Mainc.' The Thousand Islands etc. III. Language: French, Dutch, Spanish etc. IV. Linguistic transfer: Names are transferred from one language to another by four methods, three of them in an oral situation and the fourth in a written situation: A. An informant says the name in his own language, and the recipient renders it by sound, perhaps later in writing, as well as he can according to his own language habits. This process is primitive (existing even before writing and between illiterate) and is especially prominent in situations where the recipient has little knowledge of the language of the informant. B. The name is translated from the original into the receiving language. Such procedure occurs more commonly when a fair degree of mutual understanding has been established. C. The name is governed by folk-etymology. D. The transferal is by the written or printed form. The name is often erroneously pronounced as the spelling suggests, and many of the misconceptions in American names thus arise, e.g., Worlds Berlin. V. Dual or multiple origin: New York, Florida. VI. Abundance of family - Fish Spring, Elk Creek. VII. Habitations and natural features: New Orleans. VIII. Pure name - Pouch cove. IX. Linguistic playground: Mormons, Confucius. X. Shortened names: Seacoast canoe 'We shall' also of the black rock. XI. 'Official' name-changing or Social Sanctions. XII. Naming systems: Classical Latin, Thomas' system, Alphabetical systems, Grid systems etc. XIII. Literary influence: Shiloh, Bethesda, Mount Hermon etc. XIV. Religious and mythological names: Baal, Nat, Nejdi, Zemdili etc. XV. National customs, mores, beauty: Clan Alpine, Battleford, Ottawa, Beckwith etc. XVI. Personal names: Wilkinson, Albany etc. XVII. Tribal and national names: Shawnee, Chinese, Red Indians. XVIII. Names from nature: Bear, Eagle, Oak, Grass, Garden, and XIX. Exotic names: Bagdad, Memphis, Hannibal, Cairo etc.

In the Indian context, grammarian Panini (400 B.C.) in his *Ashtadhyayi* tells us about the following naming patterns :

I. Place names ending with : *Pura, Nagara, Grama, Khetra, Ghatta, Kota, Sthala, Kantha, Tira, Pattana, Kachchhha, Agni, Vatara, Ghosha, Palaka, Hrada, Vana, Arana, Kanana, Kantha, Kunda* etc. (Also *Agra, Ja, Mukha*)

II. Place names with adjectival or comparative suffixes dealt with in the *Ashtadhyayi*, IV.2-67, IV.2-71. The same enumeration in IV.2-80 has preserved about 248 place names.

III. Place names including original home of the people (IV.2-80-*Ashvadi*).

IV. Place names after the finished goods in general in India, as *Kapota*.

V. Place names known due to control of a particular group of people or given over from unalterable.

VI. Place names under the control of one king have been given by Panini known as *Sharangravadyah* (*Ashtadhyayi* IV.1.146-151).

VII. Place names known after the name of rivers by Sapta or Sindhu extend in the areas of Vedic times-days known as Punjab in the territory of India.

In modern times, H.D.Sankalia suggested in *Survey of the Ancient and Colonial and Ethnography of Gujarat*, Deccan College, Poona, 1941:

-Place names after a person—hero, saint, tribal chief.
-Place names after a city
-Place names after a spirit
-Place names after a tribe
-Place names after an event :
-Auspicious personal
-Bad omens etc.
-Place names after customs and superstition
-Place names after geographical and physical factors
-Place names after hill, mountain, mound or elevated place
-Place names after river, stream, lake and pond
-Place names after forest, wood, desert
-Place names after flowers, fruit, nut and crop
-Place names after animals
-Place names after bird
-Place names after reptile
-Place names after insect & others.

In later date, Sankalia modified his work in the line of S.K.Chatterjee in *The Origin and Development of Bengali Language*, Calcutta, 1926, reprint 1977) as :

-Place names from tribes or caste
-Place names—Cultural factors
-Place names of a religious character
-Place names after person and event
-Place names copied from other place name

Again,

I. Place names, which pertain to geographical and physical features :
i. Places named after mountains, hills, mounds, rocky surroundings etc.
ii. Places named after all types of water including rivers and rivulets
iii. Places named after different types of lands
iv. Places named after location

II Place denoting flora :
i. Trees and plants
ii. Part of trees and gardens
iii. Flowers, specified
iv. Flower, general
v. Grains and pulses

III Place denoting fauna :
i. Animals, wild
ii. Animals, domestic
iii. Birds, specified
iv Birds, general
v. Reptiles
vi. Fish

IV Religious place names :
i. Name of the vedic gods
ii. Saivite names
iii. Vaisnavite names
iv. Goddesses both Saivite and Vaisnavite
v. Buddhist
vi. Jain
vii. God general
viii. Goddess general
ix. Philosophical, mystical and celestial
x. Sages
xi. Epic heroes

V. Ethnographical terms :
i Castes and professions
ii Tribes
iii. Rivers

VI Place names of historical significance :
i Royal dynasties

ii. Kings and queens
iii. Consorts of kings
iv. Subordinate chiefs and royal officials etc
v. Official designations

VII. Place names of commercial character

VIII. Place names after Sanskrit cities

IX. Miscellaneous place names :
i Names which distinguish between the new and old places of same name
ii Names indicating two different sizes of places of same name
iii Names indicating ceremonies, festivals and superstitions
iv. Places named after metals
v Places named after colours
vi Places named after food items

While studying the naming process in our region, we have noticed certain peculiarities, which are relatively uncommon in other areas. Prof. G. N. Reddy in his Survey of Indian Place names : A Case Study p.30 stands that Indian place names are generally analysed into two parts or components : specifics and generics. But in our region we have found another prominent class i.e. 'Prefix' like 'Bar', 'Chor', 'Sil', 'Mukh', 'Par', 'Dam', 'Kol' and so on. It is observed that almost all the style of naming process is national level or system common in the people in Assam, which is probably due to its location in the geostrategic importance of mankind. Place names with numeral as prefix or suffix is common in our next door West Bengal, which is also a common feature in Assam. The place names with numeral suffix like words are also a peculiar feature of this region such as four-like words are Chaukham, Dukkoomey, Barpetia Kuri etc. Name-people Name-Parichchedan, Dukkoomey, Barpetia Kuri etc. Name-people Name-i. Jain Mongoloid characteristics and some Tibeto-Burman like words, which are not seen here. Though some grammarians place the like words as 'prefix'. This it can be said numerous styles of naming person of national and international perspective assembled here making the process of more varied, more beautiful and forming a multi-coloured mosaic. The systematic analysis of the naming process, though interesting is not a difficult task due to complexities of different classes in groups of people and their variations in language, culture and locality creating admixture, corruption in different class of place names. Place names of Assam are the result of a good deal of evolution as result of impact of religion, historical, cultural exposure in consequence migrations and inva-

since. Nevertheless, here we will try to show some of the important naming processes in the context of place names in Assam :

Place names derived from natural objects

a. Topography :
- *Hills or Mountains
- *Mounds or Ting
- *Elevated place of Chapori
- *Rivers or Streams, shifting of River courses
- *Lake or Ponds or Beels
- *Caves or Caverns or Holes
- *Gorges
- *Waterfalls
- *Rapids
- *Currents
- *Valleys or Plains
- *Wetland, Marshy and Dry land
- *Colour of Soil, Water, Stone, etc.
- *Force of Wind

b. Flora :
Such as- Trees, Crops, Pulses, Flowers, Creepers, Grasses, Fruits, etc.

c. Fauna :
Such as- Animals- Wild, Domestic, Reptiles etc.
Aquatic Animals- Fish, Reptiles etc.
Ornithes etc.

II. Place names derived from cultural objects
a. Religious
- Saivic name
- Sakta name
- Vaishnava name
- Islamic name
- Saints name
- Deity name
- Sport name etc.
- Place name after- Duls (Temples)
- Place name after-Namghars, Satras
- Place name after-Islamic shrines
- Place names after-Christian settlements

b. Secular-
- Place name after-Deserts
- Place name after-Existing places
- Place name after-Royal titles
- Place name after-Important rulers
- Place name after-Important actors
- Place name after-Tribes or Tribal Groups
- Place name after-Chiefs
- Place name after-Chiefs
- Place name after-Clans
- Place name after-Community
- Place name after-Professional Clans
- Place name after-Capitals, Towns, Ports (Rest camps)
- Place name after-Camps (Ramparts)
- Place name after-Forts (Garhs)
- Place name after-Road Crossings or Intersections of Roads
- Place name after-Markets (Chhowks etc.)
- Place name after-Bathurts, Bagans (Parks)
- Place name after-Forests
- Place name after-War fields
- Place name after-Theatres, Monuments
- Place name after-Trades, Commercial channels etc.
- Place name after-Markets and Fairs
- Place name after-Buildings
- Place name after-Cultural centres
- Place name after-Specific professional clans with prefix 'Na' (New)

c. Miscellaneous group :
- Place names with- Numerals
- Place names after- Social items
- Place names with Musk
- Place names with Colours
- Place indicating - Rare plants, exotic animals and superstitions
- Place names in- calling- Old and New
- Place names showing - Directions
- Place names indicating- Two different sizes of the place of the same name etc.

Structurally nonmenclatured place names in the region can be categorised into - Noun - Noun, Adjective + Noun, Adjective + Adjective, Noun + Adjective, Onomatopoetic combinations, Invariations-Prefix, Suffix (Gen

nerals). Specific and Middle were (2+3) are also common features here. The other Indo-Aryan variations are : Corruptions of words, Hybrid formation, Shortening of Words and Consonants, Change of Words and Consonants, Change of Affixes, Metathesis, Elisions, Sound changes, Consonants Clusters, Assimilation, Metaphings, Semantic changes etc.

The common Prefix-formations in the regional are (As = Assamese, Aus. = Austric, Bd. = Bodo, Nags = Naga-ese, NIA As. = New - Indo Aryan Assamese, T. = Tai, OIA Sk. = Old Indo - Aryan Sanskrit) as follows :

Ban (T. Village)- Ban - dang, Ban-kak, Ban-khen, Ban- para, Ban-phi, Ban-pha, Ban-pur, Ban-ri, Ban-ri-ban, Ban-rung etc. Assamese : Ban-mukh.

Bar (OIA Sk. = NIA As. - Bihl - Barduksi, Barkuar, Bargaon, Barghar, Barhat, Barkola, Barnagar, Barpathar

Chum (T.-Tribal)- Chamring, Chumlung etc.

Cha (T - Tawai)- Cha-hung, Cha-mun, Chapan, Cha-ngua = Chungan, Chanaidee = Chanaidee etc.

Chung (T.-Tai)- Changtak-Chuntak etc.

Diar (Embankment- Mahidiar, Nangaidiar etc.

Di (Bd. River, Water)- Dikrong, Dilim, Digaru, Dihing, Dikhow, Dimou etc

Doi (Bd. Water, T. Mountain, Hill)- Doiyang, Doigrung, Doi-kao-roya, Doi-mung, Doi-thorn, Doi-je etc

Ha (Bd. Land)- Hahung, Hallang, Haja, Hakama etc.

Mung (T. Country)- Mung-dan-Chu-khan, Mung-khung, Mung-kleng, Mong, Pakam, Mung-Tinkha, Mung-Tung etc

Na (T. Field, As. New)- Na-Bari, Na-Nagar, Na-pam, Na-gaon, Na-Kachari etc.

Nam (T. River or Water)- Nam-chang, Nam-dang = Dang, Nam pang, Nam-sai, Nam-ti, Nam-ti-pa-Rik etc.

Pani (As. Water)- Pani-Sheel, Pani Dihing, Pani-Para

Rai (T. Prominent)- Raileng, Raikha etc

Tai (T. Tai) - Taimung, Ta-Ting, Tai-Khamti etc.

Ti (T. River)- Tirak, Timen, Tisk, Tipuk, Tin, etc.

Ting (T. High)- Tingkhung, Tingrai etc

Tung (T. Field)- Tunkhung

The common Suffixes-words are

Ali (Road)- Dhaiali, Namdali, Gandi etc.

Ani - Amani, Bakuluti, Kathaleni etc.

Ati (As. Village) - Amati, Hazarati, Hadiati, Mikati, Nalbati etc

Bagan - Asibagan, Nibagan etc

Bale - Kaurbala, Mukhbala

Balar (River comp)- Namdangbalar, Namalichar, Rangalibalar, Tulibalar

Band - Thanabandi, Lakandandi etc.

Bandha - Jashidhandha, Ambarandha Mahabandha etc

Bar - Dhaparbar, Kuliabar, Tabar etc.

Bari - (A cultivated or cultivable piece of land, fields, persons etc)- Amtoli, Agbaribari, Banamlati, Bangaibari, Bamanbari, (old name of Gargaon), Karkalbari, Natbari, Sonabari, Tamulbari, Tokobari etc.

Bat (A way, a road)-Panbat

Bandhi- Pathanbi

Bazar (A market)-Dalmabazar, Tangibazar, Mandazar, Somanbazar etc

Beel-Chandabeel, Dipanmeel etc

Bam-Nagabam

Bridge-Nangalchanga, Teadibanga, Tulubanga etc.

River-Mikabanu, Rajabanu etc.

Bri ta (A highland)-Japanbrita, Dakachita etc

Bhakti-Prag)-Bhaktibhakti.

Bari-Raghabari, Mahanari

Chala-Dakchala

Chali (A shadi-Stonechali

Chapari (A heath-Naghuliachapari, Jamugurichapari, Rangadiapari

Char-Alugurichar, Brahmaputrachar, Tangramarchar etc.

Charali-Halbahucharali, Bamunichariali, Dalani-Michariali etc.

Charia-Dakchoria, Durbichoria, Kachichoria etc.

Chera (A terrace)-Hazarichira, Kumarichira, Rangarachira etc.

Chiria-Alichiria

Chua (Hollow, Kalarchua, Sanchua etc

Chora (A clearing, place)-Hatchora.

Chuk (A corner) -Bajlachuk, Jakachuk etc

Dang (T.A more or less solitary or chain peak) Chandang, Jajidandang, Mechardang, Nandang etc.

Dangia-Bamandangia, Mandangia etc.

Dar-Bhalandar, Mahdar etc

Desa-Kalabdesa, Mitchidesa

Diar-Chandidiar, Jakadiar, Nagalidiar etc.

Diara (Flat land, in marsh-Bangaldiara, Bhatchara, Dhapdhara etc.

Di-Bandi, Sandi, Majandi etc

Dia (Island)-Diamara, Diamari, Diamukh etc.
Dobi (To sink)-Dibrumdoba, Bengaldoba etc.
Doi-Dhoyoki, Damdoi, Dhamoni, Dangaldoi etc.
Dol (A temple)-Rajdol, Khoradol, Namadol etc.
Dole-Daldoa, Jugidole etc.
Donga-Mandonga, Nadonga, Tehadonga etc.
Dowa or Dewa-Bandardewa, Bordewa etc.
Duar-Chaidwar, Chardwar, Nadwar etc.
Dubi-(Deep in water)-Bardubi, Gagaldubi etc.
Ganga-Aonlaganga, Barhiganga, Dangaiganga, Basishthaganga etc.
Ganj-(Arabic, Village)-Jaraiganj, Salbaganj, Kaliaganj etc.
Gaon (A village)-Ambagaon, Beghagaon, Chaygaon, Dimgaon, Nagaon etc.
Garh (A rampart)-Hargarh, Hatimuragarh, Jaygarh balabhgarh, Ladoigarh, Mangarh, Namuligarh, Vaikargarh etc.
Gat (A landing place)-Darjilgat, Dighaligaon, Ghilagaripathar, Golaghat, Silghat etc.
Ghagra (An abode)-Bardughagra, Dejighagra, Mushlimghagra etc.
Ghuti (A sacrificial place)-Hatighuti, Mukhuli etc.
Gola-Bargola, Chargola etc.
Gonia-Dolgonia
Gora (A lane)-Dighalgora, Nagajora, Rangagora etc
Gorma (A village)-Dewargaon, Hajarikaguria, Nalichgaon etc.
Gudam (A store)-Dhanigudam.
Guti (A group of trees, a cluster)-Ahagori, Amguri, Chapaguri, Dalagori, Jamiguri, Simalugori etc
Hagi Gandhagi, Kanyahagi etc.
Hat (A Market)-Barhat, Dhupdhat, Dhuyahat, Jorhat, Jamugurihat, Kacharihat, Nagahat, Rupahihat etc.
Hati (A hamlet)-Amherhati, Guwahati, Kochati etc.
Jan (A river)-Bokajan, Dangjan, Dalhajan, Kakojan, Mukulijan, Nagjan, Pavajan, Sunakjan, etc.
Jiuri (A narrow land)-Chipajiuri, Sukrajhar etc.
Jonka (Naga Boundary)-Nagajonka
Juli-Dhakajuli, Kanjuli, Rupajuli, Sonajuli etc.
Kandi (Anekandi, Bilaskandi, Silikandi etc.
Khal (Dakhkhal, Kankhal, Mangalkhal etc.
Khana (To dig)-Dakuakhana, Dhanekhana, Jankhana, Kakhana, Sukhuikhana etc
Khat (An unit of land measure)-Gayankhat, Jalukbari, Likhaimangkhan, Pangankhat etc.

Khoji-Sapekhoji
Khola-(A shelter or an abode)-Barkhola,
Khoa (An abode)-Chapakhoa Chanikhola, Lakhuakhoa, Pamukhola etc.
Khowang (A hollow in a river)-Dhansirikhowang, Monakhowang etc.
Khowa (Flower)-Dukhkhowa, Chyakhowa, Chaikhowa, Nalikhowa, Mukang khowa, Sadiyakhowa etc.
Khuli-Dakhuli
Kona-Khanikona, Dangakona, Mukhkona etc.
Kora-Chanikora
Kota-(Stone)-Hashkota, Changakota, Dangkota, Kukurkota, Lepetkota, Salakota etc.
Kuti-(An unoccupied)-Baghuarkuti, Nangmaguti, Nayakuti etc.
Kuchi-(Small)-Bellakuchi (Small)
Kuchi or Kuchi (A village)-Balikuchi, Bandarkuchi, Dandakuchi, Haridaskuchi, Sualkuchi etc.
Mukha-Bamunmukha
Mankata (Separated in modern sense)-Kamrupamankata
Mari (To kill or burn)-Chitalmari, Ghasamari, Gurumari, Powamari Rasomari, Sidhmari, etc.
Mati (Earth)-Jhadi-Kaccamati, Nanati, Noonmati, Pimatimati etc.
Mora (To kill or burn)-Baglamora, Dingamora, Dukalamora, Kukumora Naglamora, Nanamora Salmora, Sidhmora etc.
Mukh (A mouth)-Dhansirimukh, Dhansirmukh, Gachangmukh, Gamamukh, Gangamukh etc
Mur (An end or a part or temple)-Amur, Gurumur etc
Muri (An end)-Sapamuri
Nagar (A town)-Bamunjar, Chaitpurnagar, Dhaidnagar, Goreagar, Pamagar, Rangpurnagar etc.
Nala (Channel)-Bardemala, Chapanala etc.
Nga (Jaintiya Konyak, Mezenga etc.
Nai (River)-Nanoi, Padnoi etc
Pahar (A hill)-Dhabanpahar, Dumpahar, Silikhapahar, Mayangpahar, Mikirpahar etc.
Pam (A newly cultivated field)-Napam, Pathalpam etc.
Panchali (Five road junctions)-Rajdhanpanchali.
Pani-Dighalpani, Dighalpani, Lakhapani, Tengapani etc
Par (A locality)-Bhatiapar, Chandapar, Dakhinpar, Gharapara, Hanuapar, Kandapar, Uttarpar etc.
Para (A hamlet)-Gosaipara, Kumarpara, Lahorpara, Nagapara etc
Pa hal (A mountain)-Bhimapahar, Gobharapathar, Sibsagarpahar etc

Pur (A location, a seat) - Dakshinpat.
Purbari (Part of a village) - Arpanbari, Santipurbari, Subhankarpurbari
Pathar - (A field) - Athmuripather, Bachchelor, Hamdeniyachar, Lengapathar
Pitha - Kamakhyapitha, Kanipitha, Sarapitha, Swarnapitha, Saumarpitha
Pota (To fix or insert) - Kanthipota, Jantrapota, Tarapota etc.
Pota - Garampota.
Pukhuri (A tank) - Alipukuria, Gangapukhuri, Jayantipukhuri, Rajapukhuri, Rajmoapukhuri etc.
Punji (Hamlet) - Bamunpunji, Khasiapunji, Mikirpunji, Rongpuli, etc.
Pur (A town) - Adhikapur, Bampur, Bhabanipur, Jaipur, Lashanpur, Mathurapur, Narayanpur, Pragjyotishpur, Sarupur, Rotanpur etc.
Pur - Abhoypuri, Chandrapuri (-vissya) etc.
Ra - Dadara, Dhanua, Kanara, Mahora, Nimura etc.
Rasta - Pragjyotishrasta
Rasul - Dargarasul, Dakshinpurasul, Jagirasul etc.
Saga (A big tank) - Gauisagar, Jaysagar, Lakhimisagar, Sivasagar etc.
Sal (A cowherd's hut) - Amtolisalbasti, Bakulsalbasti, Chutiasal, etc.
Sara (A water-course stream) - Ahagurisara, Amratolisara, Dakhinpursara, Kamalabarisara etc.
Sindhu - Lauhitya-sindhu
Ta - (Ass. Land, soil) - Bakata, Chamata etc.
Tari - Bakamari.
Tek (Ass. Elongated land) - Paglatek, Sindurtek etc.
Than - Gopalithan, Kamrupchan etc.
Ti (Ass., T) - Balati, Bakati, Khanti, Nanti etc.
Ting (A highland) - Dhading, Pakating, Hatiating, Nogaoting etc.
Tinali - Bagulitinali, Tamulitinga etc.
Tola - Bathola, Kusmotu etc.
Toli - (A basic ground) - Amtoli, Chintoli, Fatholi, Chatha, Kathjatoli, Sarishatoli etc.
Tolwani (Gaon abode) - Rautamoni, Uttamoni
Tol (Ass. A hill) - Dharantol
Vinaya - Chandrapurvinaya, Manjapurvinaya etc.

A few endings like
I - Jorai, Bolai, Rongai, Bugai etc.
Ma - Burama, Dulgoma etc.
Nga - Dongga, Majonga, Kerongy etc.
Ra - Dadara, Jagara, Kanara, Nanora etc.

Double suffixes (or primary and secondary suffixes) place names are :

Bada + gaon, Bagha + pathar, Bamuni + pukhuri, Bati + jan, Bhanga + amtoli, Bhoja + bandha, Jamuguri + pur, Jamuguri + ra, Kacha + jan, Kesh + kuchi, Kesha + kuchi, Nagaka + amtoli, Nasim + pukhuri, Tungna + amtoli etc.

A few Middle Indo-Aryan (MIA) formation in place names are :
Dahikata + ta, Muttakamakhya-Kam, Nara-Narayan Pukhuri-Amguri-Kam, Ran chandi-Kam etc.

Corruptions of words in certain place names :
Bhaktiar > Bhaghari
Kamrai-kata > Kamakhya
Mukha + Dakanta > Dakata
Mowngkii > Mandai
Namuk-ar > Namchi > Namrup
Pragjyotish > Pragjoish

Shortening form of certain place names :
Pat + saikheng-kam > Pat Kai
Sung + Samaria > Simaria

Translated forms of some of the place names :
Brahmaputra or chief > Namtikar or Nadadarpti
Dhansiri > Tai. Namtinai
Disang > Tai Khamtikam or Lechang
Dihingmukh > Tai-mung
Dikhow > Tai. Khamjaidee
Dikhowmukh > Tai. Chaipamchai.
Dijo > Tai. Namkhai
Gajpara > Tai. Chaichaut.
Gargaon > Tai. Chaisung
Jaji > Tai Khamjai + Jang
Rangpur > Tai. Chamai,
Sonai > Tai. Khamjai Lam
Tengasoni > Tai. Namchamai etc.

Archaisms in phonetic formations and linguistic element in place names of the region :
Dhansiri > Ass. Dhanam – Aus. Sai
Di-hing > Bd. Di – Aus. Hing
Di-khow > Bd. Di – Aus. Lac.
Nam-dang > T. Nam + Bd. Ti Ma
Nam-dihing > T. Nam – Bd. Ti (Unrelated Sanskrit Dih > Aus. Lac).

Ass. Sivasagar. > Tai Khamti-cum-Ahom > As. Sivasagar, etc.

Semantic change of place names:
Dimow > Dimow, a name of a river > a town.
Kamrupa, a name of a country > connected to a capital name.
Nagaon, anglicised form of Kowpoting, once a village name of A. D. 17th century > expanded to a district name.
Nagamisch, older name of a country > connected to a district name.
Sivasagar, a name of a tank > expanded to the name of the town, subdivision, and district and so on.

Structural formations of place names:
Adjective + Noun > Bonga (old) + Gaon (Khasi)
Noun + Adjective > Nam, la classified word + Deng > Deng (old)
Num + Noun > Siva – Sagar.
Dharmapeeth names > Dharmapeeth, Chandipeeth, Dandeswar, Durgadevi etc

Origins of place names (communitywise) :
Aryan region - Naming of Aryan (Sanskrit) origin,
Austric origin - Naming of Austric origin,
Bodo origin - Naming of Bodo (like Dima, Rava, Lalung, Dimasa) origin,
Tai origin - Namely after Tai (Tai-Ahom, Tai Khamti, Tai Phake, etc.) language etc.

As regards classifications of place names, P. D. Sankalia has rightly commented, "Classification of names according to their name elements is indeed difficult. The meaning of which the dictionaries - Sanskrit and Prakrit suggest - has also their limitations. Very often a name has more than one meaning. What we know connection is, can probably be understood only by a personal visit to the place. For example, Mundh Shahr, may be after the old name Aryan title of the Mundas of Kolarishi inhabited this area or it may be after Shiva, as in Munda is one of the names of this God. But this meaning can be verified and proved correct if there are even ruins of the temple etc. of Siva who was called so. The limitations referred to are that the dictionaries may not be giving really ancient usages, or usages as tells the inceptional name itself. They may have record the meaning given by later words. So the inceptions suggested here are to be understood as provisional, and not final. They need further collaboration from other sources, but particularly from first hand knowledge of the place itself" (Quoted: Sankalia, p.iii). The most acceptable 'international classification of place names as referred in Encyclopaedia of Britannica, Vol.24, 1986, pp. 726-729, is:

Place name or Toponymy is basically classified into:
I. Locational places - Cities, Towns, Villages etc,
II. Undefined places - Hills or Mountains, Forests etc
III. Hodonymy - Streets, Roads, Ramparts etc
IV. Hydronymy - Rivers, Lakes, Ponds, Wells etc
V. Oronymy - Mountains or Hills, Marshes, Deserts places etc
VI. Coenonymy - names of things
VII. Macronymy etc.

[J. Kapp classifies names into two broad categories and ten subdivisions as:

A. Natural names and
B. Cultural names. These names are derived from some natural feature or characteristic
a. Phonetic
b. Ethnical
c. Locational.
Cultural zones - They reflect the cultures
Material culture - a. Physical, b. Economic, c. Intellectual
Spiritual culture - a. Moral, b. Religious, and c. Political.
Coined by R. Stewart, in his 'American Place Names' 1970, pp. xxviii-xxxii
put forward a classification of place names by Mechanism of Origin:
Place names originate from the need or desire to distinguish one place from another. A place will be named if people frequent it, and therefore wish to refer to it. A place need not be in some way be useful, and therefore worth naming. Primitive people, for instance, rarely had name for a country as a whole, for there was no reason for them to see all at once and thus to organize experience in so large a unit. Even a single mountain may not be named, because there is no necessity. Even a single mountain, though springs and meadows which is later of advantage to the living is known, though springs and meadows which is later will have names. To distinguish one place from another of the same kind (generic), the users of a language employ certain devices or mechanisms. The several which are here discussed. Nearly all (if not indeed all) of the place names of USA originate in one of these ways.

I. Descriptive names, II. Associative names, III. Possessive names, IV. Incidental names, V. Commemorative names, VI. Commendatory names, VII. Coined (manufactured) names, VIII. Transferred (Shifted) names, and IX. Folk - etymology & Mistake names

In this connection, it may be recalled, Adrian Room put forward a number of English names which he proposed to call as Category 3

of Place names like - Place names, Aristocratic title, Royal names and titles etc. In the Indian context, S.K. Chatterji and H.D. Sankalia had drawn a classification of place names on religious lines pattern which has been already discussed.

In the case of our region, the place names can be categorized under the following heads :

I. Ancient Historical
a. Palaeolithic origin
b. Megalithic origin
c. Neolithic origin
d. Proto-Historic origin
e. Historical origin

With the existing place names

I. Historical
II. Geographical
III. Ethnological or Anthropological or Sociological
IV. Linguistic
V. Religious/Cultural
VI. Folklore
VII. Miscellaneous

I. Historical category can be further classified into (periodwise) :
a. Ancient or Prehistoric Era
b. Early Medieval
c. Late Medieval
d. Modern Period

II. Historical category can be divided on the basis of ethnic groups :
a. Austric
b. Kirata
c. Indo-Chinese stock
d. Local Mongoloids
e. Indo-Aryans

I. Historical classification on the basis of dynastic rules:
a. Deorai-Asura: Mairang ... after Mahasura Deorai
b. Naraka-Bhauma Dynasty: 4th century A.D.-A.D. 650 : Kalika (Kamrupa), Kamalapa (Kamarupa)
c. Pala, Bhismaka (pre-medieval to Naraka), Deosvara, Dharmapala, Ramachandra, Sankha or Sankhadhvaja A.D. 7th century)
d. Salastambha (C.650-900)

e. Pala (A.D. 900-A.D. 1185)
f. Devas
g. Asuras
h. Koches (Dihinge, Dikhow)
i. Bhuyans (Dihpur, Biswanath)
j. Chutiyas (Sadiya, Chutia gaon, Sadiya)
k. Morans (Moran, Dibrugarh)
l. Borahi (Bokial, Hatsingimari, Jiloli)
m. Mahammadan
n. Ahom (Charaideo, Tipam, Tipkai, Namdang, Namlang, Nandephidol)
o. Koch (Kochbehar, Chikangram etc.)

II. Geographical classification : As the theme of geography is a close, so we may have a distinct geographical classification of place names which will cover almost all the place names of the world and remaining names can be put in a miscellaneous category :
1. Physical geography - Hills or Mountains, Plateau, Valleys, Rivers, Lakes, Beels, Ponds, Caves and Caverns etc.
2. Cultural geography
Rural : Names of villages, professional or non-professional, village shrines, village agricultural fairs, parks, temples etc.
Urban : Capitals, Towns, Growth Centres etc.
3. Economic geography - Place names relating to economic products Minerals, Agriculture products, Dairy products etc.
4. Political geography - Place names relating to political divisions and the like.
5. Regional geography - Place names relating to regional distribution of human and animal kingdom and the names derived from them.
6. Oikonymy - Place names relating to flora and fauna
7. Historical geography - Place names derived from historical relics, monuments, history connected with the places.
8. Soil geography - Place names connected with characteristics of soil Pkr Rangpur - Regam, Kajirbheel etc.

III. Literary classification : Place names originated in different literary periods can be placed in this categories.
i. Vedas, Upanishads and Samhitas
ii. Epics
iii. Puranas, Tantras and various other old literary, religious and secular works like Archaeology, Kalpasutras, Shastrasastra, Yogatantra, Harapsari Sastrabda etc.

iv. Epigraphs and Monuments
v. Folk Literatures: Folk-lores
vi. Historical Literatures: Buranji & Chronicles, Vamsavalis etc.
vii. Traveller's accounts
viii. Study of Maps.

IV. Linguistic classification:
i. Austric
ii. Mongoloid language: Bodo, Deva, Kachi, Lalung, Dimasha, Mishing
iii. Aryan language: Sanskrit, Prakrit, Assamese etc.
iv. Later Mongoloids: Tai-Ahom, Tai-Khamti, Singpho etc.
v. Others: Muslims, Manipuri, Deoshi, Hindi etc.

V. Religio-cultural classification:
i. Hindu: Shakta-Saiva, Saiva, Vaishnava
ii. Buddha (Mahayana) Sahaja.
iii. Muslim shrines: Dargah, Mosque etc.
iv. Christian Church

VI. Miscellaneous: This category includes those place names which are not included in any of the categories.

Comparative Analysis: Though there are certain degree of similarities in nomenclature or classification of place names in different parts of the world, yet there is an overall similarity or uniformity in many respects. As for example, the basic number of prehistoric words like -One, Water, Stone, Fire, Sun, Moon, Tree, Mountain, Cave, Village etc. which are common in our region also, like- Darbanta, Danamar, Ranchetcham, Sora gleat, Chilajharighat, Mandir, Pedoland, Michingaon, Kachartari, Gandhirchar, Kamakhya, Kachakhati, Biswanath, Dakhinpat, Nazarali, Brahmanmari, Hatichuna, Khepen, Malangi, Rangher charisali, Rajmai, Dapidol, Vaidyapati, Jongalbalahu, Phulbarichat etc. But there are certain distinctions in namings with our region, economic activities, ship names, discovers' names, founders, financial, sakta's names, christmas names, funeral, study- names etc. This is due to various cultural variations over the centuries.

Now let me throw some light on certain place names of our region:

Alhabari : Lat 26°6'-26°8' N and Long. 91°14'-15' E in the name Alhabari Ali Sarkari, a garden of trees from where collection assistance a 'gun' had been collected for payment of tax. Sri Manipha @ Khora Raja (A.D. 1553-1603) constructed a road from Gargaon to Dikhing and while constructing the road one villager brought 2 saplings of plant which would secrete 'gum' and handed over to the king for plantation by the side of the road. The king planted those saplings by the side of the road and Assamese famous as 'Alhabari'.

Brahmaputra : The main river of Assam. A.D. 10th century, this name was conferred by the Indo-Aryans of Assam. Brahmaputra, Brahmar, N. Brahma, the Hindu trinity + Putra-sacred + Nada-sacred river, Brahmaputra = Brahma-putra, the son of Brahma (Kalika Purana). Here lies of confusion if has taken place. Old name - Lauhitya-nada, appellation of the Aus.-Asiatic Lawit or Lau ? Lauhit, from change of 'h' to 'l' rod + suffix - ya. = suffix - sakha, big river, see Le a Nigal river. 3. Dihing, Aus. Lee, river, Dihing-di, river, fast clear water river. Sarten form of Lohit to 'Lui' : change of letter, 'h' to 'l', loss of letter 'h' and reverse position of consonant 'l' and vowel, 'i' to 'u'.

ing near a Thanakotali (vide Note 6). 5. The Ahom 'Barapal', a term derived from the Tai-Ahom. Semantically a temple name becomes a name of township at Gelaghat.

Gaurisagar : Gaurisagar is about 6 km south west of Rangpur and lies between 26°-55-07" N. Lat. and 94°-02-30" E Long. Old name. Description In the reign of Sivasimha, queen Phuleswari constructed a tank and constructed three temples, Siva, Vishnu and Devi (Durga)-dols, at Rangpur in A.D. 1723-24 and dedicated the complex as 'Gaurisagar', here 'Gauri' denotes the consort of Siva, 'sagar', a big tank measuring more than 400 bighas of land. Since then the area came to be known as 'Gaurisagar'. The tank is about 234 Rods in length East-West, 194 Rods in breadth North-South in water area, including the land area 315 Rods in length, 307 Rods in breadth. The Siva temple is about 47 yards in height and 60 yards in perimeter. Vishnu-dol is about 45 yards in perimeter and 30 yards in height. Devi-dol is about 30 yards in perimeter and 20 yards in height. The Manipuri princess Kumpacayari (fawn eyed) stationed here prior to her marriage with Rajeswarsimha. It was the fun of the Ahoms against Moamaria from A.D. 1769-1812. This was also encampment of English Captain Mr. Wood along with his wife. In A.D. 1816, Gaurisagar was the station of Col. Richardson, agent of the Governor in the reign of Chandrakantasimha.

Rangpur : Rangpur rests at the intersection of 26° 56-10" N. Lat. and 94°-37-36" E Long. Rangpur was the fourth permanent capital of the Ahoms. The capital of the Ahoms was shifted from Garhgaon to Rangpur by Siuhmatgohain (Gadadharsimha, in A.D. 1703-05 and this capital continued for about a century. The length and breadth of the capital was 12 and 10 miles respectively. The name was kept after the Assamese word 'Rangpur'. Rang- joy, pur- a city i.e., a city of joy and its Tai-Ahom equivalent is 'Chaosung'. Che- a city or town, mun- amusement, joy, happiness etc. The capital had a 'Rangghar' pavilion with highly decorated wood and bamboo works to witness various games and sports of the time, like: elephant-buffalo-crocodile-tiger fights, hawk fights, wrestling etc. Pratapsimha (A.D. 1736-1751) son of Rudrasimha renovated 'Rangghar' complex with the permanent present structure. According to Gunabhiram Barua, the capital was about 3 miles in length and one mile in breadth. The capital complex was surrounded by 18 ft. high ramparts all around and covered more than 1000 bighas of land. The royal seat was situated towards the eastern side of the town in which there were three approaches. These approaches were known as 'Bardoar' in the south, 'Pachi-

dual' in the east and 'Nandoar' in the west. The main entrance 'Bardoar' leads to Royal palace and the residences of the high officials. A beautiful description of the capital city of Rangpur is found in 'Aranyak Lakshan' by Ananda Acharya of A.D. 18th century. In the reign of Shivasimha, Rudrasimha constructed five temples of 'Kangyandia Shiva' in front of the Bardoar of the capital Rajeswarsimha (A.D. 1751-1769) founded the royal palace 'Talatal ghar'. The descriptions of the 'Talatal ghar' and 'Rangghar' can be found in the report of the Archaeological Survey of Upper Circle, (1902-1903). The capital continued up to the last days of reign of Rajeswarsimha, A.D. 1769, but in the same year Moamoria general Raghu Buchar forcefully occupied the Ahom capital and Borpatra was made the king and the displaced Ahom king Lakshmisimha took shelter at Sonarigaon or Sonarigaon. The Moamorias occupied the capital intermittently up to A.D. 1791, but the next Ahom king Gaurinathsimha reoccupied the capital Rangpur with the help of British Col. Mr. Wood in the same year. Ram ras Mackie in Moamoriar Buranji after that Gaurinathsimha shifted his capital from Rangpur to Jorhat. In A.D. 1831, the Ahom capital 'Rangpur' was occupied by the Burmese General Maniram Dihingia Tilwa. In A.D. 1837, the Ahom capital 'Rangpur' was occupied by the Burmese General Mingi-nha Tilwa. In A.D. 1838 for the last time king Purandarsimha stationed at Sivasagar and 'Rangpur' was main

a road side, without proper verification or screening and without involvement of linguists, geographers, historians or folklorists which will lead to utter confusion. So without verification by the above disciplines, no data should be accepted as final.

4. To draw any conclusion on place names always an interdisciplinary approach should be adopted.

5. A place name institute or a society is an urgent need of the hour. The components of the institute should consist of a group of Linguists, Geographers, Historians, Archaeologists, Ethnologists and Folk-lorists etc. The institute or society should organise awareness campaigns, trainings, field investigations, collect proper piece of name within any discretion, standardize the name form, draw a classification of place names according to naming processes, and incorporate new data etc. Finally we should review old records in the face of newly available confirmed data as well as know that nothing is final about the inadequacies of the past.

6. Promote the use of standardized names on maps and in paper edits

7. Encourage the dissemination of standardized names through the publication of gazetteers (alphabetical list of names, with co-ordinates and other data).

8. Promote the development of national automated data processing capabilities and international technology exchange.

9. Encourage collaboration between states on standardization of names for trans-boundary features. This standardization of geographic names is fundamental to effective communication and essential to our socio economic development in such fields as trade and commerce, population census and statistics, property rights and cadastre, urban and regional planning, environmental conservation, natural disaster and emergency preparedness, security strategy, search for rescue operation, maps and atlas production, automatic navigation and tourism etc.

10. To prepare a place name gazetteer or lines manual, for the entire state, the following materials will be required-suffix, prefix, specific characteristics, etymology, ethnology, geography, history, archaeology and other cultural data. Similar gazetteer for district, sub-divisions, circles and villages can also be thought of. This gazetteer should correspond with the toponymic guidelines and principles of national and international agencies or institutes.

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Geography of Assam

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Assam, a state in the north-eastern region of India, is a unique geographical entity presenting a rich physical and cultural diversity. The natural landscape of the state is, however, changing fast with the growth of industrialization and urbanization, and especially the ever-increasing inflow of people from within and outside the country. The state thus has assumed immense geographical significance needing careful study and research. This book covering almost all aspects of nature and culture is really a commendable contribution towards understanding the regional personality of Assam. Definitely this book will cater to the long-standing needs of not only the students and teachers of geography, but also those interested in environment, society and economy of the state.

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