

CHAPTER : V

INDUSTRIES.

A. Old time Industries :-

The finesse and exquisite workmanship of a wide variety of industrial products of ancient Assam earned universal acclamation, as is evident from many literary and historical records. In all branches industry and craftsmanship like weaving and sericulture, or metal, ivory, wood, leather, clay, cane, bamboo works and the like, the reputation of Assamese artisans was equal to that of the craftsmen of other parts of contemporary India. The ancient kingdom of Kamrupa was noted for many old times industries. In the pre-British period where there were independent rulers in Assam, a number of old times industries especially cottage industries got the patronage from the kings and nobles and naturally the propagation of such industries constituted one of the important features of the cultural life of the Assamese people. Self sufficiency had been the key-note of Assam's economy in early medieval time, and various cottage industries formed, therefore, an inalienable part of her culture. To a large number of the people these cottage industries had been, as it were, a way of life rather than mere source of living.

Historical evidence bearing on Assamese old time industries are not scanty and references that we have in historical and other literature of Assam are sufficient to point to a high standard of industrial efficiency that the people obtained in Assam in early times. Assam produced almost all that was necessary for life in the light of the standard of living prevalent in those days. Dr. E.A. Gait in his '*A History of Assam*' has stated that the industry was highly developed in Ahom period. There are references to weavers, spinners, goldsmiths, potters and workers in ivory, bamboo, wood, hides and cane. According to the Muhammedan historians, the people were very skilful in weaving of embroidered silk cloths. According to records, Momai Tamuli Barbarua, a minister of king Pratap Singha, made it compulsory for every adult able bodied female to spin a certain quantity of yarn every evening. The Assamese were excellent carpenters who made their boxes, trays, stools and chairs by carving these out of a single block of wood.

a. Old time Cottage Industries and their modern position :-

The principal old time industries in the State were weaving in country looms, pottery, blacksmithy, bell-metal and brass-metal works, goldsmithy, village carpentry, bamboo and cane works, spinning of *endi*, *muga* and mulberry silk, vegetable dyeing, wood carving, hand pounding of rice, manufacture of ivory products, etc.

Some of these industries are now in decaying stage due primarily to (a) lack of capital and technical know-how, (b) competition from machine made

goods at cheaper rates,(c)lack of marketing facilities,etc. We may mention the following old time industries that had been in vogue in the State of Assam.

(i)Weaving : Assam had a high reputation and early traditions in manufacturing cotton clothes required for her use. '*Harsa Charita*' mentioned one kind of *dukula* cotton which was sent as a present to king Harsa by King Bhaskaravarman of Kamrupa. This *Dukula* was made from fine hand-spun white cotton yarn by the Assamese weavers. Cotton weaving was and still is one of the most common industries in Assam. In fact,weaving in Assam is characterised by its distinctiveness,and although most of the products are for purely utility purpose,some of them which are used for certain occasions are of exquisite beauty,durable quality,delicate weave,dainty design and delightful colours. The beautiful handloom fabrics shows the creative genius of individual weavers whom tradition has made brilliant artisans. Traditionally,the skill in the art of weaving and spinning has always been held to be one of the highest attainments of an Assamese women. Even in a marriage proposal,proficiency of the would-be bride in *Bowa-kata*,i.e.,skill in spinning and weaving is counted highly. During the rule of the Ahoms,elaborate arrangements were made for keeping in the '*Royal Store*' sufficient quantity of clothes of different varieties for presentation to foreign courts and dignitaries¹. In similar references,it is also found that until the beginning of the present century the whole of the cloth requirements of every Assamese family were secured from the family handloom. But with increasing competitions from mill-made cloth,the family handlooms now supply only special varieties of clothes for women and for social and religious purposes. Even then in rural areas,women still depend on home-made clothes woven from mill made yarns. As handloom clothes cater mainly to the family needs,there is very little trade in hand-woven clothes therein. The Weaving Department of the State Government is trying to help weaving by organising co-operatives and supplying yarns,fly shuttle looms and providing facilities,etc. The Weaving Institute at Guwahati is also training students in various new designs and processes.

Example of references of handloom weaving that flourished in Assam in the past are found in many epigraphic,literary and foreign accounts. The *Kalika Purana* of the 10th century A.D.and *Harsa Charita* shows that fine cotton garments were used in Assam. The *Kalika Purana* also refers to woolen garments,*Kambala* used and manufactured in this country. During the Ahom period,handloom weaving was at the peak of its glory. It was rare to find an Assamese family without a loom. Momai Tamuli Barbarua,a minister of kin Pratap Singha,ordered that before the sunset every woman must spin a certain number of hanks of yarn. This rule was scrupulously followed in the Ahom kingdom to avoid punishment. In his book '*An Account of Assam*'

1. E.A. Gait : *A History of Assam, Revised Edition*, p.272.

J.P.Wade observed:"Warlike cloth is made in the following manner. At midnight the cotton is ginned,passed into rollers,spun into thread,manufactured into cloth and worn by the warriors in the morning." It is an old custom that the mother gives three pieces of silk garment to er daughter at the time of the latter's marriage and complete silk dress to her son-in-law when welcoming him. From early times,*Eri* cloth has been serving the purpose pf woolens particularly amongst the less affluent section of the Assamese people. Muhammedan historians observed that Assam silk was excellent and it resembled those of China. Tavernier refers to Assam silk as one "produced on trees" and confirms that the stuff made of them was very brilliant. Like the nobility of japan,the Ahom kings in Assam took personal care and interest in the silk industry and the royal patronage contributed a lot in attaining the high degree of its perfection. The fabrics prepared out of *muga,eri* and *pat* (mulberry silk)became the national dress of the Assamese and formed a common costume of the women of the Assam valley.

With the downfall of the Ahom kingdom and the advent of the British came the dark era of handloom weaving in Assam. The British did not evince any interest in the development of this national industry. They were keen only to find markets for their Lancashire products and as such weaving industry faced keen competition from the mill-made cheap goods which dominated the markets situated even in the remote areas. The traditional weavers could not withstand the competition and left their age old occupation to find employment in other sectors. However,the industry was so deeply rooted in the substratum of the Assamese life that it could save itself from total annihilation in spite of the competition that throttled its growth. It still continues to be an important occupation,especially of the womenfolk. Every girl is expected to know the art of weaving. It is still customary among the Assamese,that on *Bihu* occasions a grown-up girl makes presents of self-woven *Bihuan*, (*Phulam Gamosa*)to her near and dear ones as a token of love and respect. It is in this context that Mahatma Ganshi once remarked,"Assamese women are born weavers,they can weave fairy tales in their clothes."

The Assamese women,as in the past,pursue the industry as a part-time occupation to produce the cloth required by each family,but they detest production on commercial basis. Among the immigrants,however,professional weaving is not rare. The articles of production generally include *mekhela,chadar,riha,churia,cheleng,borkapor,gamosa*, and piece cloth,etc. The implements of weaving which were and still are common in almost all the Assamese families are quite few in number,Besides various types of looms,*ugha,chereki,mako*,spinning wheel,*neothani*,etc.,are some of the accessories required for weaving. As many as twelve types of looms are said to be in use in the State which may be broadly grouped under four categories,i.e.,Throw Suttle Loom,Loin Loom,Pit Loom and Fly Shuttle Loom. The first one is found in almost every

found in almost every Assamese household while the second one is in common use among the hill tribes. Te Bengali weavers who have migrated from East Pakistan (now Bangladesh) mostly use Pit Loom. The Fly Shuttle loom which is recent introduction, is an improved type of frame which considerably increase the output of the weavers.

Raw materials required for weaving industry are mainly cotton, *muga*, *pat*, *eri*, and silk yarn. Various counts of counts of yarn ranging from 10"to 80"are generally used by the weavers. The yarn is mostly purchased from the markets and only a few do the spinning at home. Almost whole of the cotton yarns and a greater part of the silk yarns are imported from outside the State.²

(ii) Sericulture :- Next to weaving, sericulture is the most important cottage industry of the State of Assam. Extensively practised during the agricultural off-season as a subsidiary occupation, it occupies an important place in the rural economy of the State. Assam is a leading producer of the non-mulberry silk and produces about two-thirds of India's total output and so far as the production of *muga* silk is concerned, the State virtually holds a monopoly over it.³

The origin of the silk industry in Assam is still obscure there is hardly any doubt about its antiquity. P.C. Choudhury in his book, *The History of Civilisation of the People of Assam to the Twelfth Century A.D.* observes, "The art of sericulture and rearing of cocoons for the manufacture of various silk cloths were known to the Assamese as early as the *Ramayana* and the *Arthasastra*."

The classical writers beginning at least with 1st century A.D., make important mention of the production of silk and the silk trade in and through Assam. The *Periplus* refers to both raw and manufactured silk which were from China or Assam. "As the industry was mainly confined in the past to the Tibeto Burman elements in Assam, it is not unlikely that along with their migration to Assam they introduced some ideas from China; but the manufacture of *muga* silk has been confined to Assam alone, and this land, like China, had world-wide reputation for the manufacture of varieties of silk clothes, and had a profitable foreign trade in such articles.⁴ Chinese records dating as far back as 248 A.D. mention about the trade route from the south through the Shan states, Brahmaputra river and Kamarupa to Pataliputra (present Patna) and through it, to the western part of India. The ancient trade in silk with Bhutan and Tibet, through Udalguri in the Darrang district of Assam still exists.⁵

2. *Selected Handicrafts of Assam*, Census of India, 1961, Vol – III, Assam, p. 4-5.

3. *Ibid*, p.23.

4. P.C Choudhury : *The History of Civilisation of the people of Assam to the Twelfth Century A.D.*, 1959, p. 364-65.

5. *Facts about Assam Silk* : The Sericulture and Weaving Department, Assam, Shillong. p.2.

The unique distinction earned by the fabrics prepared out of *muga, eri and pat* (mulberry silk) in the Assamese life and the interest taken by Ahom nobility in rearing up the silk industry have already been described in the preceding paras under 'Weaving'. It is due to this royal patronage during the Ahom days that the industry reached its high peak of perfection. During the eighteenth and early part of the nineteenth century, Assam silk especially *murga*, was much in demand in Europe and formed the staple trade of East India company during this period.

Like weaving, silk industry also had its period of crisis during the British regime when markets in far-flung areas were flooded with foreign mill-made artificial silk cloths. But the industry has stood the test of time having survived and risen from ravages. The Department of Sericulture and Weaving which came into being in 1948-49 (after it was separated from the Cottage Industries Department) and the various schemes undertaken by it since then for the development of sericulture provide a fresh lease of life and the industry appears to be making steady progress. The Central Silk Board of India has also been to great assistance to the State by the providing finance for the effective implementation of various schemes for the development of sericulture.

The varieties of silk from Assam are *eri* or *erandi* (*attacus richini*), made from the silk of the worm of the same name, *muga* (*antheroea assamoea*) from a cocoon of the same name and *pat* (*pattla*).

The concentration of rearers of a particular silk worm in different areas of the State depends of rainfall and climatic conditions of different parts of the State. The *eri* culture is done in areas where rainfall is done in areas where rainfall is fairly heavy and the atmosphere is humid, whereas mulberry silk worm thrives only under certain temperature and humidity. The composition of sericulturist groups in a few districts of the State is presented below.⁶

Sericulture is widely practised in the Darrang district by the Kachari (Bodo) and Assamese women. Out of the three varieties of silk worms only *eri* and *pat* worms are widely reared in this district. *Muga* worms it is learnt, are reared by a few members of the Nath or Yogi community. In the Goalpara district, the Rabha women are chiefly found to be engaged in rearing silk worms. Next come the Assamese womenfolk. Rearing of *eri* worms is extensively practised by the latter. But in very recent times, a few Assamese women have also taken to rearing *pat* and *muga* worms. In the Nagaon district, sericulture is widely practised in the Rabha area by the Nath community. The particular community is known here as 'Yogi' or 'Katoni'. They have taken up rearing of all the three varieties of silk worms, *eri, apt and muga*. A few of the Assamese and Kachari people are also found to be carrying on the rearing of the silk worms. During the reign of Ahom Kings, both undivided Sibsagar and Lakhimpur districts were

6. *Selected Handicrafts of Assam*, Census of India, 1961, Vol-III, Assam, p.26-27.

centres of all varieties of silk. Sericulture is associated with these two undivided districts. The Assamese, Mishing and some other tribal communities are also found to be engaged in this age-old craft. But amongst the silk rearing communities, the Nath community of these districts deserves special mention, and its members are found to be very skilful in the art of rearing all the varieties of silk worms. It may be mentioned here that the bulk of the *muga* silk produced in Assam is being contributed by the rearers of the erstwhile Sibsagar district.

Kamrup district is also a major silk producing area of Assam where all the three varieties of silk worms are reared. Sualkuchi in the Kamrup district is most important centre of the silk industry. Sualkuchi is undoubtedly the most famous silk fabric producing centre not only in Kamrup district but also in the entire State of Assam. Sualkuchi claims a technique, quality and reputation of its own which are unique in so far as *muga* and *pat* silk fabrics are concerned.

Sualkuchi silk is as old as its people. Although the origin of silk weaving at Sualkuchi is still obscure, there is no doubt about its antiquity. During the olden days, the industry appears to have been patronised mainly by the nobility and the ruling kings of Assam, and the type of fabrics produced were beautifully decorated with designs and were very costly being more intended to serve the individual needs and tastes of the well-to-do than meet the general demand. However, the products of this industry enjoy a great reputation outside Assam also for their delicate designs, quality and durability. A huge quantity of *Muga* sari is being regularly exported to West Bengal from this silk cloth producing centre. The industry seemed to have faced a period of adversity perhaps due to the disturbed fortunes of the ruling kings and nobility in olden times. It could not thrive well during the British regime as the latter did not take any interest for the progress of this industry in the State.⁷

However, after independence due to the efforts of the State's Sericulture and Weaving department, the All India Handloom Board and the All India Silk Board, both sericulture and weaving industries have received a new lease of life and have begun to make good progress. Concentrated and vigorous activities have been carried out in the development of sericulture and weaving industries in the State since the inception of these agencies.

In spite of many odds, the sericulture and weaving industries at Sualkuchi are functioning well with the help of co-operative societies organised in the town and addressed to silk spinning and weaving. The names of the registered societies are (1) Assam Co-operative Silk House Ltd., (ii) Assam Co-operative Resham Samabay Pratisthan, (iii) Madhya Sualkuchi Resham Samabay Samity Ltd., (iv) Sualkuchi Bhatipara Muga spinners' and Weavers' Co-operative Society, (v) Bamun Sualkuchi Silk Samity Ltd., (vi) Purba Sualkuchi Resham Samity Ltd.,

7. *Selected Handicrafts of Assam*, census of India, 1961, Vol – III, Assam, p.2

and (vii) Sualkuchi *Pat-Muga Palu Poha* Samabay Samity Ltd. Though a good number of co-operative societies are functioning at Sualkuchi, the vast majority of weavers are still working outside the co-operative fold. Some of them are still working on wage basis in local weaving factories while the others work individually.

In this context, it may, however, be noted that the weavers who work under the co-operative fold collect *Muga cocoons* or *Pat, Muga* from their respective societies, and in case of *Muga cocoons*, they themselves spin the yarn and weave the particular cloth as ordered by the societies. After delivery of the finished products to the societies they are paid specified rates on different cloths. Most of the weavers of this group work in their own houses. The other group of weavers work in some factories within the town itself. They are provided with looms in the factory and the raw materials are also supplied by the owners. The workers are paid on wage basis. The last group of weavers who work neither under co-operative fold nor in factories, are the individual weavers. They continue their business individually and sell their finished products to the local merchants.

Major portion of the finished products of the silk industry of Sualkuchi are sold through the sales depots run by different co-operative societies and Khadi Bhandars located in the towns and business centres of Assam. Besides, there are also sales centres sponsored by the All India Khadi and Village Industries Commission, the Government emporium and the State Marketing Corporation within the outside the State. A good quantity of silk products are being exported to foreign countries.

Pat is produced from the cocoons of two species of worm called univoltine or *Bar-Palu (bambyx textor)* and the multivoltine or *saru-palu (bambyx croesi)*. Both the species are reared indoors on the leaves of the mulberry tree (*morus indica*) or where mulberry is not obtainable, on the panchapa. The eggs of the *Bar-Palu* take about ten months to hatch, the worms usually make their appearance in January. The life span of the worms is about thirty to forty days. The rearing of *saru-palu* is much favoured by the cultivators as it yields four breeds in a year although thread obtained from it is regarded inferior to that of the *Bar-Palu*. *Pat* silk is used for making *mekhela, riha, blouse* piece and *chadar* for females and *Engla-chola* and *chowga-chapkan* for males.

Several causes make this silk rare and expensive. First, the worms producing this type of silk are very delicate and a large number of them die before they spin. Secondly, the supply of mulberry leaves is also limited. Thirdly, the rearing of this worm in the past carried a stigma of impurity and as such its rearing was confined only to the members of Jugi and other such communities and even they also regarded it with disfavour. However, this old time prejudice has almost died out and the rearing of the worm has become popular among the members of other communities as well.

Muga, the golden silk of Assam is produced by a caterpillar, known as "*antheroea assamoea*" which is generally fed on the Som tree (*mechilus odoratissima*). It is a multivoltine silk worm producing five breeds, viz., *Katia*, *Jarua*, *Jethuwa*, *Aharua*, and *Bhadia* in a year, only two breeds, i.e., *Katia* in October-November, and the *Jethua* in the spring are commonly reared in the State. The complete cycle of the insect lasts from fifty-four to eighty-one days, the bulk of which is occupied by the life of the worm. When they are fully grown, they are about five inches long and their thickness varies from 25.4 mm to 38 mm. Their colour is green with a brown and yellow stripe extending down each side, while red moles with bright gold bases are dotted about the surface of the body. The silk is produced by feeling the cocoons. Most of the Assamese women possess one or more garments of *muga* silk and well-to-do men ceremonially wear waist clothes of this materials.

The *Eri* worm (*attachus ricini*) derives its name from the *Eri* or castor plant on which it is usually fed. Patches of this plant are commonly seen in the gardens of most of the villages. "The worm belonging to the *Saturnidae* is for all practical purposes habitant of Assam,"⁸ as fairly heavy rainfall and moist climate are considered ideally suitable to it. In a year, five or six breeds are generally reared and those who spin their cocoons in November, February, and May yield much silk. The most useful garments made of *Eri* silk is the *bar-kapoor*; a large sheet, 6.09 metres in length, 1.52 metres wide, which is folded and used as a wrap in cold weather by all sections of the people. *Eri* silk is also made into coats and shirts, *mekhela*, *eri-chaddar*, etc.

Sericulture is mainly a household industry and generally the rearing of worms is done by the female members of the household in their idle hours. Mostly, the rearing is done to meet the requirements of the family though there are a few professionals who practise it more or less on commercial lines. The tools and implements required for the industry are few and simple, and almost all these are made by the artisan himself and by the members of his family or can be had from the market at a moderate price. The tools generally required are : Bamboo tray (*dala*) bamboo *chandrakiful* thread net, *charkha* (*nidhiram*), *takli*, boiling pan and loom.

The major problem of the handloom and sericulture industry of Assam is the problem of shortage of yarn. The present annual demand for yarn generated by 17 lakh weavers in Assam is as follows :

Cotton	135.25 lakh kilogram
Pat	0.87 „ „

8. *Glimpse of silk Industry in Assam*, Sericulture and Weaving Department, Government of Assam, 1956, p.3

Muga	0.42	„	„
Eri	0.95	„	„
Worsted wool	1.80	„	„
others	0.13	„	„

Source :Directorates of Handloom,Government of Assam,1992.

The four spinning mills in Assam can meet 20 per cent of the total demand for yarn. The rest of the yarn has to be important from outside. The transport cost and for uncertain supply of yarn have contributed to the rise in the price of yarn.

Apart from the problem of scarcity and high price of yarn,another problem which is being faced by the handloom industry in Assam is the problem of the limited supply of credit to the weavers of the State. Loan is being made available to the weavers at a concessional rate of interest since 1957-58. However,till now only 10 primary handloom co-operatives and one apex co-operative have been benefit by such loans.

The total number of loans in Assam stands at 14 lakhs and the total amount of working capital needed is Rs. 170 crore annually. On an average the per capita loan offered by each cooperative is very small. According to data published by the Banking Commission,only 13.5 per cent of the total number of members of the co-operatives in Assam are being provided with loans,the All India percentage being 39.4 percent.

The National Bank for Agriculture and Rural Development (NABARD)is an important source of credit to the handloom sector in Assam. Till recently,one of the conditions necessary for supply of NABARD loans to primary co-operatives societies in the North East was that the society was required to have 100 looms under it with a total annual turnover of at least Rs.3 lakhs. This condition have been modified now and the society is eligible for loans if it has 50 looms with an annual turnover of Rs. a.5 lakhs. NABARD is presently conducting a study of the performance of co-operative credit institutions in Assam,the long term and the short term credit structure,the poor growth in lending and disturbingly high levels of overdues.

The North East Handloom and Handicrafts Development Corporation (NEHHDC),set up in 1977,has initiated a number of steps to promote the growth and development of handloom and handicrafts in Assam and the rest of the North East. Towards this end,the NEHHDC supplies raw materials and working capital to the handloom sector and provides facilities for the marketing and the handloom products. Under the guidance of the NEHHDC,handloom and handicraft products from the North East have been displayed in various trade fairs and exhibitions held in places like Brussels,Tokyo,New York and Berlin. A wide market for the sericulture products of Assam exists in countries like U.K.Italy,

Switzerland, France, Singapore and Saudi Arabia.

About 17 lakh individuals are employed in Assam's handloom and handicrafts sector. The silk sub-sector has covered about 7000 villages in Assam. 53,000 families are engaged in *eri* production 19,000 families in silk production and 1000 families in *muga* production.

It is noteworthy that the handloom and handicrafts sector cover all sections of people in society and all the areas of the State. Women and weaker sections of people in the society have found wide employment opportunities in this sector. In 1990-91, 1200 weavers belonging to the scheduled caste and schedule tribe communities received a sum of Rs. 72 lakhs from the Centre. For the benefit of these weavers, training programmes, construction of work sites, supply of looms and other schemes have been taken up.

Khadi Programme :

Khadi (Cotton and Silk spinning and Weaving) is at the core of the Village Industries Programme undertaken by the Assam Khadi & Village Industries Board. It is now generally recognised that all of the development programmes Khadi and Village Industries is the most essential to restore the balanced socio-economic growth of the Indian society which is the main objective of our national planning.

Necessary steps have been taken by the Board to replace the traditional implements with the improved ones and to introduce improved methods of technique so that the rural artisans may increase their productivity and their earnings as well. In order to meet the demands of our weavers for adequate quantity of yarn, the State Board in addition to the traditional *charkhas* introduced about 175 new model *charkhas* of six spindles and two spindles at Hajo, Marigaon and Khudra-Sankara. Steps have also been taken to introduce such improved *charkha* at Manikpur and Udarband. Besides, 25 *Debba Katai-charkhas* have been introduced in the hill areas so as to utilise the locally grown short staple cotton.

The Board arranges training for the artisans in the traditional as well as improved methods of production at its training centre at Raha and also send Khadi workers outside Assam for refresher training and training in salesmanship.

With a view to conducting research on the development of indigenous *Endi* and *Muga* of Assam, a research centre has been set up at Guwahati towards the end of the year 1976-77 after due sanction of the Khadi Commission. This research centre has brought effective improvement in the methods of production of Assam silk.

From the achievements shown below it appears that the production and sale of Khadi and Village Industries have been considerably increased. This upward progress may be attributed to the use of khadi cloth in the Government departments, increasing demand of *Endi* and *Muga* outside Assam, and financial

assistant rendered by the Khadi Commission. Steps were taken to raise the wages of the spinners and weavers so that they might get due return of their labour. But the Board is reported to have experienced difficulty in procuring *eri* cocoons for the local spinners as the traders from outside Assam purchased these by paying high price to the agents.

In 1975-76, the Khadi and Villages Industries Board had 25 Production centres in different parts of Assam. Now, however, no of such centres has increased tremendously as can be seen from the table given below :

Assam Khadi and Village Industries Board Production of Khadi (Cotton and Silk)and Employment

Year	Type of Industry	No.of centres working	Total Employment (No.)	Quantity Produced	Value of Production (Rs.in lakh)
1986-87	Cloth Yarn	35	7959	313739 sq.metres	88.40
1989-90	Cloth Yarn	57	17744	1.62 lakh sq.metres	107.20
1991-92	Cloth Yarn	58	12903	2.38 lakh sq.metres	90.99 ...
1992-93	Cloth Yarn	57	15470	2.43 lakh.sq.metres	191.01
1993-94	Cloth Yarn	57 N.A.	16781 N.A.	3.13 lakh sq.metres 37646kg.	131.90 55.94
1994-95	Cloth Yarn	59 N.A.	12482 N.A.	1,62,435 sq.metres 23,706 kg.	81.63 41.18

Source :-Directorate of Economics and Statistics,Assam,*Statistical Hand Book of Assam*,
1987(p.124-25),1991 (p.136-37),1992 (p.164-65),1993(p.170-71)
1994 (p.116)and 1995 (p.124).

Following table shows the achievements of Khadi and Village Industries Commission in production and sales of Khadi in Assam during the years,1979-80,1990-91 to 1992-93.⁹

Types of Khadi	Unit	1979-80	1988-89	1990-91	1991-92	1992-93
1. Cotton Khadi						
(i) Production of yarn	Rs.in lakh	10.34	26.50	...	...	...
(ii) Production of cloth	Do	8.66	544.60	36.89	42.30	59.30
	Do	...	...	68.68	65.16	88.06
(iii) Retail sales of cloth	Nos.	79.39	8623	4258	3630	51.60
	Rs.in lakh	6.70	24.13	21.76	27.17	27.54
(iv) Employment						
(v) Wages						
2. Silk Khadi						
(i) Production	Rs.in lakh	45.44	...	139.80	151.92	204.65
(ii) Retail salary	Do	...	163.32	110.99	112.04	122.38
(iii) Employment	Nos.	21891	...	185.59	16657	18119
(iv) Wages	Rs.in lakh	19.87	34390	59.01	54.83	82.16
3. Muslim Khadi						
(i) Production	Rs.in lakh	...	1.21	1.62	2.00	1.41
(ii) Employment	Nos.	...	186	125	255	186
(iii) Wages	Rs.in lakh	...	0.70	1.00	1.38	0.51
4. Woolen Khadi						
(i) Production	Rs.in lakh	....	4.98	0.96	1.44	....
(ii) Retail sale	Do	....	....	3.95	4.35	6.27
(iii) Employment	Nos.	....	37	5	5	....
(iv) Wages	Rs.in lakh	....	3.20	0.24	0.54	....

9. Directorate of economics and statistics. Govt of Assam., *Statistical Hand Book, Assam*, 1991,p. 145; 1993, p. 145; 1993, p. 175; 1994,p. 118

In the year 1994-95, the physical target expected to be achieved in respect of production in the handloom sector is 86% and in the powerloom sector the percentage is 75%.

The review of the Annual Plans 1992-93 and 1993-94 shows that the physical target achieved under Khadi was 97% and 78% and under village industries sector was 29% and 21% higher than target respectively.

In respect of sericulture, the States Eight plan accords priority to (a) plantation of silk worm food plants, (b) production and distribution of disease-free silk worm seed and (c) marketing of produce.

(iii) Pottery : Pottery is one of the age-old crafts of Assam carried on by the most antiquity method of production. The art of making pottery was known to the people of Assam from early times. As regards the history and origin of the pottery industry in Assam, it has been possible to gather that the use of pottery wares was prevalent as far back as the 5th and 6th century A.D.

The extensive remains of temple and buildings give ample evidence of working on stones and bricks. This is proved also by a number of epigraphs. The art of brick making is mentioned in the Sualkuchi grant of Ratnapala. It was highly developed at a subsequent time particularly during the Ahom period. The Nidhanpur grant mentions *Kumbhakaragarta* (potter's pit), and the Kamauli grant refers to the *Kumbhakar*s who were professional pottery makers. Some of the best specimens of pottery, with artistic and decorative designs, belonging to the 5th and 6th century A.D. have been discovered from Dah Parvatia; some specimens have also been found in Tezpur and near Sadiya. The clay seals of Bhaskaravarman also point to the fact that the art of clay modeling was developed as far back as in the 7th century A.D. Moreover, Bana mentions among the presents of Bhaskara 'drinking vessels embossed by skilful artists, molasses in earthen pots and' cup of *Ullaka* diffusing a fragrance of sweet wine.¹⁰

It is very difficult to give a definite note on the existence of pottery during pre-historic epoch, as no systematic study has been made, but random finding of small-sized potteries of the pre-historic times, collected during various excavations and diggings leave no doubt that the art of pottery was also popular in Assam long ago.

The existence of some *chubas* or villages bearing prefix 'Kumar' to their names such as *Kumar Chubari*, *Kumargaon*, etc., is perhaps reminiscent of the pottery that flourished in these regions. In the plain districts of Assam, pottery is a hereditary occupation of the people belonging to the communities like Kumar, Hira, etc. Sir E.A. Gait, in an article in the *Journal of Indian Art* and, the industry published in 1898, observes that there are

10. Dr. P.C. Choudhury : *The History of Civilisation of the People of Assam to the Twelfth Century A.D.*, Guwahati, 1959, p. 378.

two distinct classes of persons engaged in the manufacture of pottery in the Brahmaputra Valley, the Hiras and the Kumars. The word "Kumar" is derived from "Kumbhakar" and means maker of pots. The word Kumar, on the other hand, so far as the Brahmaputra valley is proper is concerned, is not used to denote persons of any particular caste or sub-caste but is applied to persons of several different castes, chiefly the Kalitas, Keot and Koch, who make or whose ancestors are remembered to have made articles of earthenware. Thus, there are Kumar Kalitas, Kumar Keots and Kumar Koches, and the people so designated continue to retain their old caste status.

"In few rare instances, persons other than Hiras and Kumars were found manufacturing earthen vessels in the Brahmaputra valley. In the Tezpur sub-division, a few people of Kaivarta caste make large earthen pots which are used for building gur. Near Dibrugarh a few families of up-country men from Arra are potters by profession. They are known locally as Hira Kumars. Such up-country potters have also settled recently at Golaghat."¹¹

The present position of the Kumars is not uniform throughout the Brahmaputra valley. They are treated more or less as members of a scheduled caste in the Kamrup district while they rank almost equally with Kalitas and others in upper district.

In undivided Cachar district, the word 'Kumar' denotes what it does in Bengal, the separate potter caste, i.e., one of the nine professional castes (*Navashakha*) which are said to be descendants as the offspring from *Viswakarma*, the divine artisan. In Cachar district, some of the craftsmen are engaged in making only images of Gods and Goddesses. At present, the image making is their subsidiary occupation, their main occupation being '*Grahapuja*' along with the studies of astronomy. This class is known as '*Grahabipra*' or *Ganak* (astrologers) and the members of their families prepared images of Hindu Gods and Goddesses during different religious occasions. According to the estimates of the numerical strength of some backward classes prepared by the Census Organisation in 1954, *Grahabipra* or *Ganak* was shown as one of the backward classes in Cachar.

The principal centres of pottery industry were at Tezpur, Chatia, Viswanath, Becheria, Haleswar and Salmara in undivided Darrang district, Charalgaon, Kumargaon, Putani Dharamtul and Monoi in erstwhile Nagaon district; Joynagar, Chatla, Kalain, Rangauti, Matijuri, Bishnupur and Siboottar in undivided Cachar district; Dibrugarh, Madarkhat, Margherita, Tinsukia and Chabua in the undivided Lakhimpur district; Fakirganj, Gauripur, Rupsi,

11. Reference : *Manufacture of Pottery in Assam* by E.A. Gait, published in the Journal of Indian Art and the Industry, 1898.

Satyapur, Rokakhata, Dubapara and Marnai in undivided Goalpara district and Guwahati, Sualkuchi, Hajo, Rangia, Barpeta, Chaygaon, Pathsala, in the undivided Kamrup district.

The state of affairs of the pottery industry in the State is not very encouraging. Local pottery has mostly been replaced by the superior clay or porcelain goods and metal utensils imported into the State from outside. The profits of the industry are also small and most of the traditional potters have left the trade and shifted to other lucrative occupations.

According to the Khadi & Village Industries Board of Assam, total employment in this branch of the cottage industry was 25,736 in the year 1993-94 against 25,369 in 1992-93.¹²

The raw materials required for the industry are the glutinous clay and the tools and implements used are the wheel (*chak*), mould (*athali*), the mallet (*hatiya piteni*) and polisher (*chaki*). The articles made are cooking pots (such as *akathiah* and *Khola*, *daskathia*, *charu* and *satar*) water jars (*kalah and takeli*), vessels for boiling paddy (*thali*), larger vessels (*hari* and *jaka*), besides, lamps, pipes and drums. In the urban areas, there are small groups of potters who specialise in making the image of Hindu deities like *Durga*, *Kali* and *Saraswati*, etc. The artisans often display an astute artistic sense in making the images, which fetch them handsome amounts. In off season, they make beautiful dolls, toys, etc., and sell in the nearby markets and *melas*.

In recent years, some schemes have been taken up by the State Khadi and Villages Industries Board, Assam, with a view to encouraging the village potters to switch over from their traditional items of products to the production of glazed pottery wares, bricks and tiles which have better marketing potentiality. The Board has been providing for training facilities to the artisans. However, impact of these schemes on the pottery industry in the State is yet to be felt on a wide scale

(iv) **Bamboo and Cane works** : Among the traditional crafts, the making of bamboo and cane products is perhaps most universally practised by all sections of the people throughout the State. Its products may be termed as 'pure handicrafts' in which even elementary mechanical device is not used. Its products have wide range of uses and as such are commonly found in every household.

No definite records are available to establish the antiquity, history and origin of this craft in Assam. But it can be safely assumed that the crafts is being carried on since the very dawn of civilization.

Like other handicrafts, the bamboo and cane products of Assam earned

12. Directorate of Economics and Statistics, Govt. of Assam: *Statistical Hand Book*, Assam, 1993, p. 170-71, 1994, p.116.

wide appreciation in the past. We find mention of the use of "well decorated and coloured *Sital Pati* (cool mat)" usually made of cane. Ptolemy stated that canes were grown and used as bridge. In *Harsa Charita*, there is a mention of bamboo cultivation and its uses for various purposes. "Bana testifies to this highly developed crafts. He states that Bhaskara sent to Harsa baskets of variously coloured reeds, thick bamboo tubes and various birds in bamboo cages".¹³ From this it may be inferred that this craft was highly developed in the past not only in the production of utility articles but also of the articles of great artistic value.

This craft is now mainly a household industry and occupies an important place among the handicrafts of the State. It provides a subsidiary occupation to the cultivators and full-time occupation to the highly skilled artisans who produce only fine decorative baskets, furniture and mats, etc., on commercial scale.

The making of bamboo products is mainly a rural industry. It is commonly pursued by the agriculturists in their spare time as a subsidiary occupation. Its heavy concentration in the rural areas may primarily be attributed to the availability of bamboos in the villages and the very high demand for various bamboo products, such as mats, baskets, fishing contraptions, etc., in every rural household. The essential equipments required for the industry are *dao* and knife which are invariably found in every family. The manufacturing activities are generally carried out outdoor and all the members of the family, both male and female, take part in it. However, the male members of the family predominate. Most of the products, manufactured in such household, are meant for domestic use and only a small percentage of the products are sold in the markets. The professional artisans who follow this trade as a whole time occupation sell their products in the markets. *Japi*, the headgear which is produced on commercial scale, are of various designs and sizes. The *japis* ornamented and embroidered with different designs were indicative of the dignity and social status of those who used them in the past. Although use of such *Japis* is no longer in vogue now, the embroidered and ornamented *Japis* are still considered as precious possession by the rich and poor alike. Many varieties of '*Japis*' such as '*Halua Japi*, '*Pitha Japi*', '*Sorudoiya Japi*', '*Bordoiya Japi*', '*Can Japi*'; etc., are produced in the undivided districts of Kamrup, Nagaon, Darrang, Sibsagar and Lakhimpur. Nalbari and its neighbouring villages such as Kamarkuchi, Mughkuchi, etc., deserve special mention in respect of manufacturing of '*Fulam Japis*' (decorated bamboo umbrellas). A village named Japisagia situated at a distance of about 5 kms. from Tezpur in Sonitpur district is

13. P.C. Choudhury : *The History of Civilization of the People of Assam to the Twelfth Century, A.D.*, Guwahati, 1959, p. 378

famous for *Japi* production. In the Nagaon district, the best '*Japis*' are made at Kandali, Uriagaon, Jagi and Kathiatoli.

Bamboo mats of various types are also manufactured on a commercial basis in the undivided districts of Nagaon, Darrang and Cachar. Large scale commercial production is reported from Karimganj district where mats are locally known as '*dhara*', '*jharia*' or '*darma*' and thousand of people are engaged in this craft. In the district of Darrang and Nagaon such mats are produced from the dried stalks of various kinds of marshy plants and weeds, while in the district of Cachar, it is produced out of bamboo slips. The mats are of three kinds, *kath*, *dhari*, and *pati*. *Kath* mats are woven in a wooden frame and the better kinds are made from the *kuhila* plant (*aeschynomene aspera*). Cheaper varieties are made from *murtha* (*marantha dischotoma*) and *hogal* (*typha angustifolia*). The essential equipments required for the industry are *dao* and knife. Bamboo mats are extensively used for various purposes like construction of temporary walls and sheds, big pandals, roofing of country boats, dwelling houses, screens, etc. Besides domestic uses, mats are also required by big mills and factories for various uses.

Karimganj is the only district in Assam where umbrella handle is manufactured on a commercial basis. It is new addition to the list of other bamboo products of the State. An umbrella handle making co-operative society is functioning in the village Paldahar under Ratabari Police Station of the Karimganj district. The State Government has recently opened a training centre for imparting training to the artisans on umbrella handle making at Didhnai in Goalpara district.

The making of cane products is an important and growing cottage industry of the State which abounds in cane. Extrication of the thorny cane from the thick jungles is a difficult task. The forest authorities grant leases to the *Mahaldars* to extricate cane from forests. The tolls and implements required for the industry are mainly *dao* and knife and it is only in the making of furniture that few hammers, pliers or prunes, etc., are required. The industry requires a certain amount of skill even in producing articles of day to day use but the production of the furniture and other products of artistic value calls for a high degree of skill. In the manufacture of cane furniture, undivided Cachar district enjoys a special advantage over other districts of the State in so far as skilled artisans are concerned. But the skill has been recently developed among the artisans of Nagaon, Darrang and Sibsagar also. The craft has commercial production in almost all the important urban areas of the State.

The main product of the cane industry is the plucking basket which is required in large numbers every year by the tea gardens. As the tea planters find it convenient to purchase in bulk, and the small establishments of artisans find it difficult to meet their requirements, the supply of the plucking baskets have become the monopoly of the few farms that can afford to produce the

baskets on a large scale. Deprived of this market, the petty artisans look to the needs of the individual consumers and manufacture various types of furniture and sundry articles like boxes, cradles, cane-stool (*murrha*), office trays, tiffin baskets, bottle carriers, bicycle baskets, waste paper baskets, cane charis, etc.

The potentiality of making bamboo and cane products on commercial basis is quite considerable in the State. There is a good demand for its products and raw materials required for it are also available in plenty in the State. The dearth of skilled workers or technical guidance has limited scope of development of this industry to a great extent.

Under Cane and Bamboo Industry, an amount of Rs. 9,14,000.00 was disbursed as grants and loans by the Assam Khadi and Village Industries Board in 1994-95 against Rs.3,21,000.00 in 1993-94. Moreover, 765 centres of this branch of industry with an employment of 5034 produced goods worth Rs. 185.02 lakh in 1994-95 against Rs. 181.48 lakh, the value of total production made in 915 centres by engaging 4386 persons in 1993-94.¹⁴

The Assam Government marketing Corporation and the NEHHDC have taken up various steps to modernise the bamboo and cane industry in Assam and to expand its market. The State Government has set up sales emporium for the products of bamboo and cane industry in places like Shillong, Calcutta and Delhi. Assam's cane and bamboo products are exported to countries like U.S.A. France and Japan. '*Sital pati*' from Cachar has captured the market in the Middle East.

(v) Brass and Bellmetal Industry : The brass and bell metal industry was highly developed throughout Assam in the past. The skill of artisans who worked on metals in the past is well proved by the existing remains of a copper temple at Sadiya and copper plates issued by the rulers. Copper and brass cups of Goalpara district known as *Kansas* are products of Assam of great significance. The industry has suffered decay and is confined only to a few places like Chatia, Bacheria, Modopi, Bihaguri, Mangaldai and Patharughat in undivided Darrang district, Japargaon, Telekisinga, Bokalmajgaon, Japi Hajia, Ghorbund and Jarwa in undivided Lakhimpur district; Konwaritol, Raha, Jagial, Samaguri and *mauzas* of Barbhagiya and Khualgaon in undivided Nagaon district; Kakajan, Titabar in Jorhat district, and Sarthebari in Barpeta district, Hajo, Rangia in Kamrup district. Of all these places, bell metal and brass utensils of Hajo and Sarthebari is widely acclaimed as the best throughout the State. The number of artisans engaged in the industry is also very small. Bell metal utensils are cast in moulds but brass vessels are made of thin sheets and pieced together. The articles

14. Directorate of Economics and Statistics, Govt. of Assam., Statistical Hand Book, Assam, p. 116-17; 1995,p. 124-25.

manufactured by artisans mainly consist of utensils and vessels of day to day domestic use, such as '*lota*' (flattish bowl with narrow neck), *ban-kahi* (plate with stand), *thagi* (high plate), *ban-gilas* (tumbler with holding stand), *kharahi* (through-holed tub), '*kalah*' (jar for holding water), '*sarai*' (high tray), *saria* (tub), '*temi*' (small container to carry lime), '*thali*' (large vessel for boiling rice), bell metal spoons, tumbler, *kahi* (dish), etc. Mirrors made of shining metals were also in use in the past. Even now these mirror called *dapon* or *darpan* are used by the bride and bridegroom during marriage.

Historically, the bell metal industry dated back to the 7th century A.D. when the illustrious **Ahom** kings greatly patronized this industry with an unflinching zeal which was subsequently followed by an effective patronage by the heads of monasteries and landed aristocracy. The patronage by the kings and their progenitors obviously helped the growth and development of this craft in Assam. The products of the industry soon found extensive markets in the neighbouring countries of Nepal, Bhutan and Tibet. It is a legend that king Bhaskar Varman sent a part of '*bhortal*' a product of bell metal, to Harshvardhan, the king of North India in the 7th century A.D. as a token of his princely affection for him. Another Ahom king, *Swargadeo* Siba Singha, in recognition of the artistic genius of Jiudhan Kahar of Sarthebari for making unique bell-metal products, give him a '*tamrapatra*' with the title 'Kahar Choudhury' and 40 *bighas* of revenue-free land.

Assam's bell-metal industry is chiefly confined to few areas, namely Titabar, Raha and Sarthebari. Though the highest concentration being still in Sarthebari, a substantial segment of the people engaged in the industry has almost abandoned it and got engaged in agricultural pursuits and other vocations. The most important feature of the bell metal industry is that the bulk of units (*kahar sal*) engaged in production are run on partnership basis as a result of the age-old system. In each unit, normally four or five artisans pool their resources under a common production programme, known as '*kahar-bhaiga*' or *ojapali*. The artisans mutually decide to work under the master artisan '*Kahar*' or '*Oja*', who owns the tools and implements in such establishments and manages everything under him. The rest of the workers are known as '*Bhaigas*'. In these units, in fact, the workers are not entitled to receive direct wages as the income is shared by them on the basis of mutually agreed-upon rations. The *bhaigas* normally get equal share and the main *Kahar* usually gets one and a half times the share of a *Bhaigas* owing to his exclusive right of ownership over the implements needed for production. In the event of the *Kahar's* death, either the productive unit is disbanded or a new *Kahar* is called upon to keep the unit running.

The Assam Co-operative Bell-Metal Utensils Manufacturing Society, Sarthebari, has been in existence since 1939-40. It was started with a view to promoting the economic and craftsmanship interests of the members by supplying

them raw materials, equipments and other facilities required for the industry. The bell-metal industry in the Sarthebari area remained in good stead for quite sometimes as it could provide employment to a few thousand local artisans in some 250 operating units. The number of such units has, however, declined to about 120 in recent years. These units received a substantial portion of their supplies, say about 70-80 per cent of the total metal consumed, in the form of scrap from local traders on the stipulation that they would return the finished products to them which were to be moulded and processed according to specifications. The traders received not only the finished products from the artisans after payment of their wages but also collected the residual metal. The payment to the artisans was on piece work basis and they were no better than mere wage-earners. Sometimes deferred payments were forced upon the artisans and at times they had to accept less payment from the traders, on the plea of lack of sale of products. The traders in a way enjoyed the exclusive monopoly of marketing the products and this grabbed the entire profit accruing from the sales.

The Co-operative Society in Sarthebari, too, supplied raw materials to the member-artisans of the society for the manufacture of finished products and got them back after payment of wages to them. However, due to inadequate working capital, the society could not supply even 20 per cent of the total requirements of raw materials to member artisans. Generally, the making charges of a variety of bell-metal product fixed by the traders and the Co-operative Society were identical. However, in case of the society, the making charges were more or less assumed irrespective of whether the sales were brisk or slack.

The area of operation of the Co-operative Society is around Sarthebari. The marketing of the finished bell-metal products is carried on independently through its branches at Guwahati, Jorhat, North Lakhimpur, Tezpur and Dispur as well as through a Sales Depot in the Sarthebari area. The Tinsukia branch is now closed.

The bell-metal industry is declining in importance because of heavy investment of working capital, high cost of raw-materials which is beyond the financial capacity of the artisans, a situation which leads itself to the exploitation of the artisans by the merchants and traders. Sarthebari and Hajo are the most important centres of this industry. There is good demand for their products throughout the State. But the artisans are not in a position to buy improved tools to produce improved goods to meet the demand.

Hajo is also a centre of this traditional handicraft of rare artistic design having more than 300 artisans families with about 2,000 people completely dependent on the handicraft for their livelihood.

The brass and bell-metal industry has also been facing stiff competition from substitutes which are cheaper and a bit more attractive. A wide range of stainless steel products and other types of utensils are generally preferred by

the consumers due to the exorbitant price of brass and bell metal utensils and the simultaneous availability of cheap and attractive machine made utensils which are abundant in the market. While, with the advancement of science and technology, the consumer preference are rapidly changing, the artisans of bell metal industry are following old designs and indigenous methods. Modern techniques of production such as electrical moulding, casting, polishing, etc., are still unknown to the artisans and they continue to follow the primitive and cumbersome process.

Under the Industrial policy of the Government of Assam, 1986, a Committee was set up to study the issue and problems involved in the recognition and modernization of the bell metal and brass metal industries in Assam. The Committee took up steps for the benefit of 10,00 artisans engaged in more than 300 units of bell metal industry in Assam. To ensure the regular supply of raw materials to the artisans engaged in the bell metal and brass metal industries at Sarthebari and Hajo respectively, the Minerals and Metal Trading Corporation (MMTC), Government of India, set up a raw materials depot at Guwahati. Artisans are being sent places like Moradabad and Patna for training and honing of skills.

(vi) Blacksmithy :

Blacksmithy is an important and common household industry in Assam. It is invariably found as the hereditary occupation of the household concerned. The son works as an apprentice and receives training under his father and the skill is thus carried down from generation to generation.

In the plain districts, the ironsmith is known by the term '*Kamar*' one of the nine professional caste groups (*Nabasaka*). The '*Kamars*' do not like to be designated as such but prefer to continue to retain their old caste which, they claim, have descended from *Viswakarma*.

In the olden days, the principal articles of production of this industry included agricultural implements, domestic tools, weapons, besides the tools of the craft like anvil, hammers, chisels, etc. Time has brought about many far-reaching changes in our social and economic life but some of the tools and implements have come down through the ages to us exactly in their original shapes. The usual products of blacksmithy presently found all over the State are simple agricultural implements like plough-share, sickle, hoe and various implements of daily use such as '*dao*' knife, axe, etc. Apart from the manufacturing of these products, the blacksmiths also undertake repair and other servicing works.

Blacksmithy establishments are found in both rural and urban areas but generally the industry is more concentrated in urban areas. Usually the rural establishments are scattered and one establishment often serves the need for several villages. But occasionally concentrations are also found in rural areas

such as village Karanga in Sibsagar district. Such areas are found to be inhabited by a large number of hereditary blacksmiths for generations. For example, the blacksmiths of Karanga have been working in the village from several generations and are only branches of the same family. It is said that in days of Ahom rule, the blacksmiths of Karanga were specially appointed for manufacturing artilleries. The blacksmith of Karanga take pride in their ancestors whom they claim to be the manufacturers of the biggest cannon still found displayed in the compound of the court building at Sibsagar.

It is found that most of the artisans are working in an unorganised way. Only recently a few co-operative societies have been organised and the impact of their activities on the artisans are yet to be seen. The urban units generally provide whole-time employment and principal occupation while their rural counterparts provide only part time and subsidiary occupation to the workers.

The chief raw materials for the industry are steel and soft iron imported from outside the State. A considerable demand for raw materials is also met from scrap iron. The chief fuel is coal but some of the blacksmiths use charcoal as well which is available from local merchants all over the State. Rural blacksmiths sometimes burn logs of wild timbers and prepare charcoal for their own use. The tools and implements used by the blacksmiths are very simple. A pair of sledge hammers, cold chisels, files, a furnace with bellows are all that they need for their working.

(viii) Gold and Silversmithy :

The industry of gold-washing in the beds of Assam rivers like the Subansiri, The Brahmaputra and the Buridihing yielded considerable quantities of gold at one time. The industry suffered a gradual decay in course of time, because the amount of labour and strain involved in gold washing could hardly be compensated by selling the little quantity of gold dust collected from the river beds. The following account of gold washing and jewelery industries that flourished in some districts of Assam in the past, makes an interesting reading. An important industry of the Ahom period was gold washing and manufacture of jewelery. Gold was washed from the sands of the Brahmaputra. Many people were engaged in gold washing. They had to pay to the royal exchequer one *tola* of gold per head per year. Gold could be procured from the sand at all places on the banks of the Brahmaputra. According to the reports on the Administration of Assam 1892-93, and 1901-02, the rivers of Assam which yielded gold were those of the Darrang and Lakhimpur districts north of the Brahmaputra, the Brahmaputra itself in its upper course, the Noa-Dihing and a small stream called Jagle, which rises in the Tipam hills and falls into the Buri-Dihing. In the Sibsagar district, the Dhansiri, the Desoi and the Jhansi were

said to be auriferous. Out of these streams, the Bharali, the Dikrang and the Subansiri in Darrang and Lakhimpur seem to have formerly given the largest quantities.¹⁵ According to the Tezpur Grant, "The river Lauhitya carried down gold dust from the gold bearing boulders of the Kailasa mountain."¹⁶ It is also recorded that Vanamala rebuilt the fallen golden temple of *Siva (Hataka Sulin)* in Haruppesvara. It is probable that the reference in the *Arthasastra* (II, XII) to a variety of gold called *Hataka*, extracted from the mines of the same name, has a bearing on this and that such a mine might have existed in the mountains lying to the north of modern Tezpur or at the foot of the Himalayas.¹⁷ The histories of the invasion of Bakhtiyar again state that there was a huge image of gold, enshrined in a temple where the invader took refuge when he was surrounded by the Kamrupa army. According to Riyaz-us-Salatin, the gold image in the temple weighed one thousand *mounds*.¹⁸

Gold washing operation was carried out by a guild known as the *Sonowal Khel*, who paid the Government a tax at four *annas* weight or five rupees worth of gold per annum. The State derived considerable income from the yearly tax levied on gold washing. In the early part of the British rule, gold washing industry thrived for some time but was given up ultimately as it was expensive and unprofitable.

The industry of Gold and Silversmithy is mainly concentrated in the urban areas. The artisans are from families which have been traditionally associated with the industry. The survival of this age-old industry may primarily be attributed to its higher rates of profit and adaptability to individual tastes. The indigenous jewelers exhibit considerable amount of skill and artistic refinement in making golden ornaments such as *dugdugi*, *goalpara*, *lokapara*, *muthi*, *jonbiri*, *keru*, *kayur*, *kankan*, *karachani*, *bena*, *angathi*, *thuria*, *gamkharu*, etc. Gradually, though modern ornaments like chain, necklace, earring, bracelet, tikli, etc, made their places. Still craving for old ornaments in kind and design with modern touch still persists. The goldsmiths hail from Bengal constitutes the bulk of the artisans engaged in this industry. Among the indigenous goldsmiths only those who have adapted themselves to the changing pattern of the jewelery are still in the line.

(viii) Woodworks and carpentry : This is one of the important old time industries of Assam. This industry is seen functioning both on cottage and on small-scale basis. In Assam, the traditional carpenters who have been the important elements in a village society belong to the community *Suter* or *Sutradhar* and there is mention of this caste in '*Vedas*'. Since time immemorial their forefathers, from whom the mantle has fallen on them, have been working

15. E.A. Gait : *A History of Assam*, 1967; p. 272.

16. P.C. Choudhury : *The History of Civilization of the People of Assam of the Twelfth Century A.D.*, Guwahati, 1959, p. 370-71.

17. *Ibid*, p. 371.

18. *Ibid*, p. 371.

on wood. Generally, a carpenter earns his living by building houses, manufacturing carts, ploughs, looms, furniture, icons and boats.

In this context, it may also be mentioned that carved wooden articles were also common in the olden days such as *Palang, Salpira, Barpira, Para, Dola, Garu Ason*, wooden doors, windows, *Jatar* (spinning wheel) and *Karoni*. Local craftsmen can also produce carved benches, chairs, *thagi* or book-rest, stools, etc. The finer sense of artistic beauty among the wood workers can also be traced from the manufacture of minor weaving implements like *makol, karhoni, durpati, nasani*, etc., which were generally ornamented with carving of parrots, peacocks, monkeys and other floral designs. Although this industry is found in different parts of Assam, yet it is mainly concentrated in the important city and towns of Assam, such as, Guwahati, Dhubri, Nagaon, etc. Majuli Nagaon and Barpeta were famous for manufacture of *Guru-Ashans*, door and window motifs, North Gauhati was famous for *Dola* and loom manufacture, Dhubri and Barpeta for boat manufacture. Most of the *Satras* were patrons of good *Sutra* who could manufacture decorated *Guru Ashan pats, Thagis*, motifs for wall doors and windows and wooden figures as well as paint these. In the rural areas, most of the craftsmen carry on this industry as a subsidiary occupation.

All the artisans of this industry do not possess the required up-to-date skill and designs to attract the customers for their products. On the other hand, they require finance for equipments, working capital, factory sheds and knowledge about improved technique as well as the opportunity to sell their finished products. For the improvement of the industry, it is necessary that common-service facilities in workshop should be provided at the concentration pockets and raw materials depots be attached to the common service workshops. The Assam Government Marketing Corporation would find out markets for the products of the artisans and also suggest the lines of manufacture.

B. Industries and manufactures of State :

(1) Mining and Heavy Industries :-

(a) Petroleum Industry : Upper Assam is well known as an oil area. The oil found in this area has led to the installation of four oil refineries in Assam the first at Digboi, the second at Guwahati, the third at Bongaigaon and the fourth at Numaligarh. The existence of petroleum in this area was first discovered in the year 1828 by Lieutenant Wilcox and Mr. C.A. Bruce in 1837, Major White also reported to have located several oil springs on the Namrup river.

An attempt was made in about 1866 by Mr. Goodenough of Mc. Killop, Stewart and Company to utilise the petroleum of Assam. He was granted certain rights over a large tract of land on both sides of the Dihing river, from Buri-Dihing to Noa-Dihing. The first successful

strike at oil took place at Makum near Margherita on 26th March, 1867 at a depth of 118 feet, and about 300 gallons (1363,77 litres) of oil were collected. This well was the first successful mechanically drilled oil well in Asia, though it had only a brief life. Following this as many as eight holes seem to have been bored in Makum area, some of them being successful producers of oil. Notwithstanding these results, Mr. Goodenough was not successful in establishing a petroleum industry.

Subsequently, Messrs Balmer Laurie and company, a syndicate of private gentleman and the Assam Railway and Trading Company were granted certain rights. In 1882, while constructing the railway line from Dibrugarh to Ledo, petroleum was discovered at Digboi and exploitation of fields was started by the Assam Railway and Trading Company in 1869. The first well at Digboi drilled in 1889-90 marked the birth of the oil industry in India. The Company also established small refineries of an experimental character first at Digboi in 1893 and later at Margherita in 1886. In 1899, wells had been drilled, the Assam Oil Company was formed and in the following year the new Company with a capital of 310000 pounds came into existence with the object of taking over the oil concessions and the plant of the syndicate and of the Assam Railway and Trading Company. As the oil wells near Digboi have more favourable results, a large refinery was erected by the Assam Oil Company near the oil bearing strata and gradually the jungle was reclaimed to make room for the beautiful oil town of Digboi. Oil Refinery at Digboi started functioning in December, 1901 and supplemented the refinery built earlier at Margherita. But lack of adequate finance stood in the way of further expansion of the Company's (A.O.C.) activities and as a result, the production of oil declined to 14,000 gallons (63560 litres) per day in 1920 from 18,000 gallons (81826.2) per day in 1919.

By 1920, after years of urgent drilling for more oil, the Company completed only 80 wells and the time came when it could not carry on without strong financial backing. The Burma Oil Company, in 1921, took over the management of the Assam Oil Company and with it came much needed financial backing, technical skill and organisational experience. Production gradually rose to 30,000 gallons (818262 litres) per day in 1931.¹⁹

During the period from 1934 to 1952, the production of the Assam Oil Company remained more or less static varying from 184-187 thousand gallons (836645 to 850282 litres) per day, owing to the difficulty of increasing the output from the depleting oil fields.

More than 1000 wells have been drilled in the area. The Digboi Refinery produces unusually wide variety of petroleum products. Till 1966, more than a million tonnes of crude oil had been supplied by the Digboi oil fields and the current production stands between 170,000 to 180,000 tonnes a year. The oil reserves which have been exploited continuously for a period of 90 years are expected to be exhausted within this century. The crude is refined in

19. P.C. Choudhury : *The Economic Development of Assam*, 1963, pp. 159-60.

the Company's oil refinery at Digboi. The Refinery has an annual capacity of 0.46 million tonnes of crude and the balance of its crude requirement is met from the supplies of Naharkatia and Moran fields.

The next and most important oil field in the State was discovered at Naharkatia in Dibrugarh district. The discovery of oil at Naharkatia was a momentous event in the history of Indian petroleum industry for it opened up a new vista of oil exploration in the alluvial areas within the country. Other oil fields had also been discovered at Hoogrijaan and Moran. Geophysical work in the Naharkatia area was undertaken as early as in 1923. When it became feasible to drill wells below 10,00 feet (3048 metres), some seismic work was carried out in the area to locate the most favourable site for drilling the first well. But World War II intervened and the Government imposed a moratorium and prohibited exploratory drilling except for providing the extension of the Digboi field. However, after the War a prospecting licence was granted to the Assam Oil Company to resume exploration works.

Preparation for exploration of oil at Naharkatia was made in the year 1961 and drilling of well No.1 at Naharkatia commenced on May,26,1952. Seventy five wells were drilled upto December,1960. The deepest well in the area is 13,060 feet (3970.68 metres). The number of wells drilled in the Naharkatia area rose to 144 in August. In the Moran Oil field 30 wells were drilled till August,1964. The discovery of oil at Naharkatia accelerated the rate of oil exploration and led in 1956 to the drilling of a test well. But owing to the greater depth of oil bearing strata in the area drilling takes much longer time at Moran than at Naharkatia.

The estimated gross reserves of oil in the Naharkatia and Moran fields are 48.87 million tonnes. The oil fields are being developed by the Oil India Ltd.to produce 3.01 million tonnes of crude annually in the refineries at Digboi,Guwahati and Bongaigaon in Assam and Barauni in Bihar.

All the wells drilled by the Assam Oil Company so far in Naharkatia and Moran areas are under Oil India Ltd. The total area of operation of Oil India in Naharkatia,Naharkatia-Extension,Hoogrijaan and Moran covered by the mining lease was about 510.35 square miles (1321.80 sq.kms.). The Doom-Dooma prospecting exploration licence area under Oil India Ltd.consisted of about 1291 square miles (3343.68 kms.).

More recently,the oil and Natural Gas Commission has also been very active and has struck rich deposits of oil at Rudrasagar,Lakwa,Teok,Geleki and between Jorhat and Golaghat. It is anticipated that Rudrasagar would produce at the rate of 0.50 million tonnes a year. According to a recent estimate,the reserves in Lakwa field may be of the order of 45 million tonnes,even though the full extent of the fields has not been demarcated yet. An additional 2 million tonnes a year is expected from the oil fields of Rudrasagar, Lakwa, Teok, Geleki, Kusijan and between Jorhat and Golaghat. This additional production may require

an investment of about Rs.60 crores inclusive of exploratory work.

It is estimated that about 55 per cent of the local geographical area of Assam is made up of sedimentaries and can be considered as potentially oil bearing. In 1963, Assam produced 9.24 lakh tonnes of petroleum crude which accounted for nearly 58 per cent of the country's oil production. At present, Assam produces about 50 per cent of the total crude oil production in the country. The production of crude oil was 3,559 thousand tonnes in 1973, increased to 3,735 thousand tonnes in 1974. The production further increased to 48.6 lakh tonnes in 1994 due to intensive exploration conducted on priority basis. The table below shows production of petroleum crude utilised in Assam for past few years.²⁰

Production of Petroleum (Crude) in Assam.

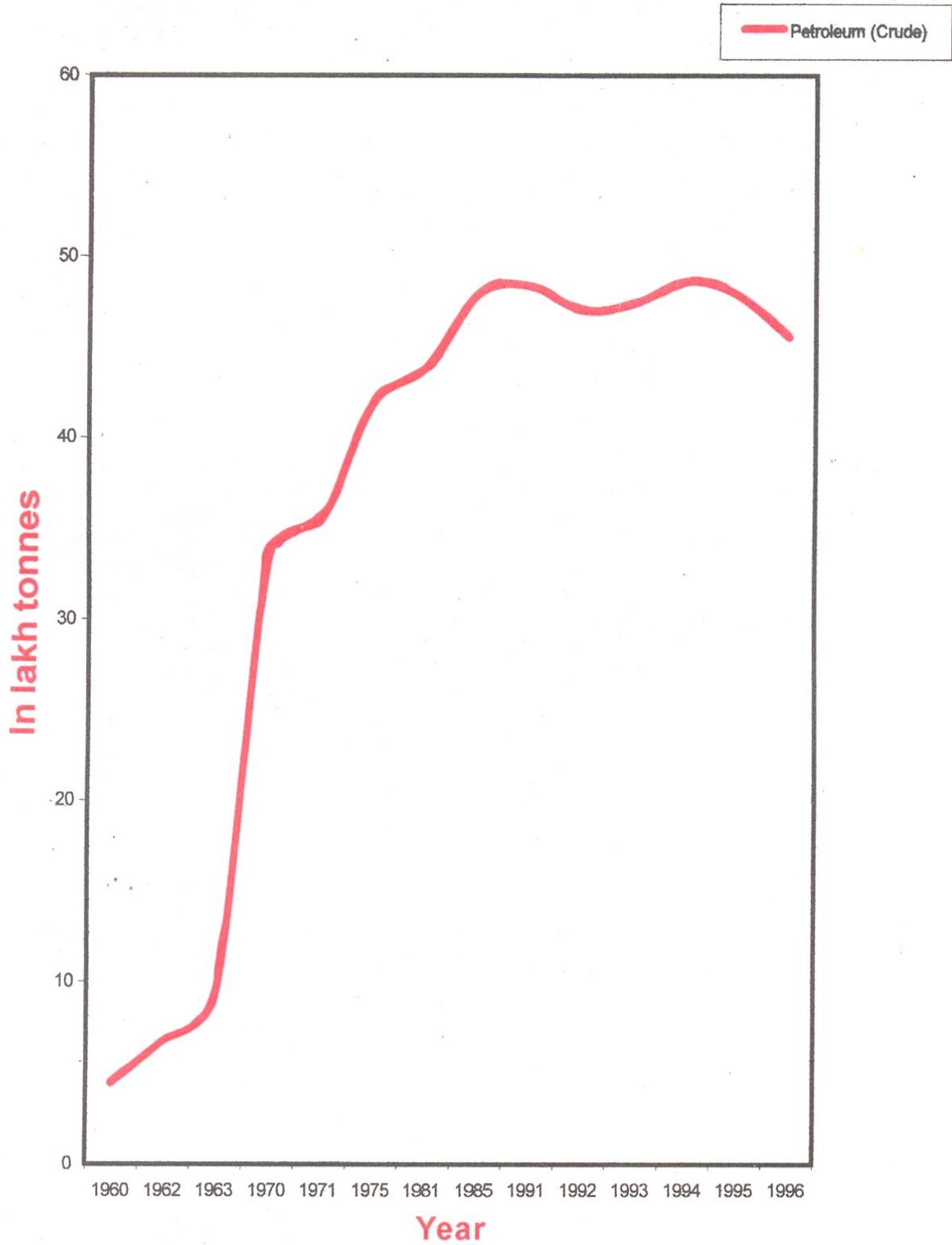
Year		(Petroleum crude (in lakh tonnes))
1960	.....	4.6
1962	.....	6.83
1963	.....	9.24
1970	.....	33.6
1971	.....	35.4
1975	.....	41.9
1981	.....	43.86
1985	.....	47.90
1991	.....	48.38
1992	.....	47.03
1993	.....	47.37
1994	.....	48.61

The crude petroleum industry in Assam according to latest trend is on the rise and has greatly furthered the prospect of Assam's economic development and that of the country as a whole. This can be judged from the Index table given below :-

20. (i) *Industrial Programme for the Fourth Plan for Assam* by national Council of Applied Economic research, p. 27.

(ii) Directorate of Economics and Statistics, Govt. of Assam : *Economic Survey* ; 1978-79, p. 44. and *Statistical Hand Book*, 1988, p.140; 1995, p. 135.

Production of Petroleum (Crude) in Assam



INDEX OF CRUDE PETROLEUM PRODUCTION IN ASSAM

(Base-1970=100)

Classification	Weight	1990	1991	1992	1993 (P)
1	2	3	4	5	6
Crude Petroleum	88.63	146	144	140	141

Source – *Statistical Hand Book*, Assam, 1994

Guwahati Refinery :- It is situated at Noonmati area of Guwahati city. This refinery has been set up in the public sector in collaboration with Rumania. The construction work of the Refinery started in 1959. On January 1st 1962, the refinery was inaugurated by Late Jawaharlal Nehru, then Prime Minister of India. Guwahati Refinery is the first public sector refinery in India.

This Refinery, like the Refinery at Barauni in Bihar refines the crude oil found at Naharkatia, Hoogrijan and Moran in Upper Assam. The crude oil from Naharkatia comes through Oil India Limited (Bulk supply) to the Refinery. The crude oil from Naharkatia oil fields are carried through pipelines over distance of 400 kilometres. This pipe line is capable of transporting to Guwahati a quantity of 2.75 million tonnes of crude oil a year. In all, from Naharkatia to Barauni, there are 9 pumping and 17 repeater stations. The pipeline is highly automatised and it has upto-date telecommunication, telemetering and telecontrol equipments. But with more pumping stations the pipe line can carry upto 4.00 million tonnes per year in its second leg. A crude conditioning plant to facilitate the pumping of the Naharkatia crude has also been set up at Duliajan in Upper Assam at a cost of Rupees two crores. The Oil and Natural gas Commission also supplies crude oil to the Guwahati Refinery from the newly found Rudrasagar oil fields.

The Indian Refineries Ltd., Guwahati, are engaged in processing 0.75 million metric tonnes of crude oil per year. The Refinery produces nine items of production and the table below shows some of the present pattern of production of petroleum products in the Refinery and the amounts likely to be produced after expansion.

Item Expansion (in tonnes)	Present production (In tonnes)	Production after
Gasoline	1,60,000	2,94,6000
Superior and inferior		
Kerosine	1,64,000	2,40,500
Two varieties of diesel oil	1,84,000	2,69,800
Petroleum coke.	39,000	57,200
Aromax	36,000	52,800
Refiner gas and losses.	54,000	79,200
L.P.G.	5,000	7,000
	to	to
	7,000	10,000
Fuel.	.....	1,13,000

Apart from the crude distillation Unit, the Guwahati Refinery also has a Kerosene Refining Unit and a Cooking Unit. It also produces gas now being flared. A plant is there to utilise this gas and produce the liquidified petroleum gas for cooking purposes.

The cooking unit produces about 39,000 tonnes of calcined petroleum coke per annum. The portion of reduced crude that forms coke is solidified through a cooking process, later cut into pieces by a hydraulic drill.

The Refinery at Guwahati has a products pipeline running from Guwahati to Siliguri through which all the white products which cannot be marketed in Assam area, are transported. This product pipeline has been commissioned in October, 1964. The major part of the products is pumped through this pipeline to Siliguri and the remaining quantity is distributed in Assam. The refined products are distributed through the marketing division.

Guwahati Refinery which is a resource based Central Government Project has good scope for success in the field of industrial development of Assam and can support a number of ancillary and subsidiary units, both by way of supplying stock items and others that would process further their products and by-products.

The establishment of the 10 crore Oil Refinery of Guwahati is a landmark in the field of industrial development in the State. According to the Rumanian experts, the Refinery can be doubled with an expenditure of 50% of the present

outlay . Moreover,the established of the Oil Refinery has given a fillip to the growth of subsidiary industries based on carbon gas and wax around Guwahati and has also created employment opportunities in the State.

Refinery-cum-Petro Chemical Complex,Bongaigaon :-The foundation stone of this one million tonne Refinery-cum-Petro Chemical Complex at Bherbheri,5 kms,from Bongaigaon was laid by Mrs.Indira Gandhi,the then Prime Minister of India on January 19,1972. This public sector undertaking,completed in about four years time at a total cost of over Rs.96 crores,is the biggest industrial project in Bongaigaon district. The crude is supplied by Oil and Natural Gas Commission from Lakwa and Rudrasagar oil fields. Provision is there to meet the additional requirement of crude from Geleki and Nazira fields of Oil and Natural Gas Commission. In order to facilitate the supply of one million tonne of crude oil to Bongaigaon Refinery,the pipeline from Naharkatia to Bongaigaon was constructed. Besides refining petroleum,this undertaking produces Polyester film,D.M.T.Polyester,Par and Orthoscuience and various other petroleum products. On the basis of these down stream products,it will be possible to set up various industries for manufacture of a wide range of sophisticated industrial goods and consumer items. D.M.T. Polyester fibre is a versatile raw material for manufacture of terelene and may open up a wide base for the development of textile industry in the State either by itself or by blending with natural fibres-cotton,wool and silk. This heavy industry complex in an industrially backward district like Bongaigaon is expected to usher in an era of industrial prosperity.

Oil India Pipeline Project :-To transport crude oil,the oil India has constructed a 1152 kms. (1720 miles)long pipe line from Naharkatia to Barauni. This pipe line crosses the difficult terrain in Assam,linking the oil fields in Upper Assam which refineries at Guwahati and Barauni. The pipeline which crosses 78 rivers including the mighty river Brahmaputra was completed in two stages. The pipes running from Naharkatia to Guwahati is 40.64 cms,while the line upto Barauni was completed in February,1963. In all,there are one pumping and 17 repeater stations. The pipeline is capable of carrying 2.75 million tonnes of crude a year upto Guwahati and 2.00 million tonnes a year thereafter to Barauni. But with greater number of pumping stations the pipeline can carry upto 4.00 million tonnes crude oil per year to Guwahati and 3.25 million tonnes per year in each second leg. In order to facilitate the supply of one million tonne of crude oil to the Bongaigaon Refinery,pipeline of the length of 600 kms.has been laid down from Naharkatia to Bongaigaon by the Oil India Limited.

Crude Conditioning Plant :-A crude oil conditioning plant has been established at Duliajan in 1962 by the Oil India at a cost of Rs.1.60 crores. The plant facilities pumping of Naharkatia crude oil. This started operating at its 25% before the Barauni Refinery went on stream. In this

conditioning plant, crude oil is processed and pumped into the pipeline for onward transmission to the refineries.

The waxy nature of the crude oil from the Naharkatia and Moran fields with a pour point varying between 270 and 280 posed a serious problem of its transmission. But in collaboration with Burma Oil Company Ltd. and British Petroleum in London, a process was evolved of making this crude flow event at very low underground temperatures. The crude was heated to about 90.c. To 100.c. To dissolve all wax nuclei and then cooled to bring it to the size and shape of wax crystals. The jellying tendency was modified to the extent necessary to keep it in a liquid state even at very low temperature. A pilot plant was rigged up to determine the optimum rate of cooling to produce minimum viscosity. The crude is first heated and then cooled down to 65.c. By incoming raw crude in exchanging in the Plant. The crude at 65.c. Is then pumped into vertical vessels, when it is cooled, at a predetermined rate. The crude 'conditioned' is pumped into the crude storage tanks for subsequent pumping into the pipeline for despatches to refineries. During the cooling period, the desired cooling curve is obtained by a time schedule controller working in conjunction with a temperature recorder. A high degree of automation has been introduced in the design of the plant which can be fully operated from a control room. The main purpose of this plant is to keep the crude 'thin' enough for pumping. A similar plant involving expenditure of Rs. 60 lakhs has been set up at Moran in Dibrugarh district.

The installed refining capacity of the oil refineries in Assam are as follows :-

Refinery	Million tonnes annually
Digboi (set up in 1901)	0.50
Guwahati (set up in 1962)	0.85
Bongaigaon (set up in 1972)	1.35
Numaligarh (construction started in 1992)	3.00

Set up by the Government of Assam in collaboration with IBP (Indo-Burma Petroleum Company), the Numaligarh Refinery in the district of Golaghat is expected to be completed by the end of the twentieth century.

(b) Industries based on Natural Gas :- Natural gas reserved discovered so far in the Naharkatia and Moran Oil fields are started to be of the order of 220,000 million cubic metres. A large proportion of this gas reserve is made up of associated gas only 8 wells, 7 in Naharkatia and 1 in Moran, are described as gas producers. The gas of other wells will require processing.

The daily output expected to be of the order of 28 million cubic metres, of which about 56 million cubic metres can be consumed by the oil fields themselves. As the oil and gas will be required to be separated in stages, the composition and the quantum of gas will also vary from stage to stage. However, the average analysis of the gas can be taken as follows.²¹

Gas	Per cent
Methane	90.40
Ethane	5.08
Isobutane	0.47
Propane	2.84
N. Butane	0.65
Isopentanes	} 0.56
N. Pentanes	
Hexenes-x	
CO ₂	Nil
N ₂ s	Nil

The Assam Gas Company which is a State Government undertaking has been formed to undertake the distribution of the gas of various users as well as to set up a Gas Fractioning plant to provide a base for possible petro-chemical industries. To utilise this gas, a thermal power station with 63 MW capacity has been established at Namrup. At Namrup, the Fertilizer Corporation of India has constructed a Fertilizer factory to produce 100,000 tonnes of ammonium sulphate and 55,000 tonnes of urea per year.

A Tindari Gas Grid has been formed to supply gas to a number of tea gardens of Tingrai circle for running factories and other allied works. The daily requirement of gas in the above undertakings is of the order of 9 million cubic metres; Namrup Thermal Power Station 5 million, Namrup Fertilizer 2.2 million and Tindari Gas Grid 1.8 million cubic metres. The expansion programme of Namrup Thermal Power Station by another 23 MW and the production of 10,000 tonnes of carbon black, for which the licence has already been issued, will require another 3 million cubic metres of gas per day.

The production of natural gas which was 171 million cubic metres in 1961 rose to a level of 1030 million cubic metres in 1992. The table below

21. *Industrial Programme for Fourth Plan for Assam* by the National Council of Applied economic Research, p.28.

shows production of natural gas utilised in Assam for past few years.²²

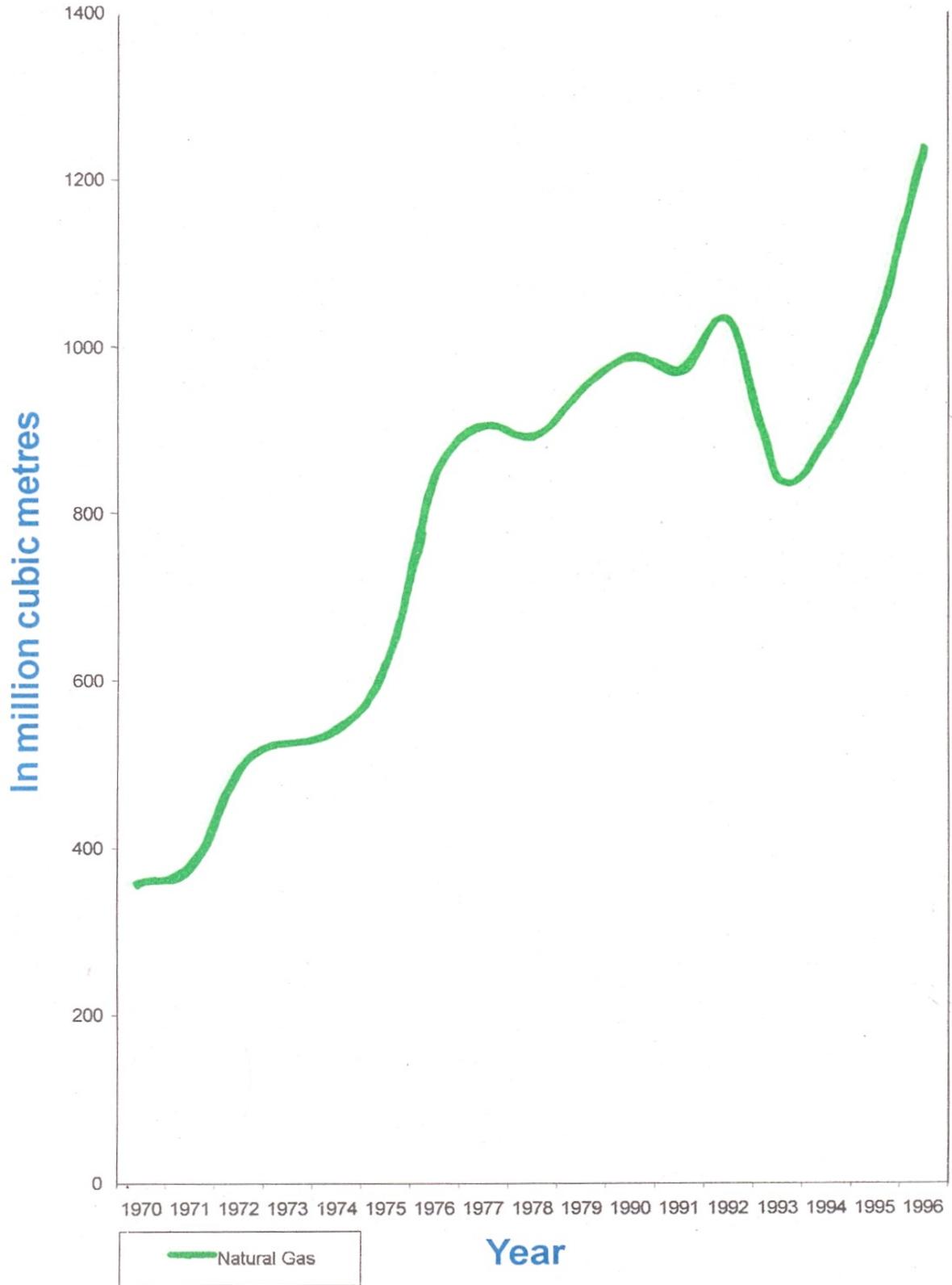
Year	Natural gas utilised (in million cubic metres)
1970	360
1971	375
1972	497
1973	522
1974	539
1975	621
1976	848
1977	902
1978	889
1979	946
1990	987
1991	967
1992	1030
1993	838

Namrup Fertilizer Project :Fertilizer is an important input which is essential for increased agricultural production. Any programme for increased agricultural production in Assam will have to be based upon fertilizer consumption,irrigational facilities and supply of high yielding varieties of seeds. In Assam,where the scope of expansion of area under cultivation is very limited,emphasis is given to these three factors. The installation of the fertilizer factory at Namrup is a momentous venture in the agro-industrial sector of Assam.

The discovery of a reserve of 220,000 million cubic metres of natural gas in Naharkatia and Moran oil fields during the late fifties of this century led to various enquiries about the use of the gas. The Government of India appointed M/S Snodgrass Associate of the United States to study the prospectus of the proper utilisation of the gas. Their report disclosed that the natural gas can be used of manufacture nitrogenous fertilizer and for generation of electricity. The Kane Committee made the final scrutiny of the plan and selected Namrup as the site of the fertilizer factory. The site was finalised in 1962 and an import

22. *Economic Survey* : Directorate of Economics and Statistics, Government of Assam p. 35.

Production of Natural Gas in Assam



licence was issued in the same year. The Government of India assigned the work to M/S Hindusthan Chemical and Fertilizers. When the Fertilizer Corporation of India came into being it was entrusted with the implementation of the scheme.

Namrup is situated at the foot hills of the Naga Hills in the eastern part of the Dibrugarh district. This industrial town is surrounded by tea gardens beyond which the green field stretches for miles. The Dilli river, a tributary of the Brahmaputra, flows nearby.

The Namrup Fertilizer Factory is owned by the Fertilizer Corporation of India Ltd. and is its fiftieth producing unit. It is the only plant of the Fertilizer Corporation of India, where natural gas is used as raw material. The gas is made available by Oil India Ltd., at a pressure of 10-15 kg, Cm^2 to the Assam Gas Company which is a State Government undertaking. In the Assam Gas Company, the pressure further boosted to 25 kg. and is supplied to a battery unit of the Fertilizer plant at a distance of 30 kms. by pipeline at a pressure of 15-16 kgs per Cm^2 . The same pipeline supplies gas to the nearby Thermal Power Station and to some tea gardens. Sulphur is the other raw materials which is imported through the State Trading Corporation.

The factory is designed to produce annually 55,000 metric tonnes of Urea, and 100,000 metric tonnes of Ammonium Sulphate. The total capital outlay is of the order of Rs.24.26 crores including foreign exchange components of Rs.6.36 crores. It went to commercial production from January 1, 1969.

With the rapid rise in the demand for fertilizers the need for setting up another fertilizer factory in Assam was almost imperative. Techno economic surveys conducted to find out suitability of various locations revealed that the expansion of the existing factory at Namrup had an edge over the erection of a new factory in any other location. The expansion project was approved in 1967 and construction in 1968.

Though this project has been termed as "Expansion" virtually it is a factory by itself having an installed capacity of 1,52,000 tonnes nitrogen and 3,30,000 tonnes of urea per year. The capital outlay of the project is Rs.51 crores including a foreign exchange component of over Rs.17 crores. Some of the important features of the existing plant and the expansion plant are given below :-

Existing plant	Expansion
Ammonium plantation capacity -200 tonnes per day;laid in two equal and independent Streams.	Capacity -600 tonnes per day;laid in single streams.
Urea plantation Capacity -167 tonnes per day;laid in two equal and independent Streams.	Capacity -100 tonnes per day;laid in two equal and independent streams.
Nitrogen 45000 tonnes per annum.	152,000 tonnes per annum.
Power requirement 14 MW	19 MW.
Capital cost Rs. 24.6 crores.	Rs.51 crores approximately.
Total tonnage 8000	10,5000

Namrup Fertilizer Factory is the first Indian fertilizer factory to use indigenous catalysts developed by the Planning and Development Division of The Fertilizer Corporation of India.

About 60 to 80 per cent of Ammonium Sulphate and 20 per cent of Urea produced in Namrup Fertilizer Factory are used in Assam. The surplus is sold in West Bengal, Bihar and Uttar Pradesh. Sale is conducted through their non Sale-depot and recognised agencies. For dissemination of technical know-how, literature on various uses of fertilizers is prepared by the marketing organisation of the project and distributed among the farmers.

(c)Coal Industry : The existence of coal deposits in Upper Assam had been known from the early days of the British occupation of the State. It is mentioned in the old Gazetteer of Lakhimpur that in 1825, Lieutenant Wilock reported that coal was found near Borhat on the Disang river. In 1825, about 5000 *maunds* of coal were quarried by Mr. Bruce was dispatched to Calcutta. The Coal was pronounced to be equal to English coal and the best ever found in India. But it took time to develop this industry. A geological survey of coal fields was undertaken by Mr. Medlicott in 1864-65. In 1876, Mr. Mallet who examined the coal fields of Nagaland, divided the coal measures of Lakhimpur into two fields, Makum and Jaipur. According to him, Makum coal field contained about eighteen million tons of coals, about half of which could be exploited

easily but no progress worth mentioning in the exploitation of this mineral could be made until the formation of the Assam Railways and Trading Company in 1881.

The survey of the coal resources of Assam was started by the Central Fuel Research Institute at Dhanbad in 1953, and later in 1957, the Coal Survey Station for the Assam coal fields was established in temporary premises at Jorhat. Then it was permanently shifted to Rowrah where the Regional Research Laboratory for Assam has been constructed. The survey and research conducted by the C.F.R.I and its station at Jorhat has revealed that Assam coals are very important geologically. The Tertiary coals are found generally to be a rank of lignite but Assam coals have abnormal properties in so far as they exhibit dual characteristics of a high and of a low rank coal, and their abnormality is generally attributed to high organic sulphur contents.

Makum coalfield : Makum coal field near Margherita is 30 kms. long, and about 5 kms. wide between the Dirak on the west and the hairpin bend on the Tirap river on the east. The coal seams extend eastward from Namdang, along the two opposite limbs of the east plunging Namdang syncline. The south limb of the syncline is obscured, at places by the Haflong-Disang thrust and consequently the coal seams extending along this are either highly distorted or totally cut off at intervals.

At present, working collieries in the Makum area are at Ledo, Namdang Tipong and Borgolai. These collieries are situated in a line among the lower hills about 6.4 kms. south of Margherita. The coal field at Ledo (at Tikak, Ledo valley and Upper Ledo) was discovered in 1882 and since then it is producing coal of good quality. The work at Namdang and Tirap Grants which formerly belonged to Mr. Haly and which paid a small dead rent in place of royalty, began in 1897 and 1988 respectively. The colliery at Borgolai was established in 1909 and while colliery at Tipong in 1924.

Jaipur coalfield : The coal bearing strata extends along the western edge of the Tipam Hills. Outcrops of the seams are seen along a strip of 25 miles (40 kms.) long, about half of which lie in the Sibsagar district. A thickness of more than 13 metres of coal in 6 seams is exposed in the Dilli river. The coal bearing rocks dip to the east with high inclination, (30° to 80°). On the Sibsagar side, that is, to the west of the Dilli River, the colliery has an area of four square mile (10.24 sq.kms.). Compared to the coal of Makum field, the Dilli coal has as shown by investigation carried out at the Regional Coal Survey Station at Jorhat, low calorific value and high oxygen on unit coal basis. The coal so investigated appears to have been oxidised *in situ*, and it is likely that they may improve in quality at depth. Like all Tertiary coals of Assam, the Dilli coals are friable and produce high proportion of fines.

Najira coalfield :-The Nazira coalfield about 25 kms.in length lies about 6.4 kms.south of Naginimara station up the Dikhou river. Except for a small outcrop of coal measure within 8 kms.of the Saffrai railway station,the coalfield lies in the Naga Hills. Since the coal is worked from the Sibsagar district,the Nazira coalfield may be conveniently described here.

The thickest coal measures are exposed in the Saffrai river where there are 5 workable seams totaling about 22 metres in thickness. The reserves of coal estimated in limited areas of the coalfield,appear to be about 40 million tonnes.

Data available from sources other than the Regional Coal Survey Station indicated that the coals are good quality. They have about 5 per cent moisture,1 to 4 per cent ash and 2 to 3 per cent sulphur.

Jhanji and Disai Coal deposits :- The coal bearing on the Jhanji river is quite narrow. While the Disai lies just on the State border,the other area stretches further in the Naga Hills. The seams are few,thin and highly inclined.

Besides these coalfields,there are also two collieries namely Koilajan colliery and Sibheta located in Karbi Anglong district. The Koilajan colliery is near Hills and has been in operation since 1949. The area of working operation is about 700 acres.

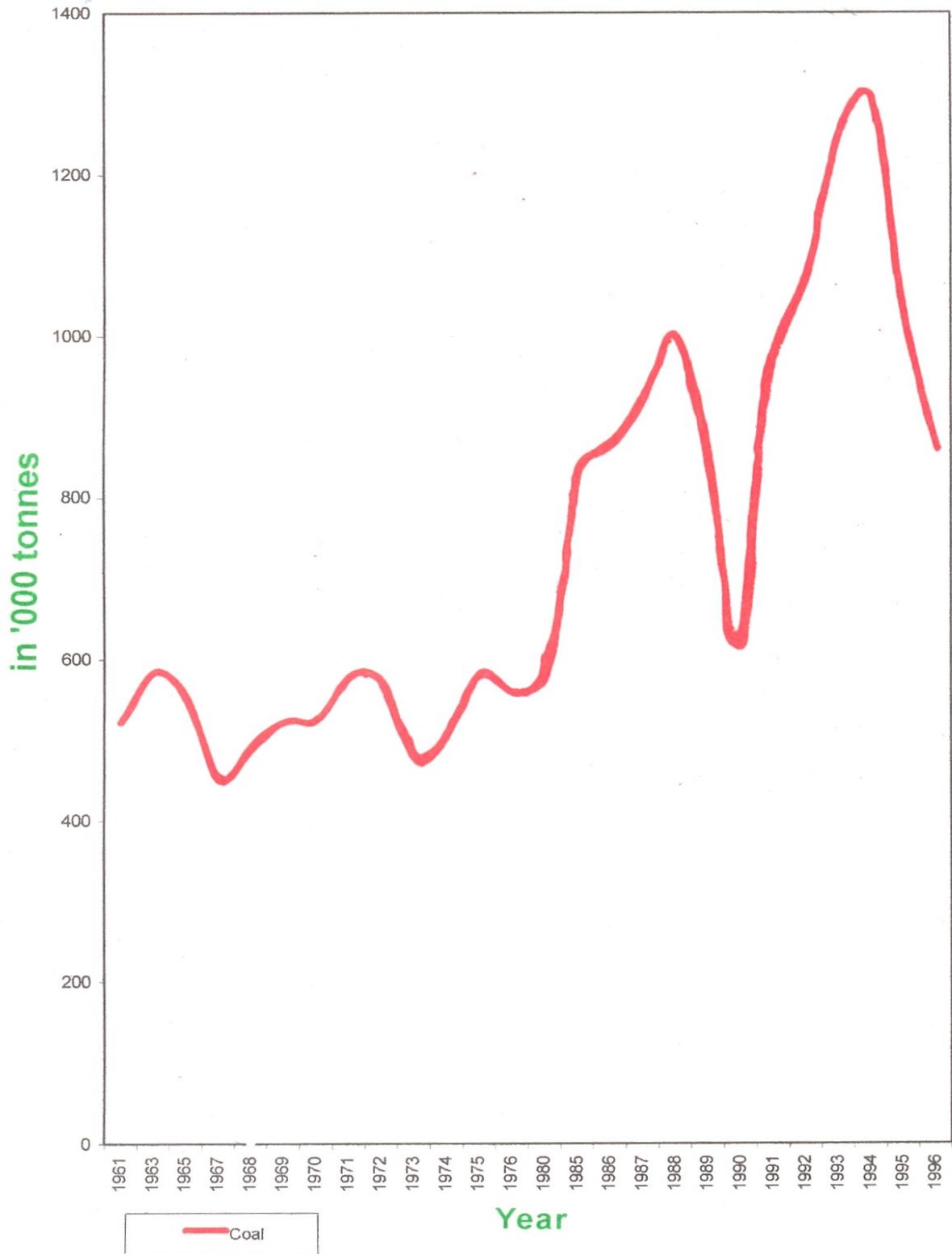
The output of coal from this colliery is gradually on the decline. High mining cost,transportion difficulty and poor quality of coal render its coal less attractive as compared to coal from Ledo and Margherita coalfields.

The Silbheta colliery is situated at a distance of 42 kms. From Diphu on the Diphu-Nagaon Road. Its base area is 2.59 sq.kms. The mining operation in this colliery commenced on 6th February,1963. The thickness of coal seam in this colliery is very low. This coal mine is operated through manual labour. In peak period of working,it provides employment to 300 labourers.

Assam products about 1.3% of the total Indian output of coal. Because of higher labour cost and greater difficulties of transport the cost of coal in Assam is higher in comparison to that of other coal producing centres in India.

The higher sulphur content (about 3 to 5 per cent in contrast to about 2 per cent in Jharia and Raniganj fields),in the coke produced from Assam coal makes it unsuitable for metallurgical purposes except for smelting sulphuric ores,e.g.,lead copper or zinc. It is also not suitable for boilers. But this coal has the unique advantage of lesser ash content (about 2 to 5 per cent as compared to 15 to 20 per cent in Jharia)and higher calorific value. If a process could be evolved to disulphurise it cheaply,then its demand will naturally show a sharp rise as it will then be ideally suitable for metallurgical purpose and will also produce much needed sulphur as a by-product.

Production of Coal in Assam



The overall production of coal in Assam was 524,000 tonnes in 1961. The coal production was increased to 578,000 tonnes in 1971. There was noticeable increase of coal production during the year 1994 when it reached the peak of 1292 thousand tonnes.

The following table shows the production of coal from 1961 to 1969.²³

Year		Production (in '000 tonnes)
1961	.....	524
1963	.....	584
1965	.....	550
1967	.....	447
1968	.....	492
1969	.....	521
1970	.....	522
1971	.....	578
1972	.....	571
1973	.....	471
1974	.....	507
1975	.....	582
1976	.....	558
1980	.....	575
1985	.....	835
1986	.....	864
1987	.....	922
1988	.....	1000
1989 (P)	.....	840
1990	.....	612
1991	.....	982
1992	.....	1069
1993	.....	1249
1994	.....	1292

23. (i) *Economic Survey*; Directorate of Economics and Statistics, Govt. of Assam, 1970, p68.
(ii) Ibid, 1977-78, p.36.
(iii) Ibid, 1989-90, p.48.
(iv) *Statistical Hand Book*, Directorate of Economics and Statistics, Govt. of Assam, p.127.
(v) Ibid, 1995, p.135.

(d)Limestone and Cement : Limestone occurrence in Assam are confined to North Cachar Hills and Karbi Anglong districts. The Sylhet limestones continue into the North Cachar Hills across the Kharkor and Kopili rivers. They are found to cover an extensive area near Garampani to The north-east of the confluence of the two rivers. In Karbi Anglong, the principal occurrences are Silbhetta-Meyong Disa, Chopung Hills, Jarapagaon, Koilajan Bar Harihajan and Doigrung. Of these the first two are rather high in iron even though the reserves are large; reserves in Silbhetta-Meyong Disa are 38 million tonnes, in Chopung Hills 17 million tonnes and in Jarapagaon 6.5 million tonnes. The total reserves between Koilajan and Kidimithapa are of the order of 81 million tonnes of which 43 million tonnes are reckoned as being high in silica. The State Directorate of Geology and Mining has proved that 3 million tonnes of these limestones are of cement grade. Average composition of the samples analysed gave, CaO 47.20 per cent and MgO 1.30 per cent. Silica varies between 8 and 12 per cent and alumina and ferric oxide 1 and 3 per cent and 2 and 4 per cent respectively. In Bar Harihajan of Karbi Anglong district, about 4.5 million tonnes are likely to be available at Saini Langso, Chota Harihajan and Disai Nala analysing.

Locality	CaO (per cent)	MgO (per cent)	R2O0 (per cent)	Insoluble (per cent)
Saini Langso	44 to 49	0.7 to 1.6	3.28 to 8.29	4 to 8
Chota Harihajan	38.84	0.81	5.25	....
Disai Nala	42.43	....	11.0	6.70

Exposures of limestones are known along the Doigrung river 19 kms. south of Golaghat but the quantity of reserves have not been estimated. One available analysis estimates CaCO_3 72-90 per cent, MgCO_3 7.33 per cent, $\text{MgO} + \text{Al}_2\text{O}_3 + \text{Fe}_2\text{O}_3$ 9.0 per cent and Insolubles 10.70 per cent.

Cement Manufacture constitutes the most important use of limestone. Next in order of importance is its use as a fluxing agent in the metallurgical industry. Other uses, apart from lime for building mortar, are in the manufacture of various chemicals, glass, refining of sugar, oil and as a filler.

The following table shows the production trend of Limestone in Assam as of late.²⁴

24. *Statistical Hand Book* : Assam 1995; Directorate of Economics and Statistics, Govt. of Assam, p. 135.

PRODUCTION OF LIMESTONE IN ASSAM

Year	Limestone quantity (‘000 M.T.)
1991	268
1992	243
1993	284
1994	338

Bokajan Cement Factory : Cement being an important construction material is required for development of every sector of the economy. In the eastern region, there is heavy shortage of cement and its transportation from surplus areas of other parts of the country involves long haulage and heavy railway freights even though there is no shortage of limestone in the State of Assam. So on the request on the State Government, the Government of India agreed to set up a cement factory in the Central sector and accordingly the Cement Corporation of India was entrusted with the task of implementing the project at Bokajan in the Karbi Anglong district with an estimated cost of Rs.14.5 crores. The factory was set up around 1971 and it was completed by the end of the year 1976. The factory has already gone into production and its production capacity is 600 tonnes of Portland cement per day. The factory has provided employment to about 600 persons.

The following table shows production of cement in Assam during the period 1985-1989.

Year	Cement
1985	169
1986	167
1987	160
1988	152
1989 (P)	166

Source : *Economic Survey*, Directorate of Economics and Statistics,
Govt. of Assam, 1989-90.

(2) Large and Small Scale Industries :**(i) Large Scale Industries :****Tea Industries :**

The history of the tea industry in Assam dates back to the year 1826,

when indigenous tea plants growing in the plains of Assam came to the notice of the East India Company. The cultivation of this plant in the State was first introduced in the thirties by the East India Company's Administration. A tea garden was started by the Government in 1833 in erstwhile Lakhimpur district. With the arrival in London of the fine quality tea from this garden in 1838, the commercial circle of the city took a keen interest in tea plantations in Assam and a company known as the Assam Company was formed in 1839 to take over the experimental holdings of the East India Company's Administration over the tea gardens established in Assam till then. This was the first company in India to undertake the commercial production of tea and was, in fact, the direct successor of the East India Company. A site was cleared from the jungle at Nazira which became and remained as the headquarters of this company until it was shifted to Calcutta in 1865. The official incorporation of this Company was effected in 1845. This company, however, did not attain much prosperity during the first ten years of its existence. By about 1852, under the management of George Williamson, one of the great pioneers in tea garden management, its condition began to improve and its success made the prospect of the industry so promising and attractive that speculators eagerly rushed to it. In 1859, the second important tea company, the Jorhat Tea Company was formed. To encourage tea plantation in the province, the Government also made liberal provisions for the settlement of the waste land for tea cultivation. In the early sixties, many provisions of the former Waste Land Settlement Rules were waived. Between 1860 and 1865, the industry was the object of wild speculation. Then came the collapse in 1866, when all tea properties depreciated and all the bubble concerns burst. So severe was the situation that a Government Commission of Enquiry had to be appointed. It reported that the industry was basically sound, and by 1870-71 public confidence was restored and development continued on sounder basis. In 1879, further slump occurred following the boom in prices due to a false rumour of shortage of exports from China. Though condition improved after three years, another slump occurred for a period between 1893 and 1906 because of over-production. The industry did not recapture its expansion mood again in the present century. On the other hand, great improvements have been made in the yield per acre under tea, in the grouping of gardens under a limited number of companies, in the progressive mechanisation and rationalisation of production and in increasing their efficiency in regard to the productivity of labour.

In 1911, the Toklai Research Station was established near Jorhat with a view to carrying on research on cultivation and manufacture of tea. This Research Station has been very useful in disseminating knowledge for the increase of yield

for the industry on sounder basis. The tea industry faced another crisis during the First World War due mainly to the release of tea stocks built up during the was years by the British Government, and the consequent fall in prices. At the suggestion of the Indian Tea Association, the tea gardens in Assam stopped plucking on 15 November, 1923 to decrease the output in order to improve the price structure. Up to 1927 an era of prosperity followed, during which modernisation of factories and production techniques made rapid strides. The industry again faced an acute crisis during the early thirties. This crisis was successfully averted by enacting the Indian Tea Control Act, 1933, and instituting an International Tea Committee and Indian Tea Licensing Committee. During the World war II, the industry again passed through a boom period and after 1951 it reached an unprecedented prosperity. Then followed a severe crisis in 1952 when prices of tea crashed to an extent often below the cost of production. Among the manifold causes suggested as being responsible for the recession in tea prices, the most potent ones seemed to be over production in competing countries, a glut in medium and indifferent grades of tea which could not attract a ready market owing to the cessation of the bulk purchase system in the United Kingdom, and the impact of the general downward trend in the commodity prices during the post-Korean slump of late 1951 and early 1952. Conditions improved considerably in the following year and since then the tea industry has been enjoying a satisfactory position, although it faced some difficulty due to severe drought in 1960.

The Opening of Tea Auction Centre at Guwahati on 25th Sept. 1970, augurs a new era for the tea industry of Assam. Marketing of tea has always been a problem for the products of this region. Previously the Tea Auction Centre at Calcutta was the only centre of sale for Assam Tea. The imposition of West Bengal Entry Tax on Assam Tea, transport bottlenecks and many more difficulties involved in arranging the sale at Calcutta Auction centre, necessitated the opening of the Tea Auction Centre in Assam which produces the bulk of it.

Both in acreage and output the tea industry in Assam expanded very rapidly upto the 1920's. But the increase of acreage slowed down considerably thereafter, though output continued to increase rapidly owing to a high yield per acre. The Toklai Experimental Station has been helping the tea estates to increase their yields by improved techniques and cultivation and by control of diseases and pests affecting the plants. The coarser plucking, since the Second World war, has also contributed greatly to the higher yield per acre.

Only about one quarter of the total area of the tea estates is actually

planted with tea. Even admitting that some portion of the garden land had been utilised or reserved for other purposes, eg., for factories, quarters for employees, future expansion, forests etc., and that some portion is unsuitable for plantation or other cultivation, large tracts or waste land are still available in the tea estates. Some portion of this waste land might be devoted to cultivation of other crops like paddy, wheat, cotton, hemp and medicinal herbs.

From the very beginning of tea plantation in Assam, the planters have faced great difficulties in securing the necessary labour force. The experiment with immigrant Chinese labour in the early days proved a complete failure due to the high cost of requirement and maintenance and to the difficulties in their management. Local labourers were not available in sufficient number. There was also the risk of their desertion. It thus became necessary to bring labourers from other parts of India in large number to cope up with the expansion of the tea plantations in Assam. As a result of continuous inflow of immigrant labourers, there are now large number of tea garden labourers in the tea producing regions of the State. Some of the labourers have settled down in the farm lands near the tea gardens. After the expiry of the term of their contract, many of them have taken up ordinary cultivation. The tea acreage has not increased proportionately to the increase in the number of tea garden labourers and as a result it has no longer been possible to give employment to all the labour force in the garden areas. There is thus a large surplus of labour in the tea areas of Assam. These labour can be utilised in food-crop, fibre and medicinal plant production.

Among the Indian States, Assam has the largest acreage under tea, producing the highest quantity and employing the highest number of labourers.

Following tables give various data on tea industry of the State.²⁵

25. (i) *Tea Statistics*, 1974-75.

(ii) *Statistical Abstract, Assam*, Directorate of Economics and Statistics, Govt, Govt. of Assam, 1978, p.154.

(iii) *Statistical Hand Book, Assam*. 1978, p.154.

(iv) *Ibid*, 1988, p.131.

(v) *Ibid*, 1995, p. 129.

AREA AND PRODUCTION OF TEA IN ASSAM

Year	No.of tea estates	Area in hectares	Total Production in thousand kg.	Average yield per hectare in kg.	Daily average no.of labour employed.
1951	785	155,674	150,370	....	....
1961	744	162,367	182,311	....	....
1968	758	176,812	202,614	1,146	388,842
1969	758	179,417	204,738	1,141	386,351
1970	751	180,065	212,027	1,178	394,410
1971	750	182,325	223,665	1,127	397,370
1972	751	184,244	139,206	1,298	396,316
1973	751	185,113	251,825	1,360	398,725
1974	754	187,408	265,281	1,416	401,169
1975	756	188,794	263,055	1,393	402,000
1976(P)	N.A.	189,338	276,308	1,459	.....
1980	777	2,00,569	300,700	1,499	448,949
1984	808	2,14,741	338,533	1,576	474,851
1988	848	2,27,517	369,428	1,624	527,848
1989	848	2,29,428	379,855	1,656	544,291
1990	848	2,30,363	388,181	1,685	541,661
1991	848	2,33,284	396,605	1,700	554,536

As can be seen from the above table, the number of tea gardens, total production and area in hectares have shown an upward trend since 1961. In fact, the tea industry of Assam has contributed greatly to the foreign exchange earnings of India, apart from being the major supplier of tea in the domestic market of the country.

Total number of Labear on roll as on 31st December of each year in Assam.

No. of Bonafide dependents of resident workers on roll as on 31st December of the year.															
Resident					Outside										
					Permanent					Temporary					
1988	1989	1990	1991 (P)	1988	1989	1990	1991 (P)	1988	1989	1990	1991 (P)	1988	1989	1990	1991
383,808	387,015	388,542	441,300	37,884	38,414	38,823	46,378	80,593	81,421	86,227	97,366	617,965	622,094	634,318	542,499

Note :- P= Provisional

Source : Statistical Hand Book, Assam, 1995, p. 131.

Tea being a commodity which is subject to direct taxation by way of excise duty, export duty and cess under Tea Act, the industry makes substantial direct contribution to Central Income Tax, Super Tax (Corporation Tax) and Agricultural Income Tax. The Agricultural Income Tax along with Sales Tax levied upon the tea industry inflates the income of the State Government to a very great extent.

Tea is the mainstay of the plywood industry and a big buyer of fertilizers. It is also a very important rate payer which pays heavy freight charges of the transport organisations. The industry has also played a very valuable part in opening up and developing areas which were previously inaccessible jungles and forests. The areas retrieved and developed into flourishing tea gardens were not areas where food grains could ordinarily be grown and as such there is no problem of competition between this crop and any other food crop. The importance of the industry in the social structure is also noteworthy due to its both direct and indirect employment giving labour intensive aspects. Agricultural in nature, the tea industry needs the application of modern scientific way of cultivation. A single unit of the tea estate has to accomplish all the process right from seedling to final packing of the manufactured tea.

The Guwahati Tea Auction Centre has successfully completed 25 years of its existence. It is remarkable that in respect of CTC (Crush Tear and Curl) tea, the GTAC has earned the distinction of being the world's largest tea auction centre. When all types of tea are considered, the GTAC is the world's second largest tea auction centre, the first being Colombo. However, only 38 per cent of total tea produced in Assam is routed through the GTAC.

Assam has 848 tea estates both high and small, and most of them are in Sibsagar district. Tea cultivation covers an area of 2.34 lakh hectares in Assam. With an annual production of about 396 million kilogram of tea, the tea industry employ 11 lakh workers. The Government of Assam collects the highest amount of Agricultural income tax from the tea industry. The Government collects Rs.12 crores as sales tax the GTAC annually.

Paper Industry : Assam having the richest bamboo resources of the country offered good scope for development of paper industry in the State. So at first, the State Government issued licences to private companies to set up paper mills in Assam. But due to various reasons, they did not come forward and the licences remained unutilised. The State Government had, therefore, to review the position and decided to associate with the Bihar Government in revitalising the almost liquidated Ashok Paper Mills Ltd. owned by Maharaja of Darbhanga and set up the same at Jogighopa in Assam.

The foundation stone of the Jogighopa unit was laid by the Prime Minister of India in October, 1970 with loans received from IFCI, ICICI and LIC. With some of the machinery brought from the Darbhanga unit of the company together with some new machinery, the Jogighopa unit was set up and production was started. The total cost of this paper mill was Rs. 31 crores. It has a capacity of producing 100 tonnes of pulp and 90 tonnes of paper per day. At present, the production of this mill has been stopped as it becomes sick.

In order to ensure steady supply of bamboo the company has taken up a programme of man-made bamboo forests in the hilly areas of the State particularly around Jogighopa.

In addition to this mill, the Hindustan Paper Corporation of India (Government of India undertaking) set up two paper mills in Assam each with a capacity of 1,00,000 tonnes of writing and printing paper per annum one at Jagiroad in Marigaon district and the other in Cachar district.

A new project, Industrial Papers (Assam) Ltd. is being completed at Dihing. The number of new units under forest-based industries has increased from 332, to 353. However, the mid-term appraisal of the Eight Five Year (1992-97) plan of Assam shows that there has been a decline in production of paper by 5 per cent in 1993 as compared to the 1992 figure. Efforts are underway to revive the sick and closed Ashok Paper Mill.

Caustic Soda and Chlorine Plant : Important processing chemicals required for paper making are caustic and chloride. These chemicals are also required by other industries of the State. But with the coming of the Ashok Paper Mills Ltd., the question of these chemicals assumed greater importance. As such, essentially to meet the requirement of these chemicals for Ashok Paper Mills a captive unit was set up adjacent to the paper mill site. This unit had a capacity of producing 25 tonnes of caustic soda and little over 22 tonnes of chlorine per day.

The Hindustan Paper Corporation which has set up two paper mills in Assam also set up caustic soda and chlorine plant for each of these two paper mills. Each of these units has capacity for producing 16,500 tonnes of caustic soda, 15,000 tonnes of chlorine and 330 tonnes of Hydrochloric Acid (100%) per annum.

India Carbon Ltd : India Carbon Ltd.'s Petroleum Coke Calcination plant

was set up in collaboration with M/S Great Lakes Carbon Corporation of U.S.A.

Foundation stone of the plant was laid on 4th December,1961. The creation work was completed in a record time of 11 months and the plant went into production by November,1962. With the establishment of this Calcination plant at Guwahati,India Carbon became the pioneer in manufacturing carbon in India by producing petroleum coke,the purest electrocarbon.

Petroleum coke,a by-product of oil refining is the primary material used by the light metal producers. It is the primary ingredient in the manufacture of anodes,cathodes and thermic electrodes as well as other carbon and graphite products.

Calcined petroleum coke is used mainly by manufacturers of aluminium,titanium, magnesium, steel and ferro alloys,producers of calcium carbide and silicon carbide and other manufacturers of carbon and graphite products.

There are only three refineries in India Producing raw petroleum coke,which is the vital raw material for calcined petroleum coke. They are (a)Indian Oil Corporation Ltd.,Guwahati, (b)Indian Oil Corporation Ltd.,Barauni and (c)Assam Oil Co.Ltd.,Digboi.

Before setting up of this plant,this material was being imported from abroad mainly U.S.A.,and by producing this material at Guwahati,the foreign exchange that was being spent on import of calcined petroleum coke is now saved.

Assam Carbon Limited :In 1962,three entrepreneurs got together to set up the second carbon factory at Guwahati to produce metallic and hard carbon grades of carbon blocks and electrical carbon brushes mainly for automobiles,D.C.motors and sliprings. The company after collecting complicated details about the industry,finalised the project and the unit came into being in the year 1963. The unit had,however,to pass through several initial difficulties. But in the year 1966,the unit could produce some grades of M.G. Carbon Blocks which could well be compared with those produced in an industrially advanced country. By 1967,the company was producing almost the full range of metallic carbon blocks,some grades of silver graphite carbon blocks and almost all varieties,types and qualities of carbon brushes. The company was converted into a Public Limited Company in 1963. The second unit to manufacture electrographitised and resin bonded carbon blocks,was set up in collaboration with Morganite Carbon limited of U.K. In 1974. The company has covered the entire range of carbon blocks and carbon brushes for all applications.

Assam Petro-Chemicals Ltd :In order to utilise natural gas of Assam's oil fields in manufacture of methanol,formalin,U.F.adhesive and U.F.moulding powder,etc., the Assam Industrial Development Corporation drew up a scheme for petrochemical industry in Assam and obtained an industrial licence from the Government of India in February,1971. The foundation stone of this concern was laid at Namrup on the 15th June,1971. The project was sanctioned for an installed capacity of 7,000 metric tonnes of methanol,12,000 metric tonnes of formalin,13,500 metric tonnes of U.F.adhesive and 1,000 metric tonnes of U.F.moulding powder per annum. The total investment estimated for the project was Rs.1200 lakhs. The project has already started production and provided employment to nearly 350 persons with a potential for further employment of 700 persons.

The project was implemented in collaboration with a Japanese consortium. M/s Japan Gas-Chemical Company Inc.,Tokyo,Japan,provided technical assistance and supervision during erection and commissioning and project engineering. The detailed engineering of imported machinery,inspection,procurement of machinery and materials from Japan was accomplished through two other Japanese firms. The plants were designed on the basis of the processes of M/s Japan Gas-Chemical Company,Inc.,Tokyo,M/s Industrial Consulting Bureau Pt.Ltd.,Bombay,was entrusted with the task of working out detailed design and engineering of the indigenous equipments including supervision during erection and commissioning of the plants.

As indicate above ,the unit produces important raw materials like U.F.adhesive for the plywood industry in the State and with the U.F.moulding powder,a number of subsidiary industries will come up in the State.

Fertichem Ltd : In order to meet the requirement of mixed fertilizer in the State,the Assam Industrial Development Corporation set up a unit for production of NPX mixed granulated fertilizer at Narangi with produc-tion capacity of 200 metric tonnes per day. The unit was commissioned in September,1974 and had been set up with an investment of Rs.72.00 lakhs. It provides employment to about 100 people.

Safety Matches and Splints : The first attempt at manufacture of safety matches in the small scale industry in the State was made in 1912 at Sibsagar in the name and style of Rampur Match Factory. But the unit was closed down soon after its birth. The second and biggest attempt was the Brahmaputra Match Factory at Jorhat,which was also closed down almost at its very start. The reason for the failure was perhaps the high cost of production and non-availability of abundant suitable timber near about.

But in 1924,abundance of *simul* timber in Goalpara,Kamrup and Nagaon and imposition of import duty on safety matches by the Government of India,prompted a Swedish Company to form the Assam Match company and set up a match factory at Dhubri. By the end of the second phase this factory was

able to produce about 42,000 cases of matches. As a result of expansion carried out by this factory during the late sixties it is now able to produce more than 95,000 cases a year. It provides employment to nearly 150 persons. The Assam Match Company has since been taken over by the Western India Match Company Ltd.

There is also a small match factory at Karimganj with a capacity of 80,000 gross match boxes per annum. It provides employment to about 50 persons.

In addition to this, a small match splint factory was set up by the Industries Department at Bijni in the year 1963. The unit had to face several difficulties during the initial years. It was later taken over by the A.I.D.C. To run the same in a commercial manner. This unit has been able to overcome the initial difficulties and is now running smoothly. The capacity of the unit is 80 million splints per day. The product of this unit is now being taken by the Western India Match Company of Dhubri and is also being sent to Tamilnadu, Orissa and Tripura. The unit provides employment to about 40 persons.

Associated Industries (Assam) Ltd.:

(Chemical Unit and the Spinning Units):

This company in the private sector was set-up at Chandrapur near Guwahati for manufacture of 300 tonnes of super phosphate and 1500 tonnes of sulphuric acid per month in its chemical unit and for spinning of cotton yarn with 12,500 spindles in its spinning units. But due to various shortcomings of the management both the units were closed down in the year 1972-73 and a large number of employees faced retrenchment. The State Government in a bid to revive the unit negotiated with the Government of India and as a result the National Textile Corporation of India (a Government of India undertaking) took over the management of this spinning unit and called back the employees and started production. The National Textile Corporation has now taken up programme for expansion of the spindle capacity to 25,000 spindles and accordingly a licence had been obtained in January, 1974. The chemical unit was, however, taken over by the Assam Industrial Development Corporation in the middle of 1974. The A.I.D.C. thereafter carried out extensive renovation and overhauling of the plant and recommissioned the unit in the year 1975.

Spinning Unit : Besides the spinning unit of the Associated Industries (Assam) Ltd., there is a spinning mill at Chariduar in the Darrang district. This spinning mill came up in the early sixties with a capacity of 12,500 spindles. This mill has also carried an expansion programme with addition of 12,500 spindles. This mill now provides employment to more than 1000 people.

Sugar Industry : To utilise the sugarcane grown in the State, the first sugar mill of the State in the co-operative sector was set up during the Second Plan period. The Assam Co-operative Sugar Mill Society was registered on 26th March, 1955 and the Assam Co-operative mill was established at Dergaon,

16 miles (25.6 kms.) east of Jorhat near the Assam Trunk Road. The manufacturing license to start the sugar mill under the Industrial Development and Regulation Act was obtained on 1.8.56. The machinery of the mill were produced from Czechoslovakia through Messrs Skoda (India) Private Ltd., Calcutta.

The foundation stone was laid by the Chief Minister of Assam on 24-5-57 and the erection started on 10.9.57, under the supervision of Czech technician and it was completed in March, 1958. The factory went into full production in 1960-61.

The mill provides direct employment to large number of technicians, educated youngmen and unskilled labour and a vast population is connected with supply of raw materials and other ancillary activities resulting in the improvement of their economic condition. The total strength of employees is 650 which is much less than what is being employed by older mills of similar capacity owing to the most modern machineries installed. The crushing capacity of the mill is 800 to 1,000 tons per day.

The second sugar mill in the State was set up in Cachar district, with a crushing capacity of 1250 metric tonnes per day. The Capital investment for the project was estimated at RS.540.00 lakhs and the project had an employment opportunity for about 600 persons. For this project 15,000 acres mostly of tea garden surplus land are being utilised for cultivation of sugarcane.

Assam Spun Silk Mills Ltd. :- This is the largest public sector undertaking in Marigaon district and was started with a capital outlay of Rs.85 lakhs, the subscribed and paid-up capital being Rs.80,37,700. The construction works started on 31st March, 1960 with a loan of Rs. 10 lakhs as its working capital which has been subsequently converted to Government's share contribution during 1968-69. The construction was completed in November, 1961, and the mill went into production of 18 December, 1961 with the installed capacity of 3,000 spindles for spun silk yarn and 420 spindles for Noli yarn. The mill was expected, while working in two shifts, to produce 34,020 kgs. of Spun silk yarn and 22,680 kgs. of Noil yarn annually. The spun mill project was set up to find out new markets for *eri* and *muga* fabrics by producing standardised yarn and to ensure reasonable price to the cocoon reares in the State. The Mill was an essential aspect of welfare ancillary to *eri* culture, which is the main cottage industry of Assam.

Jute Mill : Assam produces about 10 lakh bales of jute per year which justify setting up as many as 6 to 8 mills in the State. However, only a modest beginning could be made during the earlier Plans for setting up of a small jute mill in the co-operative sector at Silghat in Nagaon district with 150 looms and with a provision for expansion up to 300 looms. The Silghat Jute Mill happens to be the first co-operative jute mill in the country. Jute being a foreign exchange earner and the most important commercial agricultural produce in the State, the setting up of a number of jute mills in the State could have made substantial contribution towards the development of the State, but due to various difficulties nothing tangible could be done even up to the end of the Third Plan to set up any more jute mill

in the State. The State Government from the beginning of this decade took up the matter very seriously and in 1974 obtained two more licences for setting up of jute mills in the State, one with a capacity of 12,500 tonnes and the other with a capacity of 12,660 tonnes of sacks and hessians per annum. Suitable site have been selected for these jute mills one at Dalgaon near Mangaldoi in Darrang district and the other at Guagacha near Barpeta. The Guagacha units is being organised under the co-operative sector and the Dalgaon unit in the State sector through Assam Industrial Development Corporation. Besides these jute mills, a jute twine factory has been recently established at Nagaon in addition to the one already existing at Guwahati, viz., Brahmaputra Jute Manufacturing Company.

Profiles of Assam Spun Silk Mills Ltd. And Assam Co-operative Jute Mills Ltd.

Ad- minis- trative De- part- ment	State level Public Enter- prise	Infor- mation fur- nished for the year	Paid up Capi- tal	Gov- ern-ment Invest- ment	Total Capital Invest- ment	Turno- ver	Profit/ Loss of the year	Accu- mulated Loss	Net Worth Position (Nega- tive)	Em- ploy- ment (Nos.)
1	2	3	4	5	6	7	8	9	10	11
Indu- stries Depa- rtment Ltd.	Assam Spun Silk Mills	1992-93	170	325	325	240	84	469	294	422
Co-op erative Departm ent	Assam Co-op. Jute- Mills Ltd.	1992-93	317	318	318	536	1.36	181	138	857

Source : *Statistical Hand Book, Assam, Directorate of Economics and Statistics, Govt. of Assam, 1994, p. 138-40.*

It appears that the Assam Spun Silk Mills Ltd. is a sick industry and needs urgent revamping of management, marketing and personnel. Comparatively, the Jute Mills at least made a profit of Rs. 1.36 lakhs for the year 1992-93, although this industry too had an accumulated loss of Rs. 181 lakhs.

Asbestos Cement : A company in the private sector has set up a factory near Guwahati to manufacture cement sheets and cement pipes. This factory has a production capacity of 34,000 asbestos cement sheets and 4,000 asbestos cement pipes per annum.

Industrial Gases : To meet the requirement of the steel fabrication industry in the State M/S Industrial Gases Ltd. (annual production capacity : oxygen-

2,40,000 cubic metres and dissolved acetylene 1700 cubic metres)and M/S Indian Oxyzen Ltd. (annual production capacity : Oxyzen 1,90,000 cubic metres and dis-solved acetylene 50,000 cubic metres)set up their respective units at Guwahati for production and supply of industrial and supply of industrial gases. The third unit for production and supply of industrial gases (annual capacity :oxyzen – 0.324 million cubic metres and dissolved acetylene 0.18 million cubic metres)has been set up at Bongaigaon.

India Gas Company :For proper and gainful utilisation of the waste refinery gas of the Guwahati Refinery as cheap domestic fuel gas,a scheme was sponsored as early as in 1961 by some local entrepreneurs for manufacture of L.P.G. After prolonged persuasion,the Government of India agreed to set up a gas company in public sector. So,in 1963,the India Gas Company was formed. It was duly approved and recommended by the State Government to the distributors of L.P.G.Gas to be made available from the public sector Guwahati Refinery. The Indian Oil Corporation Ltd.in pursuance of the State Government's recommendation,has already appointed the India Gas Company as their distributors for L.P.Gas in Assam. The Company has also set up a manufacturing unit of different sizes and types of gas cookers to serve the gas users in Assam at a low cost.

Biswanath Brass Rolling Works,Guwahati : This large scale industry is now running in the private sector. It was started in 1954,with the co-operation and assistance of the Government of Assam. It manufacturers mainly sheets of brass,bell metal and copper. It is started that this industry was established at a time when the supply of brass sheets of Assam from outside had declined and consequently the artisans manufacturing utensils had to suffer a great deal. The installed capacity of this rolling mill is 1500 tonnes per year. This factory has been helping the brass and bell metal industries in Assam,and about 10,000 such artisans all over the State have been depending upon the manufacturing products of this industry.

Siotia Metal Industries,Guwahati :This private factory was established in 1962. The factory has got a fixed capital of Rs.1,50,000/- and a working capital of rs.5,00,000/-. It manufacturers brass sheets,brass circles,bell metal sheets blocks,gun metal items,alloys and castings,etc. The factory has engaged more than 20,000 local artisans in the manufacture of brass and bell metal industries through-out the State.

Steel Worth Private Limited : Steel Worth Private Limited is a major industry in Assam. Its head office is located at Tinsukia and brunch offices are there at Guwahati and Tezpur. In respect of raw-materials,it mainly deals with mild steels,heavy and light structural sections,sheets and plates,doors,windows and standard sections. Its main productions are jeep trailers,G.I.sheets,water tanks,hospital beds and bed side lockers,wheel burrows,M.G.and B.G.clamps,low desk steel frames,overhead tanks and storage tanks,river gates (sluice gates),control power for aviation,electric towers,all types of steel doors and windows,manufacture of agricultural implements like M.B.plough,brackets,etc. This enterprise is also recognised and registered by Defence Department,Railways,State

Government, Nagaland ,C.P.W.D., Indian oil Corporation , P.H.E., P.W.D. and other parties.

The Assam Tanneries Limited, Guwahati : The Assam Tanneries Ltd. Was established in 1940 by a handful of local industrial people for manufacture of leather and leather goods. In 1961, the Government of Assam having recognised the importance of the only leather manufacturing industry of the State, came forward to pull up the industry from its decaying condition by contributing 51% of its subscribed share capital. This marked the beginning of a fresh chapter in the life of the company to revive its business with a nucleus working capital of 51,30,281/- ,Further, with the assistance of the Directorate of Industries, Assam and the Small Industries Service Institute, Guwahati, After the third year of its revival ,the Company disclosed a net profit of Rs.3193.50 as on 31st December,1963; over a total business of Rs.1,25,583.73 during the year 1963. Subsequently, it had to close down due to want of a suitable site of working and non-supply of chemicals.

The Assam Railway and Trading Company at Margherita : It is one of the pioneer institutions that fostered the industrial development of Assam. The Company has three major establishments at Margherita, namely coal fields, timber works and brick fields. The Colliery department of the Company is functioning since 1884 and its organisational monolith is headed by the Chief mining manager with a Colliery Superintendent below him. The Average annual output of coal form the Company's collieries is of the order of 330888 tonnes.

The Timber Department of the Company is administered by the Timber Superintendent with the help of a Mill Manager. For the development of plywood industry the Company opened its own factory at Margherita in 1924 . The Ledo Brick Plant which is one of the two machine operated brick fields of the undivided Lakhimpur district is owned by this Company .

After the formation of the Company in 1881, the work of construction of the Dibrugarh Steamerghat Railway was undertaken by them . The first railway line form Dibrugarh Steamerghat to Jaipur Road , was opened in 1882. The coal fields were connected by Railway lines in 1884.

Railway workshops: The railway workshop at Dibrugarh was established in the year 1881 with an approximate investment of Rupees fifty lakhs. This is considered to be one of the biggest workshops in North East India. Altogether 1857 persons were employed there in 1964. Beside overhauling works, repairing of locomotives and coaches are undertaken in the workshop and various components required for the above are manufactured. It also undertakes casting of both ferrous and non-ferrous metal and forging of steel items. The materials required in the workshop are provided by the Controller of Stores N.F.Railway, Pandu.

Railway workshops: The railway workshop at Dibrugarh being over-burdened with the works of carrying out repair of locomotives, carriages, and wagons, a second Railway workshop was established at New Bongaigaon on Bongaigaon district in 1965 covering an area of about 80 hectares. The project at New Bongaigaon consists of 3 amalga-

mated factories and was completed at a cost of about Rs.1052 crores. It has a periodical overhauling capacity of 1,500 units of passenger coaches and 3,000 units of goods wagons per annum . It also undertakes manufacturing work for various Divisions of North-East Frontier Railway. The total number of employees in the workshop is 2,125 including 1,479 Class III and 655 Class IV staff . Over 64% of the staff have been provide with accommodation by the Railway in the colony spread over an area of about 440 hectares and lying about a kilometer from the workshop.

(ii) Small Scale Industries:

Rice Mills: In the urban areas of every district of the state, there are rice mills, some of which are combined rice and oil mills. The Government is encouraging hand-pounding of rice through the Khadi and Village Industries Board. A number of licenses to install rice-hullers have been issued in recent years.

The capital investment in the rice mills ranges from Rs. 50,000 to Rs. 2,50,000. Average number of labour per day employed in each mill varies from 30 to 50 through a lesser number is also found in very small establishments. The raw materials required for the industry is paddy which is locally procured and its main product is rice which finds its way into the local markets. Paddy procurement is the monopoly of the State Government and the millers are allotted paddy from time to time for milling on commission basis.

Flour Mills: There are small units of flour mills in the State with an annual capacity ranging from 35 metric tones to 45 metric tones and in average employing 3 to 5 persons. Wheat is allotted by the State Government and the product which mainly comprises flour is sold locally.

During the last part of the Second Five Year Plan, a roller flour mill involving a capital investment of Rupees nine lakhs was established at Tezpur. It provides employment to 50 persons both as full time and part-time workers. The Assam Valley Flour Mill which is also a Roller Flour Mill was opened on 7.8.59 just near the Rangghar Charali, about a mile (1.6 km) from Sibsagar town with a total capital of Rs. 7,82,156.13 Detailed account of this flour mill is given in the Sibsagar District Gazetteer.

Saw Mills: The saw mills are playing an important role in exploitation of the forest wealth of the state. The timber requirement of the Defence Department during the Second World provided great impetus to the industry. The progress of the industry was accelerated by many other factors during the postwar period and now it occupies the place of an important industry. There are more than 500 saw mills Assam at present. The capital investment of these

saw mills varies from rupees ten thousand to rupees two lakhs. Diesel, steam sets are used for running these saw mills. Saw timbers are mostly sent outside the State particularly to places like Calcutta, Rourkela, Delhi, Rajasthan, etc. A larger number of sleepers are also supplied to the Railway

Ginning Mills :- Cotton is widely cultivated in the Karbi Anglong district of Assam and almost whole of it is exported outside the State in unginned form. It has also a good international market if it can be blended with wool very suitably. The Diphu Cotton Ginning Co- Operative Mill was established but it is not working satisfactorily. Besides the Diphu Cotton Ginning Co- operative Mill, there are seven cotton ginning mills in Assam.

Plywood Industries :- The development of tea industry had a catalytic effect on the development of ancillary industries in the State. Tea even from the beginning of its planned cultivation and processing found both internal and foreign markets. Marketing of tea, more so when it is to be exported, and for packing of tea, plywood was found to be the most suitable material.

Like tea, coal, and petroleum, plywood industry was also started originally by the Britishers after the First World War and primarily to meet the requirement of tea industry. The plywood industries originally set up started manufacturing plywood in the form of tea sacks only, and gradually developed tea-chest plywood of 3 plies. With the discovery of various species of tea chest plywood factories in Assam and these units gradually were able to meet the bulk of the requirement of tea-chest plywood for the tea industry of the State.

All plywood factories in Assam, however, continued to manufacture only tea chest plywood almost upto the middle sixties.

Commercial and decorative plywood (including flush doors, block boards, etc.) produced in Assam is now being exported and thus it is earning valuable foreign exchange. Assam is now being exported and thus it is earning valuable foreign exchange. Assam started this industry with two miniature units in the twenties, but there are now as many as 31, many of which are equipped with the most up-to-date plant and machinery and provide direct employment to about 10,000 persons. Besides this industry is also making substantial contribution to the state exchequer by way of various taxes, royalties, etc.

Soap Factories :- About 124 units are engaged in manufacturing washing soap in Assam and almost all of them are concentrated in the urban or semi urban areas of the State. The average annual production of these units varies from 40 metric tonnes to 180 metric tonnes.

Oil Mills: There are more than 200 oil mills in Assam . The majority of them are located in the urban areas of the State , A number of rice mills have oil crushing plants attached to them. The oil mills employ 10 to 40 persons and produce mustard oil, oil cakes, wood oil, etc. There are also more than dozen citronella oil mills in Assam .

Candle works: There are a number of candle works in the State. They obtain materials form the Government and make candle of various sizes.

Automobile Workshops : With the increasing use of motor cars, trucks stage carriages, etc. a large number of automobile repairing workshop have come up in the urban areas of the State . These are mainly repairing and servicing centers. Some of them also undertake the spray painting of automobiles. Some firms of main towns of the State undertake body making of trucks ans buses.

Vulcanising and Tyre retreading : Growing use of automobiles have also led to the development of another category of rapairing workshop known as tyre retreading and vulcanising shops. These are mainly located in the urban areas of the State .

Steel Furniture : The new and multifarious uses of steel largely contributed to the growth and development of steel furniture industry. The demand for steel furniture for offices, hospitals , shops, factories, and homes is increasing rapidly due to its overall advantage in respect of economy , durability, risk of fire and scarcity of good seasoned timber . As a result , a large number of steel furniture factories are coming up.

Brick Making : With the increase in the tempo of constructional activities and urge for higher standard of living , the brick making industry has come to occupy an important place in the economy of the State .The brick fields, scattered mostly in the outskirts of towns are a common sight, though a few can be noticed even in the interior villages. The normal practice in the brick kilns is to make the bricks by manual process with help of the moulds called *forma* and then burn them in the oval pattern multi-chambered kilns.

Trunk and Suitcase Factories: A large number of trunk and suitcase factories manufacture and repair trunks, suitcases, brief cases, kit boxes, water tanks, ridgings, etc.

Shoe making : In addition to several individual shoe makers (Cobblers) in the urban areas of the State, few are engaged in making shoes and rubber chapals.

Fiber Board Industries: To utilise the waste form the local saw mills and plywood factories one licence for establishing a factory at Makum for the manufacture of chip board been issued .The volume of wastage in the saw mills and plywood factories is considerable. IT varies from 40% to 50% . This waste is not put to any use other than as fuel. There are many nondurable species of timbers not

suitable for any of the industries but which can be processed for production of hard board and chip-board. The chip-board industry will depend mainly upon the local mill wastes . Besides this chip-board industry at Makum, one hard board factory has been installed near Guwahati by M/S Hard Board Ltd. The capacity of this plant is 50 tonnes per day. This plant has utilised the tops and branches of felled trees left in the forests and poles of firewood species, The estimated requirement of these raw materials is 30,000 tons annually. The Government of Assam is a participant in the share capital in this forest based industry. The licence of 3,750 tonnes per annum at Guwahati was granted in 1961 under the name and style of Assam Hard Board limited with an authorised capital of Rs.1 crore. The State Government's share participation was an amount of 5 lakhs till January, 1965.

Timber Seasoning Plant : To meet the ever increasing demand for seasoned timber, a timber treatment and seasoning plant has been established in the Public Sector by the Forest Department at Makum, at a cost of more than four lakhs of rupees, Besides this, there are several small scale timber seasoning plants in Assam .

Engineering industries: There are a large number of engineering works concentrated mostly in the urban and semi –urban areas of Assam .These engineering works have sprung up in recent years .They manufacture parts of water pumps ,sugar-cane crushers ,cast wheels,axels,cast wheel rims,wire nails,barbed wire,tea chest fittings,nuts and bolts ,building materials,simple agricultural implements,hume pipes,steel trunks,buckets,drums,cans,jeep trailers,etc. They generally employ three to ten persons. There are also a few aluminium industries in the State which make utensils . Facility of casting of ferrous and nonferrous metals is also provided by several establishments.

Manufacture of tools and implements for tea industry:- Tea is the main industry of Assam and one of the country's leading foreign exchange earners. Its demand for various types of implements, machineries and spare parts is so great that this alone can support a number of ancillary industries. Several firms have already been established to cater to the needs of tea garden factory equipments,storage tanks , trailer,steel containers, drums , trolleys, garden leaf- shifters, pulleys, C.T.C.machines and their components ,rice and oil machines, etc. It may be noted that each tea garden has a factory of its own to process tea leaves.

Weights and Measures:- With the introduction of the Metric system of weights and measures, the demand for these also increased manifold. Some of the firms are manufacturing weights and measures as subsidiary products.

Steel structure :- Tabular structures are mainly required for construction of structural houses like factory godowns, factory sheds, etc. With the growth of industries the demand for these items has increased rapidly. Several

firms are also manufacturing steel structures in Assam.

Wire fencing:- A number of industrial units are engaged in making wire fencing of all types including barbed wire as a part of their other manufacturing activities and a few are exclusively engaged in making barbed wire. The main items of production include oven fencing ,fencing corner and posts, U. bolts, angle cross arms and other wire products. The tea gardens of the State are the leading consumers of wire fencing products.

Metal Industries :- There are several expanded metal industrial units in the State manufacturing reinforcing concrete materials for roads, foundation, dams, reservoirs, etc. Expanded metals are generally used in manufacturing and for making partitions and enclosures. Its popularity can be imagined from its tremendously increasing use in Railway passenger coaches, windows, factory machines and protective coverings, etc. The labour cost is very small in comparison to the value of the products. Besides these expanded metal units, Bagrodia Metal Industries at Guwahati is manufacturing brass wires, silicon gas, welding rods, manganese, bronze, copper coated , aluminium, etc. The normal capacity of production is 1000 kg. per day.

Printing presses :- There are a large number of printing presses and these are mostly in the urban and semi – urban areas of the State. Some of the establishments are run with treadle type of printing machines. There is also arrangement for color and block making in a few of the printing process. Electricity is being used to run the printing machines. Some of the printing presses have off-set printing as well as computer facilities. Some of the printing presses have a binding as well as computer facilities . Some of the printing presses have a binding unit attached to them .

Umbrella Making :- The number of umbrella making units in Assam is very small and all are in the urban areas. The umbrellas are, in fact, assembled from different parts obtained form outside the State. No umbrella parts are manufactured in the State and a very few indigenous people are found engaged in this in industry or in repairing umbrellas. The repairing job is done by the people, mostly Muslims from outside Assam moving from house to house and place to place also in town markets and weekly village markets.

Tailoring :- With the improvement in the standard in the standard of living and with the increased use of tailored garments both in urban and rural areas, the tailoring industry in growing extensively and can be seen almost everywhere throughout the State. The majority of workers in this industry are males.

Of late, however, women in good number have also started tailoring , working mostly within their own houses. The *Mahila Samitis* Community Development Blocked and other non-official Organisations in the State have arrangements for imparting training in tailoring to women and in some cases to men too. The Industries Department of the State runs a few tailoring institutes in Assam . Most of the tailoring shops are engaged in tailoring of shirts, trousers, pyjamas , blouses and frocks with cloth supplied by customers, while some are engaged in making ready-made garments with cloth supplied by dealers.

Manufacture of Bedding requisites :- As in various other places, manufacture of bedding requisites in the State is a monopoly of a section of East Bengal Muslim settlers and of Muslims from Bihar. While some of the units have number of workers of this trade move from house in search of work. The fixed shops keep a stock of ready – made articles and also make mattresses, quilts, pillows, cushions etc., out of materials supplied by the customers themselves.

Manufacture of Cement Concrete Ring and Urinal and Latrine Slabs :- This industry is of recent origin and can be seen in a few places of the State .Some units manufacture the items mostly on contract either from the Public Works Department or Community Development Blocks or public Health Engineering Department, or against order from large establishments like tea estates, etc. With the growing hygienic sense in the rural areas, squatting type water sealed latrine slab placed over a deep narrow pit is now in extensive use and the slabs are supplied by these units. Some units also manufacture R.C.C. fencing posts against other . Every unit , However, maintains a ready stock for sale.

Re – rolling Mills :- The tea industry , crude oil exploration , oil refinery , etc. have together helped growth of engineering industries all over the State . To meet the iron and steel requirement of these engineering industries all over the State . To meet the iron and steel requirement of these engineering industries and extensive building programmes , during the sixties, two billet re-rolling mills came up in this State which could not meet even a fringe of the State's demand . As such , the State Government had to encourage scrap re-rolling mills in the small scale sector in the State ! In the second plan period , two such scrap re-rolling mills in came up but during the decade as many as 14 more scrap re-rolling mills in the small scale sector came up in the State . The capacity of these re- rolling mills varies from 4,000 to 15,000 metric tonnes per annum . Each of these units provides employment to about 15 to 50 persons. These re-rolling mills together are now in a position to meet a partial requirement of the State for iron and steel of different sections. The Assam Udyog Company , the re-rolling mill located at Dibrugarh , is engaged in the production of rolled products like rods, bars etc. The mill is not working at its full capacity due to the shortage of raw materials.

Besides these industries in small scale sector, several small units

manufacturing different items are scattered in Assam . Due to the paucity of information , these industries are not detailed .

(iii) Cottage Industries : Old time important cottage industries like weaving, sericulture, pottery, bamboo and caneworks, brass and bell metal, gold or silversmithy, blacksmithy, etc. which are still in existence have already been described above. A reference may, however , be made to the handpounding of rice. It is commonly practised in almost every household in the rural areas of the State . Every rural family has get a wooden instrument called *Dheki* to husk paddy by pounding it with the foot. The rural population regards it as an essential part of their family requirement and about tree-fourth of entire husked rice of the rural areas are processed in the *Dheki*.

Carpentry in the rural areas, is more or less a subsidiary occupation . Village carpenters do not specialise in any branch and generally do all types of works like furniture making , house building ,etc. Wooden agricultural implement like plough, harrow yoke etc. are main items manufactured by the village carpenters. Cart wheel and boats are also made.

Among other industries of the State , mention may be made of rope making net-making , bee keeping , leather tanning , oil crushing etc. practised by the individuals here and there in the State . In the sugarcane producing areas, gur making is also very common . In recent years, tailoring also appears to have made large inroads into interior areas of the State. Due to increasing use of bicycles, the cheapest means of conveyance, a number of cycle repairing shops are coming up both in the urban and rural areas of the State. They are mostly concentrated in urban and semi-urban areas.

C. Industrial Potential :- Assam with her vast natural wealth has still remained untapped except for a small modest beginning . Dependence of its people mainly on agriculture, preponderance of tea manufacturing and a modest beginning in oil mining are some of the important features of economy of the State.

As per the Census of 1991, about 70% of the state's population depends on agriculture . Agricultural census 1976-77 reveals that average size of the operational holding in the state declined to 1.37 hectare in 1976-77 from 1.47 hectares in 1970-71. However in 1985-86, the average size of the operational holding slightly increased to 1.41 hectare. This indicates high and uneconomic pressure on land which requires diversion and industrial outlets. About 63% of the total working population of the State depend on agriculture. As per 1991 Census, 13% of the total working population of the State was found to be agricultural labourers. This sad picture is still persisting in spite of immense natural resources and industrial potentiality of the State . Upto 1980, there were only 1893 registered factories including only 4 major factories with employment

facilities of 85.5 thousand labourers found to be functioning in the State. The significant , 24% saw mill and plywood factory and 22% are rice ,*atta* and oil mills . At present agriculture contributes more than 40 per cent to the State Domestic product and 65 per cent of the economically active population in Assam is directly engaged in agriculture.

The following Statement will show the forest vegetation based natural resources of Assam , Which can be explored and expanded through planned plantation in the State for better utilisation of the labour force and raw materials found locally . Some of them can be used as foreign exchange earners.

List of locally found raw materials, their area and producible goods in Assam.

Locally found raw material 1	Wherefound 2	Producible goods 3
1.Timber (<i>Sal, Bansum, Gamari, Sishu, Sonaru, Titasopa, etc</i>)	Entire State. Particulary Kamrup, Nagaon, Goalpara, Darrang	(a) Railway Sleeper. (b) Plywood , Particle <i>Khokan, Simalu,</i> boards, hard board, etc (c) Building materials. (d) Furniture. (e) Other timbers frames, icons, figures of use like cotton. (f) Paper pulp and fuel.
2. Medical plants (<i>Arjun, Aswagandha, Ashok, Molar, silika, Amlakhi, Bel, Sewali, Jaba, Sarpagardhe, Teteli, Bhoira, Thekera, Salmugra, Olatkambal, Ou, Boku, Jamu, Amara, Tulasi, etc. And Hundreds of herds and creepers.</i>)	Entire State.	(a) Medicinal oil and scent (b) Medicine. (c) Fuel.
3. Cane (<i>Raidang, Patidoibet, etc.</i>)	Entire State particularly Upper Assam and Cachar,	(a) Furniture baskets, chairs etc. (b) Umbrella handle, stick, rope, etc.
4. Bamboo (<i>Bhaluka, Jati, Kotah, Nal, Kekoa, etc.</i>)	Entire State	(a) Building materials. (b) Utility (domestic and cultivation) goods. (c) Paper pulp, fodder etc.

1	2	3
5. Other utility plants (<i>khoir</i> , <i>Nahar</i> , <i>Agor</i> , <i>Majankari</i> , <i>Som</i> , <i>Era</i> , <i>Sowalu</i> , <i>Barhamthuri</i> <i>Majathi</i> , <i>Indigo</i> , <i>Bata</i> , <i>Khagari</i> , <i>Kher</i> , <i>Takeu</i> , <i>Tara</i> , etc.)	-do-	(a) Non-edible oil (b) <i>Muga</i> and <i>Eri</i> cocoon rearing (c) Scent and other utility goods, <i>Khoir</i> , gum, dye, <i>Jaju</i> , etc.
Stone, stone chips, Earth and sand.	Entire State	(1) Building materials. (2) Brick, earthen wares, tiles, etc. (3) Glass, icon, figures, etc.

Besides there are 50 to 60 less durable or *Akathi* timber species in the State and these timbers can be made fit for use in manufacturing frames, boxes, plants, building, etc., with due treatment. So, there is also scope for timber treatment plants in the State. Wastes from plywood and saw mills can be utilised in making particle and insulation boards.

Castor oil, *Nahar* oil, *Neem* seed oil, *Agor* oil, Menthol and popperuiant oil, seed oil, etc., can be prepared extensively if seeds are properly collected in time. Besides citronella or lenon – grass oil, all the above oils are good foreign exchange earners.

Lac, rubber, gum, *Katha* or *Khoir* can be extracted from forests and production can be continued and expanded with proper plantation planning. Beside it seems there is no scheme to protect and increase these plantations in the State.

Besides, there are 50 to 60 less durable timber species of low royalty class in the State. These species have little or no market at present. These timbers can be treated and introduced in the market. There is a good scope for increasing the number of timber seasoning plants in the State. It is stated that the State is moderately rich in hides and skins. If chemicals are supplied at subsidised rate, a number of tanneries can be successfully operated in Assam, provided bone-mill organic pantry breed and fertiliser manufacturing units are also set up within the same compact and extensively expanded campus. Besides glue, gelatine, and decalcium phosphate which are also produced from bones can be set up along with the tannery. All the three types of gelatin – edible, Non-edible and photographic can be manufactured if bones are collected through an organised machinery. All these goods are foreign exchange earners and savers. As Assam is a rice growing State, mills for manufacturing rice borne oil can also be

established . The non-edible oils can be utilised in soap manufacturing and prevent the outflow of a huge quantity of money from the State.

Fruit cultivation, or Preservation and Canning Industry :-

Assam with a wide range and pineapple are commercially most important for processing . Processing and canning may be extended to other perishable fruits. Pineapples and oranges are cultivated on a commercial scale. Bananas and papayas, and to a small extent pears, plums, peaches, etc.,are also grown.

Since fruit is perishable in nature in nature it requires careful handing especially during transportation . For the fruit industry to progress on a commercial scale it is necessary to provide quick and easy transport and refrigeration facilities. In Assam , at present , these, are fruit preservation centres one each at Guwahati, Silchar , Kuthari (Nagaon) , Dibrugarh , Tinsukia and Jorhat.

Fruit cells, peels, seeds and wastes also can be utilised profitably for processing to avoid wastes. According to expert's opinion , there is ample scope for development of set up a large fruit preservation unit at Silchar with a modern composite unit capable of processing pineapple slices and Juice, orange segments , orange concentrates , orange oil and vinegar from the waste products.

Besides the State Government fruit preservation Cantres at Guwahati an Silchar, there are several unit in Assam . M/S Birla Brothers are floating a company to set up a large fruit preservation unit at Silchar with a modern company to set up a large fruit preservation unit at Silchar with a modern composite unit capable of processing pineapple slices and juice, orange segments, orange concentrates, orange oil and vinegar from the waste products.

At present , nearly three- fourth of the total fruits are exported outside the State. If this ratio is altered and brought down to fifty per cent then nearly 250 million lbs. (113.40 million kgs) of fruits will be available in Assam for caning purposes. Assam should aim at exporting canned fruits as it will increase the industrial income for the State. Hence, there is good scope for development of small and big fruit canning industries.

At present , a total number of 72 fruits and vegetable processing units are functioning in the North East of which 22 are in Assam . The centre has provided Rs. 40.40 lakh to these units in 1993 . The total installed capacity of fruits and vegetable processing industry in India is currently estimated at 9 lakh Mt of which the North-East contributes only about 502 MT. The capacity utilisation in the units is low , ranging from 5 to 30 per cent . Marketing has been recognised as the single most important factor holding up the progress of fruits and vegetable processing units in Assam and the rest of the North-East . The North Eastern Regional Marketing Corporation (NERAMAC) was set up in 1982 to act as a regional apex body for organising

processing , marketing and promotion of the sales of agri-horticultural produce of the region.

Paints manufacturing :- There is no paints-making unit in Assam at present . The demand for different types of paint is high enough to feed some units. Basic raw materials such as linseed oil is available throughout the State. Pigments are imported products and in this respect all States all States are on equal footing. The difficulty is only about the containers. This also can be partially met by the plastic industry.

Container making:- In view of the prospect of different industries in the State, manufacture of tin containers has turned out to be a necessity. The prospective fruit preservation units and the paint industry and the like, Would depend on the tin, plastic and glass containers for packing their final products.

The carrying of empty drums,cans and containers places a great strain on the transport system as they occupy a large volume in the available capacity. It has not been possible to estimate the State's demand for drums and containers in precise terms as it would mean a proper assessment of the fruit canning , various agricultural processing industries, etc. However, even judging from the excellent prospects for the fruit canning industry itself, it is felt that there can be a large unit in Assam to manufacture about 1,000 tonnes of drums and containers.

Reclaimed rubber :- At present , old rubber tyres are thrown away in Assam. These tyres might be collected and old rubber could be reclaimed from them . All rubber factories consume reclaimed rubber to mix up with new rubber. The industry would be quite profitable. The job also does not require technical skill of high degree.

Surgical instruments, dressing and hospital appliances :- There is a good scope for surgical dressing manufacture in Assam . One or two units may take to manufacturing these in Assam . According to NCAER at present absorbent cotton , surgical instruments, etc., might not be economically produced buy bandages could be manufactured and it would be pushed in the market.

Umbrella Ribs:- The umbrella ribs are not manufactured in Assam . A good demand exists for umbrella because of heavy rainfall in Assam. A unit may be encouraged to take up manufacture of umbrella ribs.

Ceramics :- The basic raw material is China clay and this is available in the Garo Hills . (now in Meghalaya). But considering other economic factors like relative position about availability of technical , financial , management, transport and marking facilities, it is suggested that the factory may be put up near Guwahati. The Government of Assam has already started imparting training in ceramics at Guwahati in the Cottage Industries Training Institute. Low tension and high tension insulators, and sanitary wares and pottery are being taken up for manufacture.

Enamel ware :- The demand for this type of product is increasing day by day in Assam . Judging from the number of hospitals in Assam it was Suggested in the Techno-Economic Survey that there could be a unit in Assam for manufacturing about 50,000 number of enamel ware per annum. There is a unit at Guwahati which is engaged in the production of this item but its capacity is not known. It is suggested that the existing unit in the State doubles its production and also a large unit for manufacturing about 1.5 million pieces per annum be established.

Among other industries, which can be started in Assam are (i) Chalk Crayon , (2) Mirrors, (3) Plastic Articles and Toys, (4)Plastic Rain Coats, (5) Sports goods, (6) Containers for Liquified petroleum Gas, (7) Stoves and Burners for burning L.P.G., etc.

N.F. Railway is also a big customer of a large number of items (Stores requirement) Which could be manufactured on small scale basis. A list of items which the N.F. Railway occasionally bring and which can be manufactured on small scale basis is furnished below :-

(A) Hardware items:- Bolts , nuts, rivets, washers (square and round) , wire, nails, screws, iron and mild steel, split pins, tube, fire, and water buckets, pans, iron mortar, latrine pans, etc.

(B) Tin smithy items :- Lamps of all sorts and their spare parts viz., hand signal lamps, hurricane lamps, points of trap indicator lamps, signal lamps, etc., can and measures of all sorts, feeder oils, come under this category of items and there is scope for entrepreneurs to manufacture this items in an individualistic small scale industry.

(C) Aluminium and Brass ware :- Utensils, mugs, aluminium , *degchi* aluminium with lid *lota* brass, dipper brass with handles.

(D) Mechanical fittings :- Hose trips, clips ,door locking devices, reservation label holders, handle carriage door, face plates for axle boxes,alarm signal, communication chain , etc.

(E) (i) Castings :- Brake blocks, fire bars, piston rings, full stands, etc. and other cast iron signaling items.

(ii) Bronze :- Bearing brushes, cans, liners, boiler countings.

(F) Wooden items :- Handles wooden all sorts, furniture of all description , wooden block , boards, etc.

(G) Personnel requirements :- Holdalls, tents, bags, tarpaulin, etc.

(H) Leather goods:- Dust shield, cash bags, shoes, chappals, etc.

Mineral :- In the industrial programme for Assam , it stated that the whole petro-chemical family of industries is yet at a nascent stage. Even the known items like caustic soda and calcium carbide have not evoked any interest among investors. An oxygen and acetylene unit went into production in 1962. It has already been mentioned that the Namrup unit, of the Fertiliser corporation of India Ltd., went into production with effect from 1-1-69. The unit was originally designed to produce 1 lakh tones of ammonium sulphate, 66,000 tonnes of urea per annum . The Corporation took up an expansion programme for this unit which was completed in the year 1975 for production of 3,85,000 tonnes of urea per annum. The sulphuric acid is used in the field of fertilizers explosives, artificial silk, dyes, etc. to name only a few. Beside the Namrup Fertiliser Corporation of India Ltd. Producing 82,5000 tonnes of sulphuric acid per year , there is another unit in production at Guwahati. The present unit at Guwahati is producing 15,000 tonnes annually.

At present there is no factory to produce caustic soda, in Assam . The industries which consume caustic soda may be put up as follows: (i) Pulp mill for writing paper, (ii) Newsprint mill, pulp mill for rayon , (iii) Soap and (iv)Petroleum. While other raw materials for paper , rayon, soap and petroleum are abundantly available in Assam , setting up of a large unit of caustic soda unit will help and accentuate growth and setting up of these industries.

Besides the petro-chemical industry, fertiliser plant and power generation, the natural gas in Assam also provides a good raw material for the manufacture of polypropylene acid in Assam .

Polypropylene has a wider field of density, dimensional stability, good mechanical strength and superior appearance blended with enough crystallinity. Its physical properties withstand the high and changing temperatures. Articles made of polypropylene have been found to be of excellent appearance and is also moisture proof. Films are also being made of Polypropylene. It finds an important use in manufacture of fibres which are being used as monofilaments in the production of ropes, nettings, upholstery fabric and many other items Polypropylene production capacity licensed under different petro-chemical schemes in India is 15,000 tonnes, but total requirement of this item is 20,000 tonnes. Therefore, it is suggested that a unit be set up in Assam to match this 5,000 tonnes gap.

Carbon Black is considered as the backbone of the rubber industry at large .The demand for carbon black in India was estimated 70,000 tonnes by 1970-71. Assam is in a position to contribute 15,000 tonnes of carbon black to the type, paint and printing ink industry by manufacturing petroleum coke(Calcine)

from refinery waste and utilizing it as raw material for production of Carbon Black.

Acetaldehyde is mostly used in the manufacture of acetic acid, acetic hydride, butanol, penta ery-thritol , etc. One of the by-products in manufacturing acetaldehyde from natural gas (butane or Propane) will be 14 per cent formaldehyde solution. It is suggested that acetene and acetic can be manufactured from natural gas plant with 20,000 tonnes capacity per year to manufacture all the end-products is suggested for Assam by the national council of Applied Economic Research.

Artificial graphite is as good as natural graphite. Except for making of clay graphite crucibles, it substitutes the natural graphite in all other uses. With all its purity the artificial graphite has exclusive uses as a high temperature Lubricant or for electrodes in various chemical manufactures and for petroleum coke which is abundantly available from the refineries of Assam. So a unit, with a capacity of 10,000 tonnes per annum can easily be set up in Assam to manufacture various types of graphite utilizing the calcinated petroleum coke.

The main raw materials for the production of calcium carbide are chemical quality limestone , petroleum coke and cheap electricity. In Assam , all these are available . Therefore, setting up of calcium carbide unit may be worth considering. But from the market point of view, Assam is in a disadvantageous position. A small plant which will cater to the needs of Assam and its neighbouring States only has to be planned . Mainly the carbide will be used for generating acetylene for welding purposes. A small furnace with 30 tonnes of carbide per day is being suggested in the industrial development programme for Assam. Acetylene which can be produced from calcium carbide, is also needed at innumerable consumption points in the State in engineering industries.

The Assam Petro- Chemical Limited :- Envisages the manufacture of methanol from natural gas and conversion of methanol to formaldehyde. The formaldehyde by reacting with urea which will be available from the Namrup Fertiliser Plant will produce urea formaldehyde glue and moulding powder. Although, the products methanol and formalin will be for captive consumption, these two products can also be sold to other consumers if it gives better profit than converting to synthetic glue and moulding powder. Thus the project has got great flexibility in marketing the products.

There is a good demand for urea formaldehyde glue in Assam as it is used by plywood industries. Moulding powder is used by the plastic industries for manufacture of various utility articles. At present, glue is supplied to various plywood industries in Assam from Calcutta, Faridabad and Bombay. The price of glue is very high in Assam . Once the glue is locally available at a reasonable

price, the demand of glue will increase considerably.

There are many plywood industries in Assam and almost all of them are situated in Upper Assam . There are immense possibilities in the State for factories to manufacture chip board, etc. With the availability of glue locally it would be possible for the existing plywood industries to expand their production and this would give a great impetus to exploit the forest resource of the State and also lead to the development of a number of other industries based on forest produce. Even chipped off wastes of timbers can be converted into water proof building materials with synthetic glue.

The availability of urea formaldehyde moulding powder will encourage establishment of a number of plastic processing industries in the State.

Methanol and formaldehyde are closely related products . A larger percentage of methanol is used as a raw material for the production of formaldehyde. At present methanol is only manufactured in India by the Fertilizer Corporation of India at Trombay . A huge quantity of methanol is annually imported from abroad.

Besides, as a raw material for formaldehyde, methanol is also required for a wide range of products such as paints, synthetic resins, polyester fibres, etc.,also finds applications in aircraft, medicines and as a solvent.

It will be possible to supply about 2,600 tonnes of methanol per annum by the Assam petrochemical unit, to the proposed polyester fibre plant to be established at Bongaigaon. Methanol can be supplied to consumers in tank wagons, special vessels and drums.

Formaldehyde solution which is usually sold in the market contains 37 per cent formaldehyde, 55 per cent water and 8 per cent methanol and it is technically known as formalin.

Over 95 per cent of formalin is consumed as a raw material for the manufacture of synthetic glue, moulding powder and synthetic melamine, Formaldehyde glue, cresol formaldehyde glue, xylene formaldehyde glue, various types of moulding powder and polyvinyl alcohol (PVA) fibre.

Formalin is also used for manufacture of hexamine, pent-aerythritol for textile, etc.

Hexamine which is the trade name of "Hexamethylene tetramine " is a white crystalline powder manufactured with formalin and ammonia as the main raw material .It is extensively used as a hardener for urea formaldehyde glue and phenol formaldehyde glue, foaming agent and vulcanizing accelerator for rubber and explosives.

Pent-aerythritol is manufactured from formalin and is used mainly in synthetic glue, paint as a plasticiser in the manufacture of vinyl chloride.

Formalin is usually sold to the consumers in the tank wagons, special vessels, and drums. For long distance transportation, formalin is conveniently transported as paraformaldehyde in paper bags-which is 80 per cent formaldehyde and is a white solid substance manufactured by means of condensing formalin. Paraformaldehyde which has a large demand also finds use as insecticides, disinfectant and antiseptic.

At present, the production of formalin in India is too small compared to its demand and this is mainly due to the shortage of methanol. Therefore, a considerable quantity of Paraformaldehyde is now imported. Production of these materials by Assam Petrochemical Ltd. will save a huge amount of foreign exchange for the country as a whole. Melamine is a very important plastic material and also has wide use in the manufacture of melamine resins which are used for moulding powder, textile industry, laminated board, etc. Melamine can be used for the manufacture of plastic utility articles such as cups, plates, tumblers, etc.

Currently, over 5,000 tonnes of melamine are being imported every year into India. Setting up of units for manufacture of these goods will save the country substantial foreign exchange.

The main raw material for the manufacture of melamine are ammonia and urea and these are available from the Namrup Fertilizer plant.

Methyl Methacrylate :- Methyl methacrylate (MMA) is very important plastic and has very wide use including those of defence requirements. The raw materials required for the manufacture of methyl methacrylate are hydrocyanic acid, methanol, ammonia, natural gas, sulphuric acid and acetone. Except for acetone which has to be brought from Bombay other raw materials will be available at Namrup. The Assam Petrochemical limited is also planning to set up an acetone plant in Assam using refinery off-gas or other suitable substances. Acetone has to be carried from Bombay for a few years in the initial stage.

Hydrocyanic acid will be manufactured by catalytic synthesis between ammonia, natural gas and air. Hydroacetone forms acetone cyanohydrin. This intermediate product when reacted with acetone in presence of sulphuric acid forms methyl methacrylate monomer. This being a monomer, needs refining to obtain a pure product.

When the monomer is polymerised, it becomes methyl-methacrylate polymer, a pure substance which can be utilised for manufacturing sheets, pellets, rods, etc. Methyl-methacrylate which is a thermo-plastic product is

'artificial glass' and generally known as wind-resisting glass or organic glass, and is called the "Queen of Plastics" owing to chemical resisting properties, its transparency and its beautiful lustre. It is widely used in advertising boards, buildings, lighting appliances and industrial equipments.

The manufacture of methyl methacrylate in Assam will meet the demand of India for quite some years and save foreign exchange to a considerable extent.²⁶

With the planned development of various industries, based on petroleum resources of the State there will be a profound in the economy of North-eastern India and the sluggish economy of Assam will vibrate with a new life and vitality.

While the potential of oil appears fairly well set with the recent oil struck at Rudrasagar and more recently at Lakwa and Geleki, natural gas is almost entirely dependent on further reserves being proved. In so far as new structures have been discovered, this possibility cannot be ruled out. In the case of coal, an appreciable reduction on the demand due to dieselisation of the railway in the region has been taken into account. It is envisaged that this would be more than offset by increased demand for the cement industry in Assam and utilisation of Assam coal in the cocking blends at steel centres in West Bengal.

Besides increased production of sillimanite, utilisation of the other ceramic materials have also been considered. The possibility of utilising the recently discovered iron in the Goalpara and Kamrup districts using natural gas for production of sponge-iron has been decreased.

Among the various minerals that may be taken up for investigation to implement the programme of development are :-

Coal:- (a) Detailed providing of low ash coal in the Makum field, (b) Exploration for coal in the Karbi Anglong district.

Feldspar :- Feldspar occur in pegmatites in the Archacean gneissic complex in the Karbi Anglong, North Cachar Hills, Goalpara and Kamrup.

Iron ore :- Recently, the geological Survey of India has intensified the search for metalliferous deposits in Assam. As a result, occurrence of banded magnetic quartzite, similar to the Salem iron ores of Madras, have been found in West Goalpara and along the Kamrup border. The bands on the Chandordinga Hill on the north bank of the Brahmaputra, west of Goalpara and also the one on the hill south of Hahim in Kamrup district are reported to be fairly large.

The total reserves may be of the order of 50 million tonnes.

The proportion of magnetite in the rock is reported at 25 to 30 per cent and the total iron content may be upto 50 per cent.

Gypsum :-A gypsiferous shale has been reported in the Disama Reserve Forest in the Karbi Anglong district. In view of the importance of this mineral to the cement industry, which has to be brought from as far as Bikaner in Rajasthan, the investigation of the occurrence assumes great importance.

Salt :-Brine springs occur in Bhubhan Hills in Cachar district. Small quantities of salt were extracted from these. However, the sources are small and large scale production cannot be thought of.

Fire-Clay :- Fire-Clay occurs in association with coal in the Makum coalfield. Though the reserves have not been estimated so far, the deposit is reported to be large. Besides, a number of clay horizons varying in thickness from 1 to 5 metres are found associated with coal seams near Koilajan. The reserves have not been assessed but according to one source as much as 5-6 million tonnes may be available here. Samples from the horizon at the base of the Sylhet limestone are reported to be promising for high grade refractories.

Presence of copper has been reported from Meghalaya hills in Goalpara district.

In view of poor copper resources of India, its above occurrence should be investigated further.

Over and above these, liquified petroleum gas can be burnt in stoves for heating appliances for domestic cooking. The manufacture of stoves and burners may be undertaken with a moderate degree of business risk.

The Central Fuel Research Institute, Dhanbad, has evolved a technique for economic use of Indian coal for manufacture of calcium carbide. The suitable composition was made by blending Assam coal, petroleum coke, and wood charcoal. Besides the above materials, lime is required. All these above materials are available in Assam. Guwahati being the main market the suitability of putting up a unit near Guwahati is suggested.

There is also immense potentialities for the development of the following industries in the State (i) Tea, (ii) wooden electrical accessories (iii) trucks and bus body building (iv) Mechanised carpentry (v) Leather tanning, (vi) Leather foot wear, (vii) Bone meal, etc.

Formation of State Government Corporation for Development of Industries :- In order to formulate suitable infrastructural and follow-up guidance

in the sphere of industrial development in the State, the Government set up a number of corporations to work as its agency in respect of functions entrusted to each of them. These are as follows :-

Assam Small Industries development Corporation Ltd. :- This corporation was established in the year 1962 under the Indian Companies Act. The objectives of the Corporation, inter alia are (i) to promote, establish and set up small scale industries in the State with a view to transferring any of such small industries ultimately to entrepreneurs who evidence interest and keenness in setting up such small industries, (ii) to aid, assist, counsel and finance any industrial undertaking with capital, credit and resources, (iii) to promote, establish, and execute industrial project or enterprise for manufacture and production of various projects, (iv) to promote and operate schemes for small industries, (v) to procure capital and financial assistance or provide machinery and other facilities for the purpose of establishment of industries and (vi) to assist small scale industrial units in getting essential raw materials.

The Corporation took over a number of units from the Industries Department to run them commercial basis, one of which is match Splint Factory, Bijni. The other units are :

(a) Assam Ayurvedic Products :- This unit has been successfully manufacturing a wide range of ayurvedic which have been well received throughout the State.

(b) Cachar Textile Industries, Badarpur :- This unit came up with 196 powerlooms with a sizing and calendering plant. Besides commercial manufacturing of gray cloth, the unit had also a training unit. After running the unit for about eight years, the powerlooms have recently been distributed to a number of local entrepreneurs. The Corporation is running the sizing and the calendering plant to help the powerloom units run by private entrepreneurs.

(c) Distribution of raw materials :- For distribution of raw materials, the Corporation has depots at Guwahati, Tinsukia, Jorhat, Bongaigaon, Tezpur and Badarpur from where small scale units can get supply of essential raw materials.

(d) Programme of Assistance :

(i) Mini Industrial State : Under its programme of assistance to small scale industries, the Corporation has also taken up scheme for setting up mini industrial estates and developing industrial areas in different important places of the State. Two mini industrial estates have already come up, one at North Lakhimpur and the other at Sibsagar. Mini industrial estates in many other places are under different stages of implementation. A vast industrial area has been

developed adjacent to the Industrial Estate, Guwahati. In his industrial area, plots of land and built-in-industrial sheds have been provided to a number of entrepreneurs. Many of them have already gone into production.

(ii) Supply of machinery on hire purchase : In order to aid and patronise small scale industries, during the 2nd plan, the government of India introduced a scheme of supply of machinery on hire purchase under the National Small Industries Corporation (a Govt. of India undertaking). In Assam, the scheme for supply of indigenous machinery to SSI units upto a limit of Rs. 1 lakh in each case was taken up by this Corporation in the year 1972-73.

(iii) Provision of Seed Money : To enable local young entrepreneurs to obtain assistance from banks and financial institutions, the Corporation provides them with seed money towards the margin required for the purpose.

(iv) Equity Participation : Under this scheme the Corporation has participated in the share capital of some small scale units.

(v) Special Employment Programme : Under the special employment programme undertaken by the Corporation a number of small scale units like bakery, tailoring, umbrella assembly, *supari* making, *atta chaki*, mustard and sesame seed crushing and dehydration of ginger, etc., were taken up. The entrepreneurs were given financial assistance in the form of loan in soft terms to meet their entire capital requirement.

(e) Training Programme : Under the Corporation's Training programme, a large number of local youngmen have been trained in different fields of industry.

(f) Consultancy : To guide and advise young entrepreneurs, the Corporation set up a consultancy cell attached to its head office at Guwahati. Besides providing advice and information regarding development of small scale industries, this Cell publishes project profiles for different small scale industries from time to time for circulation among prospective entrepreneurs. Where an entrepreneur is required to obtain a project report from private consultant, the entrepreneur concerned is given a subsidy towards cost of project report.

Assam Industrial Development Corporation Ltd. : This Corporation was incorporated in the year 1965 with the objectives to promote, establish, assist and finance industrial projects or enterprises, companies and associations for the purpose of development of industries in the State.

In fulfilment of these objectives the Corporation has already taken up the following projects :-

- a) Assam Petro-Chemical Ltd.
- b) Cachar Sugar Mills Ltd.
- c) Fertichem Ltd.
- d) Chemical unit of Associated Industries (Assam) Ltd.
- e) Assam Conductors & Tubes Ltd.
- f) Jute mill at Dalgaon.

In addition to this, the A.I.D.C. Ltd. Has participated in the share capital of North Assam Agro Industries Co-operative Society for setting up of a rice bran oil plant at Rowta in the Darrang district. The Corporation has taken over management of Assam Glass Industries Pvt. Ltd. Besides these industrial units, the Corporation has also obtained a number of licences for industries like (i) manufacture of cigarettes, (ii) sponge iron, (iii) card board, (iv) portland cement, (v) carbon black, (vi) maize products, (vii) cotton yarn, (viii) melamine, (ix) brewery, etc.

Assam Hills Small Industries development Corporation Ltd. Guwahati :-

As the hill districts of the State are relatively backward in industrial growth, the State Government constituted a separate small Industries Development Corporation Ltd. to take up the subject intensively. The Corporation was incorporated in March, 1968 with the principal objective of development of small scale industries in the two hill districts of Karbi Anglong and North Cachar Hills. Because of steep terrains the district were without infrastructural facilities, even for minimum development. The lack of entrepreneurship which is a problem for the entire extremely acute in the hill districts. As such, the Assam Hills Small Industries Development Corporation Ltd. had not taken steps for development of industries but also to create entrepreneurial skill in these areas. With this end in view and in order that the industries in the hill districts could be developed on the resources available there and also that the people can be associated with the developmental activities, the Corporation carried out a techno-economic survey and identified the possibilities of industrial development. The Corporation under-took schemes to set up the following industrial units by themselves.

- (1) Khandsari sugar mill at Mania near Diphu.
- (2) A fruit preservation unit at Baro-Haflong in N.C. Hills.
- (3) The second khandsari sugar mill at Kheroni in the Karbi Anglong district.
- (4) A solvent extraction plant at Howraghat in the Karbi Anglong district.
- (5) A battery of lime making units both in Karbi Anglong and North Cachar Hills.

- (6) A number of citronella oil extraction plants in Karbi Anglong and N.C.Hills.
- (7) Ginger Dehydration and oleoresin unit in N.C.Hills.
- (8) Cinnamon oil extraction plant in N.C.Hills.
- (9) Oil seed crushing mills.
- (10) Timber seasoning plants.

Assam Government marketing Corporation Ltd. : The Assam Government Marketing Corporation Ltd. was established in December, 1958 with the primary objective of marketing the products of the cottage industries, handicrafts and small scale industries of the State. The Corporation has under it a chain of emporia within the State as also in the important cities like Delhi and Calcutta. The Corporation during the last decade made special efforts for marketing of handloom and handicrafts products. It also undertook training schemes under the Special Employment Programme. The Corporation has recently been transferred to the Sericulture and Weaving Department of the State Government.

Assam Financial Corporation :- This Corporation has been making substantial contribution towards industrial development in Assam and in other States of the North-Eastern Region by giving financial assistance to industrial units in the form of block capital.

Assam Tea Corporation Ltd. : After India became independent, the British tea interest in Assam naturally suffered and a spurt in sales of British tea gardens started. The British tea estates in Assam were being sold to the first bidder who were mainly from the trading community. They appeared to be more interested in immediate profit than in long term development of the industry. As a result, the production in a number of tea gardens gradually declined. There was a loss of quality too. As tea is one of the few most important foreign exchange earners for the country and also in view of the fact that tea has built up the entire secondary sector of the State's economy, and also that a number of tea gardens fell in the hands of inexperienced management, the State Government formed the Assam Tea Corporation Ltd. in a bid to save the tea industry. The Corporation was incorporated in the year 1972 with the primary objective of purchasing and or take over management of tea gardens where such purchase or take over was considered necessary. The Corporation has by now purchased many tea estates. Some of the tea estates purchased by the Corporation have the reputation of being the best tea estates in this region, because the production and the profit of these tea estates have been increasing since the take over by the Corporation.

D.Power : Assam has the highest power potential in the country, based on water, natural gas, coal and oil. The hydroelectric potential available in the State is estimated at 12 million K.W., i.e., about 30% of India's hydro power resources excluding that of the Brahmaputra which is itself 30 million K.W. at 60% load factor on the basis of minimum discharge. This represents one of the largest concentration of hydro power potential in the world. In spite of the bounties of nature, Assam is one of the least developed State in India as dearth of power has been a limiting factor to industrial development in the State.

During the pre-independence period, not to speak of the rural areas, even the urban population in most of the towns of Assam were used to kerosene lights for want of power.

After the independence attempts were made to generate hydraulic power in the State. Prior to the first Five Year Plan, there were only seven small undertakings with an installed capacity of 2.903 K.W. In addition, there were a few private power generating stations worked by the railways, collieries and oil fields with an installed capacity of 2.903 K.W. The period from 1955 to 1958 of the Second Plan saw a substantial expansion in Assam's power output from 9.8 million K.W.T. to 18.07 million K.W.T. consequent upon the commissioning of the Umtru Hydel Plant in 1957. The Department of Electricity came up in 1951 and the State Electricity Board was constituted in 1958.

During the first two plan periods, however, power development in the State was very slow. The per capita consumption of electrical energy in 1960-61 was only 2.46 K.W. as against the all India average of 32 K.W. The installed capacity in the State in 1957 was only 14000 K.W. generated mostly from diesel sets except from Umtru Hydro-Electric Project. Thus during the first two plan periods, two-thirds of the total electricity output was generated from oil plants. During the First Plan, the output from oil plants increased from 4.4 million K.W.H. to 7.8 million K.W.H. The Assam Electricity Board which came into being in 1958 undertook the following major projects estimated to generate the total capacity of 1,70,000 K.W. during the Third Five Year Plan.

- (a) Umiam Hydro Electric Project.
- (b) Namrup Thermal Project
- (c) Garo Hills Stream Power Project.
- (d) Guwahati Thermal Power Project.

The construction of the first phase of hydro-electric project was taken up on the Umtru River in the year 1954. This station with an installed capacity of 8.4 M.W. was commissioned in 1957. In the year 1960, the Umium Hydro-electric project with an installed capacity of 26 M.W. was taken up for construction. This project was commissioned in the year 1965.

The installed capacity in Assam was only 3 M.W. at the commencement of the First Plan. This rose to 10 M.W. in 1969-70 and further to 171 M.W. in 1970-71. Assam's power position continued to be unsatis-

factory. Power generation (about 1566 M.W.) per capita consumption of electricity (32.7 Kwh in 1976-77), and rural electrification (10.3%) are very much behind the All-India average. During 1974-75, per capita consumption of electricity in the State was one of the lowest in India being only 28 K.W.H and much lower than the national average of 99 K.W.H during the same year.

The responsibility of co-ordinated development of generation, transmission and distribution of power in the State lies with the Assam State Electricity Board (ASEB). The Board was bifurcated in January, 1975 between the States of Assam and Meghalaya as per provision made in the North Eastern Areas (Reorganisation) Act, 1971. As a result, the Umium and Umtru Hydro-Electric Project under the Board were transferred to Meghalaya due to their location within that State. Consequently, power generation in the Re-constituted Assam came down considerably. However, power supply from these sources continued to be made for the consumers in Assam without any break or restriction. Subsequently, an agreement was arrived at between the Meghalaya Government and the Government of Assam to form a joint and integrated venture on 19th January, 1975, by which the Umium Power Installation was transferred to work in an integrated system in co-ordination with the Chandrapur Thermal Station district for maximum power generation to facilities power supply in both the States throughout the year.

Respective shares of power for the two States during the next 7 years or till a new project is developed, have also been agreed upon. At present, Assam has an installed capacity of about 156 M.W. with two major generation stations, viz., Chandrapur Thermal (30 M.W.) and Namrup Thermal (11.6 M.W.) and a few insulated diesel generation station aggregating to approx. 15 M.W.

During 1970-71, power generation in erstwhile Assam was of the order on 359.5 million K.W.H. Separate figure of power generation in the re-constituted Assam was available only for the year 1975-76. In that year power generation in the reconstituted Assam was 449.37 million K.W.H. The table below shows the generation of power in Assam from different sources over the past few years.²⁷

Installed Capacity and Generation of Electricity in Assam

Total Installed Capacity of Generating Plants (M. W.)						Total Units Generated (Million Unit)			Power purchased from other (Million Unit)
1	2	3	4	5	6	7	8	9	10
1990-91	512.4	2.0	-	-	514.4	1206.4	0.02	1206.42	996.5
1991-92	512.4	2.0	-	-	514.4	1079.5	N.A.	1079.5	996.8
1992-93	452.4	2.0	-	60.0	514.4	1068.3	-	1068.3	1088.5
1993-94	532.4	2.0	-	-	534.4	939.9	-	939.9	1175.3

27. *Statistical Hand Book*, Assam, 1995; Directorate of Economics and statistics, Govt. of Assam, p.107-8.

Pattern of power consumption in Assam had undergone noticeable changes since 1970-71. More and more power is now being consumed by industries, tea gardens, defence establishment, etc. Industrial consumption of power (at low, medium and high voltage) in the State increased from 154.5 million K.W.H in 1970-71 to 529 million K.W.H in 1993-94. Consumption of power by tea gardens has also increased considerably. Thus total consumption of power in the State stood at 1611.00 million K.W.H in 1993-94 as against 288.5 million K.W.H in 1970-71 (including Meghalaya and Mizoram). The following table shows the consumption of electricity in Assam for few years.²⁸

Sector	1990-91	1991-92	1992-93	1993-94
1	2	3	4	5
1. Domestic	180.00	243.20	232.00	369.00
2. Commercial	115.00	118.00	110.00	131.00
3. Industrial Power	149.00	66.56	70.00	149.00
4. Industrial Power High Voltage	440.00	457.47	448.00	380.00
5. Public lighting	14.00	5.92	17.00	18.00
6. Free Supply	10.00	125.00	135.00	10.00
7. Irrigation	26.00	35.92	30.00	38.00
8. Public Water Works	27.00	31.25	27.00	35.00
9. Tea Garden	240.00	188.53	193.20	237.00
10. Bulk supply in the State	165.00	158.94	150.00	156.00
11. Outside State	218.00	76.52	107.71	35.00
12. Rural Industry	50.00	76.55	70.00	53.00
Total Units consumed by the ultimate consumers	1636.00	1584.28	1590.00	1611.00

It has been mentioned earlier that power generation within the State has come down to a much lower level due to bifurcation of the State Electricity Board between Assam and Meghalaya. If adequate attention is not paid to power developmental programmes in the State, there is likelihood of considerable power shortage in the State in view of the likely rise in the demand for power in near future as a result of the developmental schemes that are being initiated. In order to meet this anticipated shortage of power, a number of projects have been taken up in hand.

For distribution of power to all corners of the State long distance 66 KV and 132 KV transmission lines have also been installed. During the year 1971-72, an

28. *Statistical Hand Book*, Assam, 1995; Directorate of Economics and Statistics, Govt. of Assam, p. 107-8.

extensive programme of drawal of 33 KV.,11 KV.and L.T.lines all over the State was taken up. One 220 KV transmission line has been completed in the last part of the year 1979.

The Tenth annual electric power survey (C.E.A)estimate the peak load and energy requirement of Assam to increase from 120 MV.and 605 million units in 1976-77 to 214 M.W.and 1075 million units respectively in 1978-79,whereas peak availability and energy availability by the year are placed at 85 MW and 654 million units. Thus Assam's installed capacity for power generation at present is far be-hind the estimated present demand. As far as new power generation projects are concerned mention may be made of the following (i)Namrup Thermal Power Station , (ii) Namrup Gas Turbine , (iii) Bongaigaon Power Station, (iv)Kopili Hydro Electric Project,(v)Chandrapur Thermal Power Station, (vi)Lakwa Gas Turbine Station and (vii) Lower Borapani Hydrel Project. The 1st extension work of Namrup Thermal Power Station has already been completed and has been commissioned in 1974. The Namrup Gas Turbine Set has also recently been commissioned. Guwahati Gas Project at Narangi which was commissioned in 1964 was subsequently shifted to Namrup and the reinstallation was completed in 1972-73. The Chandrapur Thermal was commissioned in June,1972.

Namrup Thermal Power Station :

Oil struck in the Naharkatia area abounds gas,but the associated natural gas is dependent on the extraction of crude oil and when the off-take of crude oil to the refineries goes upto 24 million tonnes per year the production of associated gas that will be available for utilisation after meeting the requirement of oil fields,is very conservatively estimated at about 1.3 mil-lion cubic metres per day.

The National expert committee recommended the installation of a thermal power station with gas turbines,along with other gas based industrial installation for timely and proper utilization of natural gas found in Naharkatia. In May 1962,the Assam State Electricity Board started installation of a thermal power station at Namrup,initially containing three gas turbine generating units of 23,000 K.W each to be later augmented by one 23,000 K.W gas turbine and two 23,000 K.W steam turbine units,totaling a station installed capacity of about 1,40,000 K.W and consuming about 0.5 million cubic metres of natural gas per day at 57 per cent load factor.²⁹ The plant with total outlay of Rs. 14.75 crores for the present was commissioned in April,1965.

The power from this plant is available to different industries based on natural gas of which the Namrup Fertilizer plant is the most important. Other beneficiaries are the tea estate factories,Assam Railways and Trading company at Digboi. Other industries and consumers of the entire upper Assam are able to utilise the power from this plant. For the purpose, a vast network of 66 K.V.,38 K.V and 11

29. *Namrup Thermal Project Supplement : The Assam Tribune* dated 10th April, 1965.

K.V transmission and sub-transmission lines has also been installed. The main transmission and sub-transmission lines are (i)66 K.V Double circuit line, (2) 66 K.V.Double circuit line, (3) 66 K.V.Single circuit line, (4) 33 K.V and 11 K.V sub-transmission lines and (5) 66 K.V. Single circuit line.

In order to distribute power,several grid sub-stations on other distributing sub-stations have also been installed. The associated 66 K.V grid sub-stations are distributed in 6 to 7 places while 33 K.V sub-stations are provided at several other places. Special care has been taken in the alignment of transmission and distribution lines so that major industrial areas fall within the tea estates and other consuming centres fall within easy reach of the system.

Bongaigaon Thermal Power Station : The Bongaigaon Thermal Power Project was sanctioned on 1.7.75 at an estimated cost of Rs. 47.02 crores. It was installed near Nandangiri Hill at a considerable distance from Bongaigaon.

There is one powerful turbo generator set with provision for extension. The turbine sets are fed by a system raised in boilers. The required coal is supplied from the West-Bengal-Bihar coal mines as the coal of Margherita-Ledo contains higher sulphur content.

The required water is drawn locally. The total generation of energy in the power station is 66 crore units annually.

Kopili Hydro Electric Project : Power generation project will be completed in two stages at a total cost of Rs. 55 to 60 crores.

There will be 4 stations with potentials for 24 MW,71 MW,8 MW and 20 MW respectively,the total potential of all these stations thus coming to 73 MW,231 MW,24 MW and 100 MW continuous.

The total potential of the whole valley development works out to be 466 MW continuous where an installation of 1000 MW can be easily envisaged. The total estimated cost of the entire project with 4 stations coins to Rs. 134 crores.

On April 25,1976,the Prime Minister of India laid the foundation stone of the Kopili Hydro Electric Project which is being executed by the North Eastern Regional Power Corporation Limited recently formed for power development in this region. It is expected that Assam's requirement of power will be met to a great extent after completion of the above projects .

The Assam State Electricity Board has taken up construction of a net work of transmission of power to the load centres. Eleven new single circuit transmission lines are being construction in the State. Power to Allipurduar also is supplied by the Board through double circuit line.

In the undivided Goalpara district of Assam,the power supply was taken over by the State Electricity Board since 1957 by phases. A beginning was made by starting thermal stations in Goalpara and Kokrajhar towns while diesel generating sets were installed with initial capacities of 124 KV at Goalpara and 150 K.W at Kokrajhar. Power supply in Dhubri town was managed by the National Power Supply Corporation which had been functioning in the district since 1954 and

prior to that another private company supplied electricity in this town for some years. The Board took over power supply in Dhubri in 1966 making a beginning with Diesel generating sets. The number of power stations under the management of the State Electricity Board increased to three in 1966, and in 1971, another station with a 25 KW. Diesel set was commissioned at Mancachar.

At present, the Board supplies electricity to the from Umium Umtru Chandrapur power stations through grid-sub stations.

A thermal power project with two 60 M.W. Turbo generator sets extension by another 3X60 M.W set has been undertaken near Bongaigaon by the Board which is extending electrification to other towns and even rural areas in phased manner.

It may also be mentioned that some big industries including including the tea industry have own power houses at Bongaigaon and Fakiragram Junctions.

Power supply and its development in the undivided Darrang district are of very recent origin. Prior to the formation of the Assam State electricity Board in 1958, there was only one diesel power station run by the Tezpur Power Supply Company Pvt. Ltd. at Tezpur to supply power to the town. In 1958, the Assam State electricity Board took over this Company and subsequently in 1959 installed 3 more diesel sets in the district, one each at Dhekiajuli, Charali and Mangaldoi towns. For the management of the power supply in the district, the Assam State Electricity Board has now opened one Electrical Division at Dhekiajuli, Balipara and Mangaldoi. Following the completion of the long distance 132 K.V double circuit transmission line crossing over the Brahmaputra at Pandu in 1967, the Assam State Electricity Board has began to supply hydro-electricity to Tezpur Station since January, 1964. The diesel stations were kept as a stand by from that time.

In January, 1969, the Assam State Electricity Board installed a diesel set at Dhekiajuli, and another diesel set at Charali in July, 1959.

In 1968, all the diesel stations of Dhekiajuli, Charali and Mangaldoi became hydro-electricity transformer.

Supply and distribution of power in the undivided Nagaon district have been undertaken by the State Electricity Board in the year 1958. Prior to this it was under the control of Power Department of the Government of Assam. The first electrification scheme in the undivided Nagaon district was started in the year 1940 by a private company, which ran upto 1949.

After taking over the scheme by the State Electricity Board, the source of power supply was diesel generating set which continued till June 1970, and after that some portion of the Nagaon town was connected to Umium Grid System. In case of its failure, power is supplied from the stand by Diesel Power station which is situated near the Nagaon Railway Station. Hojai was connected with hydraulic power system during the third five year plan only.

The power house at Diphu was set up by the State Electricity Board, Assam in 1957 and commissioned in 1958 with two generating sets. Consequently with

the increase of load another set was installed in 1963. With the further increase of load, one more set was installed in 1965. In March, 1968, the Namrup Thermal Power supply was energized and connected with Diphu. The power house is now kept as stand by supply during the period of interruption or lowering down of the load in the main line. By now Siloni, Mahindujur and Lumbajong also are covered by electrification system of the Board.

Power House at Haflong was installed by the Assam State Electricity Board in 1996. It has two generating sets and it extends service upto Maibong and Mahur. But the capacity of the Power House is very limited.

Supply and distribution of power in the urban areas of the undivided Sibsagar district have in recent years been undertaken by the State Electricity Board. All the State power stations of this district are run by diesel oil. There is every possibility of Hydro-electric project being installed in the district in near future. All the tea gardens have their own diesel power generating sets though the State Electricity Board has now extended their supply system throughout the gardens of the district.

The following stations are supplied with energy from the State electricity Supply, Jorhat, through tension line : (1) Assam Engineering College, (2) regional Research Laboratory, (3) Jorhat Civil hospital and (4) Rowrah Airfield.

One generating set each at Sibsagar and Golaghat has been installed. The Toklai experimental Station, Cinnamara, Mariani, Nazira, Joysagar town, Simaluguri, Farkating have been electrified.

Both Tinsukia district and Dibrugarh **district** have high power potential based on water, natural gas, coal and oil. Two private electric supply companies were operating at Dibrugarh and Tinsukia.

The Companies were taken over by the Assam State Electricity Board in 1972. Over and above these, Assam Oil Company, Digboi, Oil India Ltd., Duliajan, and Assam Railway and Trading Company Ltd., Margherita have their own electric supply units. These Companies are generating electricity mainly for their own use but sometimes they supply power for public use also.

Prior to constitution of the Board, the State Electricity department started two diesel stations one at North Lakhimpur in Lakhimpur district and the other at Doom-Dooma in Tinsukia district in 1957-58. Then with constitution of the Board, the programme was extended to cover almost all the towns of both Dibrugarh and Tinsukia districts during the period from 1958 to 1972.

In Cachar, prior to Independence there was only one power station at Silchar which was under the control of the Silchar Electric Supply Company Ltd. established in 1928. In 1952, Karimganj Electric Supply Co. Ltd. came into being but it was acquired by the Government in 1956 for its inefficiency. With the establishment of the Assam State Electricity Board in 1958, the Silchar Electricity Supply Co. Ltd. was also taken over by the Government.

The district is now served by the sub-station at Panchgram near Badarpur.

There is another power station at Durlavcherra which supplies electricity to the whole of Tripura and a part of Cachar.

Notwithstanding the fact that the Brahmaputra-Barak basin and the eastern Himalayas account for more than 30 per cent of India's total hydro-electric power potential of 84,000 MW, Assam's power scenario makes a grim reading. The in-stalled generating capacity in Assam stands at about 540 megawatt (MW) which is a mere 0.75 per cent of the country's total installed capacity of 70,000 MW. In 1992-93, while the per cent capita electric energy consumption was 281.48 Kwh (Kilowatt hours) for the country as a whole, that of Assam's stood at only 105 Kwh.

At present, the Bongaigaon Thermal Power Station (BTPS) runs on coal from Bengal-Bihar belt, is the largest power plant in the North-east with an installed capacity of 240 MW. The installed capacity of the first natural gas based Namrup Thermal Power Station (NTPS) has raised from 69 MW to 133.5 MW. The Lakwa Thermal Power Station (LTPS) has four gas turbine sets each with a 15 MW capacity. At Kathalguri and Geleki, the ASEB has installed mobile gas turbine generating sets.

Based on the "Fourteenth electric Power Survey of India" published by the Central electricity Authority, the energy availability in Assam works out to be 1656 Mkw against the energy requirement of 3348 Mkw thereby creating a deficit of 1692 Mkw (50.53%).

Two important power generation projects now in the process of completion are the Kathalguri Thermal Power Project, a 270 MW project of the North eastern Electric Power Corporation (NEEPCO) and the 285 MW Amguri Combined-cycle Plant of ASEB.³⁰

Rural Electrification : In Assam, the pace of electrification in the country side had been rather slow. Till the end of 1977-78 only 2,267 villages or 10.3% of the total village in the State were electrified as against 38% for the Country as a whole. The number of irrigation pump sets/tube-wells energised till the end of 31st March, 1978 stood at 1,054.

In 1993-94, the total number of electrified villages has gone up to 21,495 which works out to be 87.1 per cent of the total number of villages in Assam. With release of funds from the Rural Electrification Corporation the number of villages electrified is expected to rise in 1994-95. In the same financial year, it has been proposed to electrify 40 villages under the State Plan.

E. Labour and Employer's Organisation :

The State of Assam has a number of labour organisations or trade unions in the different industrial establishments.

Tea Industry : The following employer's associations are functioning in tea industry of the State : (1) Assam Branch India Tea Association, (2) Assam Tea Planters' Association, (3) Bharatiya Chah Parisad, (4) Indian Tea Planters' As-

sociation and (5) Assam Bengal India Tea Association. Of all these Employers' Associations, the Assam Branch India Tea Association calls for special mention.

1. The A.B.I.T.A was formed following a meeting held at Kokilamukh on the 29th October, 1989 and was originally called the Assam Valley Tea Association. The Assam Branch Indian Tea Association is divided into 16 circles which are grouped in the three zones as follows :-

Zone 1. Doom Dooma, Dibrugarh, Panitola, Tingri, Naharkatia and Moran.

Zone 2 . Sonari, Nazira, Jorhat and Golaghat.

Zone 3 . Nagaon, Biswanath, Tezpur, Barsala, Mangaldai and North Lakhimpur.

Each circle is represented in the appropriate zone committee and also on the general committee in which is vested management and control of the association's affairs. There is an executive sub-committee of the general committee to assist the chairman in arriving at decisions of matters of urgency when time does not permit of a reference to the general committee. The Branch Chairman and also committee members are elected annually. The office of the Branch Secretary and Joint Secretary of Labour are at Dikom in Dibrugarh district. In each zone, there is Zone Secretary and an Additional Secretary, their offices being located at Chaukhowa (zone 1), Cinnamara (zone 2) and Sonabeel Tea Estate (zone 3).

The objective of the Association are to watch over and safeguard the interest of its members and labour employed on member estates. Close contact with the Government of Assam is maintained by the Association's adviser and with district officials by the zone stipendiary officers. There is also constant liaison with the parent Association, i.e., Indian Tea Association in Calcutta and with sister Associations elsewhere on matters of common interest. The association's stipendiary officers advise members on labour and other problems and assist them in negotiation with trade unions and in proceedings under the Industrial Dispute Act. The Association also represents members on various tripartite committees set up by the Government to advise on matters of labour policy.

2. The Assam Tea Planters Association is another employer's organisation in the State established to safeguard the interests of small tea growers. The headquarters of the Association are now at Jorhat. The formal inauguration of the Association was made in the year 1935 under the name of Assam Valley Tea Planter Association, but in 1947 when Sylhet was carved out of Assam, the name was shortened to Assam Tea Planter's Association.

The aims and objects of the Association are (1) to promote the common interest of all persons concerned in the cultivation of tea in India particularly of the tea planters of Assam and the welfare of the labour employed, (2) to keep in touch with Government in matters affecting the tea industry and (3) to maintain close association with the industry with the same or like objects in view and to ensure uniformity in all garden practices amongst the member estates.

Generally, one tea estate is a member of one association but some gardens

are members of more than one association. These associations are advisory bodies of their members and see to the interest of the members in matters of business, industrial relations and progress of the industry.

Assam Chah Karmachari Sangha, *Assam Chah Mazdoor Sangha* and *Sramik Union* are the organisation for employees functioning in the State. *Assam Chah Kramachari Sangha* is the organisation for staff other than the manual workers. It is affiliated to the Indian National Trade Union Congress. Its head office is located at Dibrugarh. *Assam Chah Mazdoor Sangha* is an organisation of the manual labourers and is also affiliated to Indian National Union Congress. Its head-office is also located at Dibrugarh. Besides these two associations, there are also branches of *Bharatiya Chah Mazdoor Sangha* affiliated to All India Trade Union Congress in some tea gardens of Assam and they are also working amongst the tea labourers. *Cachar Sramik Union* looks after the tea garden labourers of Cachar district.

Besides the employers' associations in the tea industry there are only a few other employers' association in the State of Assam. The most important association are (1) the railway and Trading Company, Margherita Employer's' Organisation is affiliated to the (a) Indian Mining Association, Calcutta, (b) Bengal Chamber of Commerce and Industry, Calcutta, (c) Eastern India Tea Chest and Plywood Manufacturer's Association, Margherita, (d) Indian Plywood Manufactures' research Association, Bangalore; (2) Assam Manufacturers' Associations, (3) All India Manufacturers' Association, (4) Assam Rice and oil Mills Associations, (5) Assam Chamber of Inter-State Carriers.

Trade union activities are predominant in Assam. The workers of almost all factories and industrial establishments are organised as trade unions. Most of these are affiliated to Indian National Trade Union Congress or All India Trade Union Congress. However, there are few exceptions which claim to be independent of any affiliation to such bodies. The Indian national Trade Union Congress has branches all over Assam.

There are many labour organisations in the State. The following are some of the important labour organisations :-

- (1) The Assam Colliery *Mazdoor* Congress (affiliated to the INTUC), Boragoli.
- (2) The Assam Coal Mines Workers' Unions, (affiliated to the AITUC) Ledo.
- (3) The Assam Railways and Trading Company Workers' Union Margherita.
- (4) The Lakhimpur District Brick Workers' Union Ledo.
- (5) The A.B & T.Co. *Mazdoor* Union (affiliated to AITUC), Margherita.
- (6) The Tezpur Oil & Rice Mills *Mazdoor Sangha* with their respective of
fices at Tezpur (affiliated to Indian National Trade Union Congress).
- (7) The Darang Mill *Mazdoor* Union, Tezpur.
- (8) Tezpur Industrial Employee's Union, (affiliated to Indian National Trade
Union Congress).
- (9) Makunda *Sramik* Union, Cachar.

- (10) Cachar Mills Workers' Union.
- (11) Cachar District Biscuits Workers' Union, Banamali, Karimganj.
- (12) The All Assam Nation Pictures Employees' Union.
- (13) Assam Spun Mill Workers' Union, Jagiroad.
- (14) Nagaon *Zilla Mil Mazdoor* Union.
- (15) Assam Match Co-*Sramik Sangha*, Dhubri.
- (16) Goalpara *Zilla Bidi Workers' Union*, Dhubri.
- (17) Lower Assam Mill *Mazdoor Sangha*, Dhubri.
- (18) AMCC Technicians' Union, Dhubri
- (19) AMCO Staff Union, Dhubri.
- (20) Dhubri Plywood Factory *Mazdoor* Union, Dhubri.
- (21) Dhubri Jute Workers' Association.
- (22) AMCO Employees' Union, Dhubri.
- (23) Dhubri Press Workers' Union.
- (24) Ashok Paper Mills Employees' Union, Jogighopa.
- (25) Assam Tribune Employees; Union, Guwahati.
- (26) Kamrup Mill *Mazdoor Sangha*, Guwahati.
- (27) Assam State Electricity Supply Workers' Union, at Guwahati and Tezpur
- (28) Assam State Electricity Employees' Union, Guwahati.
- (29) Goalpara *Zilla Electric Supply Workers' Union*, Dhubri.
- (30) Tezpur Electric Supply Employees' Association (affiliated to the INTUC).
- (31) Kamrup Iron and Still Limited Workers' Union, Guwahati.
- (32) Kamrup Industrial Workers' Union, Guwahati.
- (33) Steel Worth Workers' union, Guwahati.
- (34) Guwahati Engineering Workers' Union, Guwahati.
- (35) Assam *Khadi* Board Workers' Union, Guwahati.
- (36) Hume Pipe Line Workers' union, Amingaon .
- (37) Kamrup Construction Workers' Union, Amingaon.
- (38) Refinery Workers' Union, Noonmati, Guwahati.
- (39) Assam petroleum Workers' Union, Guwahati.
- (40) Tata Oil Mills and Associated Co.s Employees' Union, Guwahati.
- (41) B.O.C. Pipe Line Workers' Union, Guwahati.

There is also labour unions in the Assam Oil Company and the plywood factories of Upper Assam.

F. Labour Welfare :

The Labour Departments of the Central and State Government shoulder the responsibility of labour welfare in the State. The departments have been armed with a number of labour legislations passed by the Indian Parliament and the State Assembly. The legislations so far enacted cover public and private sector establishments. The employers have been brought under the purview of the legislation and are expected to adopt necessary welfare measures in their establishments. Some of these acts regulations are : (1) The Workers Compensa-

tion Act,1923, (2) The Indian Trade Union Act, 1926, (3) The Tea District Emigrant Labour Act, 1934; (4) The payment of Wages Act, 1936; (5) The Assam Maternity Benefit Act,1944; (6) The Industrial Employment (Standing Orders)Act,1946; (7) The Industrial Dispute Act,1947; (8) The Factories Act,1948; (9) The Assam Ships and Establishments Act,1948; (10) The Minimum wages Act,1948; (11)The Coal Mines Provident Fund and Bonus Schemes Act,1948; (12) Employees Fund Act,1948; (13)Employees State Insurance Act,1948; (14) The Motor Transport Workers Act,1951; (15) The Plantation Labour Act,1951 and (16)The Assam Plantations provident Fund Scheme Act,1955,etc.

These acts and regulations cover a wide range of labour welfare measures such as housing ,medical, education ,nutrition ,establishment of canteens,etc.,rest and recreation ,day nurseries,sanitations,holiday with pay and sickness benefits.

The Labour Directorate of the Government of Assam is responsible for the implementation of the above acts and regulations. The said Directorate consists of several officers of different cadres of which the Labour Commissioner is the head .In the headquarters, the Labour Commissioner is assisted by one additional Labour Commissioner, one Chief Inspector for Plantation, one Chief Inspector for Motor Transport undertakings, one Labour Welfare Officer, one Special Officer of Labour for committees and conferences ,one Registrar and other staff. The functions of the labour Welfare Officer relate to the looking after of the interest of workers in welfare matters. This Directorate has five administrative zones each in charge of an Assistant Labour Commissioner . Besides the enforcement of the acts mentioned earlier,most of the officers from the Labour Commissioner right upto the rank of labour Inspector functions as conciliation offices under the Industrial disputes Act for maintaining industrial harmony and settling the differences between the employers and the employees. Besides the officials of the State Labour Department stationed at Guwahati,Central Labour Inspectorate with its headquarters at Guwahati is functioning here extend-ing its jurisdiction over Assam,North Bengal,etc. The officials of the Central Inspectorate have been declared as Inspectors under the following important acts amongst others (1) Payment of wages Act (Railway Rule), (2) Payment of Wages Act (Mines Rulers), (3) Minimum Wages Act, (4) Hours of Employment Regulations , (5) employment wages of Children Act, (6) Fair Wages Clause-C.P.W.D and Military Engineering Service, (7) Industrial Employment Standing Orders Act, (8) Industrial Disputes Act,etc.

Under the Factories Act,1978., there is one Inspector of Factories at Guwahati who works under the administrative control of the Chief Inspector of Factories,Assam. His main functions is to ensure strict observations of the provisions of the Factories Act.

For trial of industrial disputes,Government of Assam has set up two industrial tribunals one for upper Assam with headquarters at Dibrugarh and

the other for lower Assam including Cachar with headquarters at Guwahati. Their functions are to adjudicate the disputes referred to them by the Government under provisions of industrial Disputes Acts.

Further, it may be mentioned here that under the Five Year Plans the Government of Assam had undertaken the establishment of community centres for plantation labour in concentrated tea areas with a view to ameliorating the condition of labour and training up in cultural, social, economic, educational and similar other activities.

The State Labour Department has also established a number of welfare centres for urban industrial labour in Assam and also arranges training of departmental officers in the subjects relating to labour welfare.

The enactment of Plantation Labour Act in 1951 has brought about improvement in the working condition of the plantation workers in Assam. It is a comprehensive piece of legislation and had put employers under obligation to all tea, coffee, rubber, cinchona plantations with an area of 25 acres or more and employing 30 or more persons. It can be extended to other plantations by the State Government. It provides for creation of inspecting staff by the State Government and imposition of penalties for contravention of provisions of the Act. Under this Act the employers are required to provide drinking water, sufficient latrines and urinals for men and women, canteens in every plantation where 150 or more workers are employed and creches where 50 or more women are employed. Employers are also to make arrangements for proper medical and educational facilities for the workers and their children. Providing standard type housing accommodations for the workers and their families is also the responsibility of the employer. Besides maternity and sickness benefits, the workers are allowed leave with wages. Children below 12 years are not to work in plantation and night work between 7 P.M. and 6 A.M. is prohibited for women and adolescents. Welfare Officers are to be appointed in every plantation where 300 or more workers are employed.

In accordance with that Act, free education upto the lower primary standard is provided by the management on most of the tea estates of Assam. Besides, to provide medical facilities, the management of the tea estates has established hospitals and dispensaries within their estates.

In tea plantation areas, houses are provided free of charge. In the early thirties and forties, 90% of the houses in the tea plantations of Assam were *Kacha* houses made of mud walls and thatched roofs. These houses were devoid of sanitary provisions. There were no latrine, window or *verandha* in any house. Labourers were required to get their houses repaired themselves. Even access to labourers' quarters was prohibited to all except worker's friends and relatives on grounds of right to private property. The Royal Commission in 1929 objected to this and recommended that all the plantation areas should be thrown open to the public and there should be Boards of Health and

Welfare to determine minimum requirements of housing.³¹

The problem of providing improved housing accommodation came up for discussion at the first Tripartite Plantation Conference which held in New Delhi in January,1947. Later on,it was discussed at the second session of the Industrial Plantation Committee's meeting held in September,1949 and November,1950. The Indian Tea Association drew up certain minimum housing specification which were accepted by the Government of Assam. With the enactment of the Plantation Labour Act,1951,responsibility for making necessary houses for the workers and their families,now rests with the employers of respective tea estates. In pursuance of this Act,some progress,no doubt,has been made but still much remain to be done especially in uneconomic and small tea gardens.

The introduction of the Assam Tea Plantation Provident Fund and Pension Fund Scheme Act, 1955 has ushered in a new era of socio-economic uplift of the plantation workers in the State of Assam. It extends the statutory guarantee of social justice and social security to the working class engaged in the plantation in the estates.

The scheme of provident fund under the Act is applicable to (a)Plantations having 25 or more acres of land under tea with productions of more than 200 kgs. Of tea per acre,and (b)Plantation having 50 or more acres under tea irrespective of the rate of production. In pursuance of the provision of the Assam Tea Plantation Fund Scheme (Amendment)Act,1958,some small and uneconomic plantations have been exempted form its purview.

The benefits of the Contributory Provident Fund are compulsory extended to all categories of employees barring personnels of managerial and executive cadres and other employees whose total (cash) emoluments exceed Rs.1000/- per month per head. The employees of the tea gardens are classified into three broad categories,viz.,adult labour,adolescent and children but the Fund recognises no such classification for this membership. The rate of contribution to the provident funds has been raised from 6 $\frac{1}{2}$ % to8% of the wages of the workers both from the employees.

The scheme provides for advances refundable and non- refundable to the members from this provident fund accumulations on specific grounds. Refundable advances are made available ceremony and death rituals of a family member and non-refundable for construction of dwelling house,payment of life insurance premium,purchase of shares of co-operative societies and subsistence when famine conditions prevail due to natural calamities and unemployment due to closure of gardens.

The scheme is administered by the Board of Trustees and the cost of administration is met from a separate fund created by contributions.

31. R.C. Sexena : *Labour Problems and Social Welfare*,p. 214,227.

Since the introduction of the scheme, its functions and scope have been considerably expanded by adopting other ancillary schemes, viz., Life Insurance Scheme through Provident Fund, Old-age Pension Scheme and Family Pension Scheme.

Life Insurance through Provident Fund was introduced in 1963 with a view to rendering financial protection to the family of the deceased member. While extending this additional benefit, it was ensured that no additional financial burden was put upon the members on that account. The lives of the Provident Fund members in the age group 18 to 40 years are insured for Rs.1000/-, Rs.500/- and Rs.250/- in respect of the clerical staff, male labourer and female labourer respectively. The papers are assigned to the Board of Trustees who keeps these in the custody and prefers claim as and when necessary on the Life Insurance Corporation. This obviates the medical examination or age proof of individual members and direct payment of premium by employees. The amount of premium is paid by the Board of Trustees from the provident fund contributions of a member annually and the balance is credited to his provident fund account. However, on the amount paid off as premium, no interest is paid by the Board of Trustees. The cost of administering the scheme is very economical and it is met from the commission earned on the policies from the Life Insurance Corporation of India.

The pension scheme which provides for old-age pension the workers after retirement was introduced with effect from 2.10.67 covering the entire provident fund members. Its benefits are in addition to the benefit of the contributory provident fund and insurance without entailing any extra financial burden on the employees and employers. The fund for the pension scheme was created by provident fund contributions.

The scope of the pension scheme has been much widened since 1.4.72 to provide family pension to the family of a member in the event of his death while in service. The benefit under the old-age pension scheme would continue in respect of the members who retired or died prior to 1.4.72, while the revised pension scheme including family pension has been made applicable in respect of the member who dies or retires on or after 1.4.72. Under the new scheme family pension is granted @ Rs.40% p.m. for life or till remarriage and lump sum of Rs. 1,000/- to the family of the deceased member who dies while in service.³²

The Family Pension Fund comprises the annual contribution made by the Government of India and the amount annually transferred from the General Pension Fund @ 11.6% and 21.3% of the wages of the employees covered

32. Complied from the *Annual of the Working of Assam Tea Plantation Employees Welfare Fund Act*.

under the scheme respectively. Besides, the Government of India have agreed to bear the entire administrative cost of the Family Pension Scheme.

The enactment of the Assam Tea Plantation Employees Welfare Fund Act, 1959 is another land-mark in the history of welfare legislation for the tea employees in the State of Assam. Under the provisions of this Act a fund is to be constituted out of the fines realised from the employees in the course of management of the plantations, all unpaid accumulations, all grants from the State or Central Government or the Tea Board, any voluntary donation, any sum borrowed under Section 8 of the Act and any sum unclaimed for forfeited in the provident fund account of the employees. The fund shall be maintained by the Board of Trustees constituted by the State Government and shall be applied to meet the expenditure in connection with measures which in the opinion of the State Government are necessary for promoting the welfare of the employees employed in the State of Assam. Without prejudice to these general provisions, the fund may be utilized by the Board of Trustees to defray expenditure on adult education, community and social education centres including reading rooms and libraries, community necessities, games and sports, excursions, tours and holiday-homes; entertainment and other forms of recreation; home-industries and subsidiary occupation for women and unemployed persons, corporate activities of a social nature; cost of administering the Act including the salaries and allowances of the staff appointed for the purposes of the Act and such other objects as would in the opinion of the State Government improve the standard of living and ameliorate the social condition of the employees provided that the fund shall not be utilised in financing any measure which the employer is required under law for the time being in force to carry out.