CHAPTER 2

PHYSIOGRAPHIC SET UP

Physical Layout

The district of Barddhaman is largely an interfluvial basin bounded by the river Bhagirathi in the east, the Barakar in the west, the Ajoy in the north and the Damodar in the south. Physiographically the district may be divided into two main parts, (a) the eastern plain, (b) the western upland. (Sketch 2)

(a) The Eastern Plain

This area covers a vast land surface with a total area of 5187 sq.kms of Barddhaman, Katwa and Kalna sub-divisions. It is a part of the Gangetic delta. The surface is generally covered with clay and riverine alluvium with less propensity of soil erosion. The general slope of the area is less than 1.25 ft./km. from west and south-west to east. The area is drained by the Damodar, the Ajoy and the Bhagirathi and many of their tributaries. The course of the Damodar is higher than that of the river Bhagirathi. The central part of the area is a low-lying area. Water table reaches near the surface during wet season. So, large number of tanks over the surface is a remarkable feature in this area.

(b) The Western Upland

This part of the district comprises Asansol and Durgapur sub-divisions with a total area of 1813 sq.km. It is a rocky, undulating country, some 24 km. wide lying between the Ajoy in the north and the Damodar in the south. This barren rocky and rolling country is covered with clay and Vindhyan alluvium deposited by the Ajoy and the Damodar. The area is threatened with the manace of soil erosion. This tract of the district is largely without vegetation cover. Severe soil erosion
is caused by the tiny rivulets of the area which remain dry except during the rainy season. The well-known Raniganj coalfield and the Ironstone shale measure in which the coal occurs are also situated in this undulating surface of the west.

Geology

The surface layer of the eastern part of the district is covered with alluvium which belongs to the Older Alluvium formation, usually composed of massive argillaceous beds. The river beds of the Damodar and the Ajoy are sometimes covered with reddish and yellowish coarse-grained sand.

The western part, mainly Asansol and Durgapur sub-divisions, is composed of Gondwana rocks. Raniganj coalfield lies within this system. The Archaean Shield is to be noticed here below a thin layer of Vindhyan alluvium. The erosional features on the Archean basement exhibiting the shape of buried domal structure, are in existence just below the alluvium.

The Damuda series of the Gondwana groups consists of three beds in succession:

- a) The Barakar Group
- b) The Ironstone Shales
- c) The Raniganj beds

| Damodar (Permian & Carboniferous) |

These beds are composed of conglomerates, coarse and fine sandstones, shales and coal seams of continuous occurrence over considerable areas. These beds are sometimes covered with the rocks of the Rajmahal group having successive beds of basaltic traps. So, dykes and sills are predominant in the Raniganj field. This area has a southern slope varying in dip from $5^\circ$ - $25^\circ$. This stratum is usually cut off by a normal fault near the police station Galsi. To the east of the district the Gondwana rocks dip under and are hidden by fairly thick alluvium.

1. District Gazettier (Barddhaman) 1981, unpublished, Govt. of West Bengal.
Soft, coarse-grained sand-stones and white-cream coloured clays are exposed near Durgapur. There is controversy about the actual age of this Durgapur bed. Some authorities are of the opinion that it would be equivalent to Supra-Panchets when others consider them to be of Miocene age.

River System

The most important rivers of the district are the Bhagirathi, the Damodar and the Ajoy. The small rivers like Kunur, Banka, Khari, Nuniia, Singaran and Dwarakeswar are also flowing through the district. Except the Bhagirathi, most of these take off from the eastern slopes of Chhotonagpur and Santhal parganas and these are rain-fed.

The Bhagirathi - Hooghly mainly forms the eastern boundary of the district with certain exception, where it goes through the Nadia district near the township of Nabadwip. But again it forms the eastern boundary from Samurdragarh. In the dry season there is hardly any current due to the gradual deposition of silt on its bed.

The Ajoy rises from the hills of Santhal Parganas and touches the district near Gaurangdih, 16 km north-west of Asansol. It flows from west to east and forms the northern boundary for about 128 km. Near Kumarpur, some 24 km. above its confluence with the Bhagirathi at Katwa, the river flows through the police stations of Purbasthali, Monteswar and Katwa. The river has a serpentine course formed by the oscillation of the current. The river bed is low and sandy. Kunur is the only tributary of Ajoy, taking its rise in the undulating surface of Kanksa police station. It falls into the Ajoy at Nutanhat, north of Mongolkot.

2. West Bengal District Handbook (Burdwan) 1951, Govt. of India.
The Damodar is also a rain-fed stream and comes from the Hazaribagh plateau. The course of the river is straight towards east and the bed is full of sand banks. The Barakar, an important tributary of Damodar, flows for 8 km along the western boundary of the district. The river Damodar touches the district at its junction with the Barakar, a few km south of Barakar police station. In its course, it has a sharp bend to the north-east and after passing Daraddhaman town it turns directly towards south.

The other rivers like, Khari, Banka, Nunia, Singaran, Tamla, Kana, Bramhain and Babla, the tributaries and the distributaries of these big rivers, flow through the district and are useful for irrigating the agricultural land. (Sketch 3)

Changes in the River Course and Floods

Considerable changes in the courses of the rivers Bhagirathi and Damodar were more frequent in former times. The Bhagirathi has left its cut-off along its western bank, forming marshes and jhils in Kalna and Katwa sub-divisions. In the earlier part of the nineteenth century a sudden change in the course of the Bhagirathi left the town Nabadwip on the right bank.

The river Damodar was formerly referred to as "the Sorrow of Bengal" because of frequent changes in the course resulting in flood and damages over a vast area. According to Hunter's interpretation of Vanden Brouckes map of Bengal, 1660: "One branch of the Damodar continued an easterly course at Burdwan into the Hooghly near Kalna. Later, the Damodar left this channel and a main branch flowed in a north-easterly direction to enter the Hooghly at Naozerai, 12 miles south of Kalna". "Sometimes in the middle of 18th century", according to Rennel, who shows this channel as an old bed in 1776", "the Damodar deserted this course and the main stream followed its present direction southward into the Hooghly
at Falta. One remarkable feature was that, after heavy rain the head-wave of
the river swept over the channel, rising sometimes to a height of 5 feet, causing
great damage and loss of life.

Frequent changes in the course of Ajoy due to the rapidity of the current
can easily break the embankments. Thus extensive flooding occurs on its both banks
especially near the confluence with the Bhagirathi. So embankments are extended
and constructed on extensive areas by the Govt. of West Bengal to protect the
agricultural land from damages of flood.

The devastating flood of 1959 retarded such Planning Programme to some
extent.

Soil

The soil in the eastern part of the district is predominantly covered by
alluvium. These are renovated every year during the rainy season by deposition
of silt. The low-lying tracts of the cultivated land is mostly mixed with clay. Such
a fertile land surface is highly conducive to flourishing agriculture.

The western part has a very thin layer of Vindhyan alluvium transported
by the mountain streams of the Damodar and the Ajoy. The soil of this part is
partly lateritic clay and partly red-coloured coarse-grained sand. This part is
an undulating waste land traversed by tiny rivulets. At places laterite rocks are
exposed with typical honey-comb structure. The laterite is acidic and poor in organic
matter. The Red soil is formed by the weathering of ancient crystalline and
metamorphic rocks. It is coarse featured and mildly acidic and poor in organic
matter. It is red due to the presence of iron ore. The soil of this area with low
water-holding capacity, is poorly aggregated. (Sketch 4)

3. West Bengal District Handbook (Burdwan) 1951, Govt. of India.
5. Krishnamurti S.R. - The Lead Bank Survey Report, District Burdwan, West Bengal,
Forest

The district has almost 3% of the total land under forest. Most of the forested land is in the western part of the district covering part of the area of Barbani, Faridpur, Kanksa, Bud Bud and Aushgram police stations. But due to rapid industrialisation and expansion of mining, the areas under forests have been decreasing. Consequently, this part has been threatened with the menace of soil erosion. The main forest product of the district is Sal timber. Sometimes this timber is attacked by white ants which are a particular type of pests - thriving in laterite soil. The agricultural part of the district has hardly any forest except some small patches in some of the villages of Bhatar, Katwa and Kalna.\(^5\) (Sketch 5)

**ECONOMIC SET UP**

Population

The total population of the district was 48,35,388 in 1981. The natural resources, industrial expansion and agricultural development of the district have together acted as a pull factor for population concentration and aided in migration. The district shows a high industrial labour concentration in the highly industrialised area from Barakar in the west to Durgapur in the east. About 88% of the district's total industrial labour is employed in this area. On the other hand, the remaining part of the district, which is a flat-agricultural plain, is responsible for the employment of about 80% of the cultivators and agricultural labourers in the district.\(^6\)

The growth rate of population was 23% during 1971-81 while it was 27% in 1961-71. But the maximum growth rate (41%) of population was found during

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5. West Bengal District Handbook (Burdwan) 1971, Govt. of India.
6. West Bengal District Handbook (Burdwan) 1971, Govt. of India.
The establishment of large-scale Iron & Steel factory together with associated ancillary industries acted as the attractive force for such growth.

The density of the population in the district was 688 persons per sq.km. in 1981. The density is recorded highest in Asansol Urban Area (6,926 persons per sq.km.) that is spread over Asansol and Hirapur police stations. Over 80% of the total population lives in urban areas of western part of the district, of which 90% of total urban population is to be found in Durgapur police station alone. This is due to the emergence of Asansol - Durgapur industrial complex which acted as a magnet for attracting people from the neighbouring States.

The district is also rich in agricultural products in eastern, northern, southern and central parts. This has led to the development of market centres in rural sector for the intake and distribution of the agricultural products. The rural market areas are densely populated compared to the remote villages of the district, which are thinly populated.

The density of rural population was 217 persons per sq.km. in 1981. About 20% of total population is living in rural areas which covers more than 95% of district’s total area. Maximum number of inhabited villages are found in Memari, Kalna, Raina, and Purbasthali police stations but most of them have less than 1000 inhabitants. Most of the workers of those villages are cultivators and agricultural labourers engaged in cereal and other food-grain production.

Agriculture

Agricultural development of an area is largely dependent on the physical characteristics and cultural processes practised on land. Agriculture has played a significant role in the economic growth of the district as well as of the State. It is the main occupation of the rural people employing 56% of district’s total workers.

6. West Bengal District Handbook (Burdwan) 1971, Govt. of India.
8. West Bengal District Handbook (Barddhaman) 1981, Govt. of India.
District of Barddhaman is favoured with suitable geographical features and a huge number (70%) of rural workers for agriculture (1981). The undulating waste-land in the western part of the district is unfit for agriculture due to adverse soil conditions. The eastern, southern, central and northern parts of the district are extensively cultivated having 80% of the land under cultivation. Flood plains and alluvial cones are the predominant geographical features in the agricultural field. But frequent changes in the course of the river Ajoy and the devastating floods of Damodar have caused major damages to the crop. With increasing irrigation and flood control schemes coming into operation, the violent nature of flood is largely controlled and more and more thirsty land is getting the much-needed water for agriculture.

**Irrigation System**

The multipurpose Damodar Valley was introduced in 1948. A big barrage was constructed across the river Damodar during Second Five Year Plan. Branches of the main canal are responsible for supplying irrigation water to the agricultural field of the D.V.C. command area. D.V.C. started to supply irrigation water from 1957-58. Two-third of the total command area of the D.V.C. canals lies within the district. About 90% of the total irrigated land is under canal irrigation by the D.V.C. scheme. Nineteen blocks in the lower Damodar Valley are capable of getting benefit from this irrigation scheme. A large proportion of area is under this irrigation system in four police stations of Memari, Galsi, Bhatar and Barddhaman.

Dams on river Damodar discharge irrigation water during Kharif and Rabi seasons. About 3.8 lakh acres of land were irrigated in the Kharif season and 4.5 thousand acres of land in the Rabi season during 1958-59. (Sketch 6)

9. *Multipurpose Projects in India - Damodar Valley*
Publication Division, Ministry of Information & Broadcasting, New Delhi, 1960, pp-10
IRRIGATED AREA UNDER DAMODAR IRRIGATION CIRCLE (1959-66)

Sketch 6
DVC Irrigation Circle
A part of West Bengal

Memari
Raina
Bhatar
Barddhaman

Galsi
Aushgram
Monteswar
Kalna
Ketugram

Jamalpur
Khandaghosh
Katwa
Mongolkot
Kaksa

Period
Period
Period
Period
Period
Period
Period
Period
Period
Period

Area in 1000 acres
Area in 1000 acres
Area in 1000 acres
Area in 1000 acres
Area in 1000 acres
Area in 1000 acres
Area in 1000 acres
Area in 1000 acres
Area in 1000 acres
Area in 1000 acres

Rabi
Kharif
Rabi
Kharif
Rabi
Kharif
Rabi
Kharif
Rabi
Kharif

Period
Period
Period
Period
Period
Period
Period
Period
Period
Period

IRRIGATED AREA UNDER DAMODAR IRRIGATION CIRCLE (1959-66)
Before the inauguration of the D.V.C. two major canal systems existed in the district - (1) The Eden Canal (22 miles long) completed in 1881, and (2) The Damodar Canal (26 miles long with 21 miles long branch canal) was put into operation in 1933. A network of distributaries and channels with the main two canals were intended to serve as a sanitary canal to flush river beds and also to irrigate the agricultural field.

In order to supply irrigation water over a vast tract of arable land, small and minor irrigation schemes were implemented in the district in recent years. Minor irrigation includes irrigation by deep and shallow tubewells and lift irrigation with the help of tank irrigation. As the canals do not supply irrigation facility over the entire area of the district, small and minor irrigation plays a considerably significant role.

1. **Tank**: This system has been the traditional type of irrigation pursued through ages. Though a small amount of land in the western part of the district is irrigated, this is done mainly with the help of tanks.

2. **Tubewells**: These are numerous in Purbasthal police station and in some areas of Katwa, Kalna and Memari too. The police stations adjacent to river Bhagirathi practice deep tubewells irrigation. In 1969-70 about eleven thousand hectares of land (1971) were irrigated through this system.

3. **River Lift Irrigation**: River lift irrigation is much more effective in plots situated at a much higher level. This can be possible only to areas located along river banks. It is practised in some of the police stations. The entire area is drained by many rivers but the percentage of land irrigated through this method is very low.
Package Programme

The agricultural performance of the district has been marked by rapid growth as I.A.D.P. took the initiative in agricultural production since 1962. This programme was popularly known as 'Package Programme'. It was introduced in the district during August, '962. It was an effective effort to get immediate gains in farm practices in some promising areas where the soils are good and irrigation water is assured, natural hazards are minimum and co-operative and other village institutions could be strengthened rapidly. D.V.C. irrigation scheme is the most important ingredient in the package programme for intensive and efficient cultivation of the high-yielding varieties of crops.

Attempts were made to evolve high yielding varieties (HYV) of paddy. The coverage of area under HYV paddy was as much as 41.64% of the total area under crops (1971). An increase in irrigated area under D.V.C. Irrigation Circle was observed especially in 1959-60 and in 1962. The completion of Damodar Irrigation Barrage in 1959 and introduction of Package Programme in 1962 mainly accounted for such an increase. During I.A.D.P. years the growth of the area under irrigation went up by 71% from the base year of I.A.D.P. However, though the package programme was characterised by different facilities such as irrigation, supply of new variety of seeds, manuring and improved implements, it was fully successful mainly due to the extension of irrigation facilities by the D.V.C.

The rate of fertilizer input increased from 1 to 5 kg/acre. The district was a high agricultural producer as it produced 95% of the total food grains under this programme.

10. The Intensive Agricultural District Programme - Ministry of Food and Agriculture, Govt. of India, New Delhi, 1960, pp.13.

* IADP years - 1962-68.
Thus I.A.D.P. was successful in attracting cultivators to its crop plan and package of recommended practices. The green revolution which had increased production of some of the cereals in the district had been a popular programme in the agro-economy of the State.

Paddy

The predominance of paddy monoculture with a lack of diversification in the cropping pattern, is responsible for the district’s supremacy in rice production. The technological revolution in combination with high-yielding variety seeds, chemical fertilizer, plant protection measures and especially the water management led to sharp the increase in the yield rate. The rate of yield per acre increased to 60 mds* per acre at the end of the package programme (1968) where it was only 40 mds per acre before the introduction of this programme (1960). Though the peasants are poor and subsistence farming is still in vogue and most of the household farms are small about 65% of them being 5 acres or less, the largest quantity of paddy is produced in Monteswar followed by Bhatar, Ausgam and Barddhaman. The eastern and southern part of the district produce bulk of paddy. Rice lands constitute 95% - 98% of the total gross cropped area (1971).

Wheat

A striking feature of the spread of HYV wheat is noticed in the crop yield figures. In 1961, the total area under wheat was about 7,000 acres and in 1965-66 it was about 95,000 acres. The figure rose to about 200,000 acres in 1967-68. There was a 3.5 fold increase of yield rate after the practice of package programme for eight years.

*mds - Maunds.
40 kg = 1 md
Millets

The cultivable waste lands of western part of the district are rich in the production of oil seeds, ground-nuts, barley and pulses. Though uncertainty of rainfall and the leaching action of soil in some areas (especially in Kanksa, Jamuria, Barbani, Faridpur police stations) often cause trouble, their yield rates also increased during I.A.D.P. years.

This increased emphasis on agricultural production acted as an incentive to the growth of agro-based industries in the district, as we shall see later.

Mining

Mineral resources play a significant role in the growth of industrial civilization. The extraction of these resources is the central thread running through the whole industrial production complex based on minerals. As some of these resources are difficult to transport, manufacturing industries tend to gravitate towards the sources of these minerals. This is more so in case of coal which is still the prime source of power in the country.

Coal

The region's most significant mineral production, particularly coal, in West Bengal lies mainly within the district of Barddhaman. Furthermore, the largest potential for the development of mineral-based industry exists in the western part of Barddhaman district. It is the well-known Raniganj Coalfield, which is the largest supplier of non-coking coal in the State as well as in the country.
All the coal mines belong to the Gondwane System. The eastern section of this system is called Raniganj Series. The Raniganj Field is located in West Bengal, though it partly extends into Bihar. It covers an area of 1550 sq.km. with twenty-three principal coal-bearing horizons separated by the river Barakar. This coal seam has two distinct coal-bearing horizons: (a) Lower (Barakar - Measure of 640 m. thickness) and (b) Upper (Raniganj - Measure 1034 m. thickness) series. These two are separated by a barren Measure (610 m thick) of iron-stone shale devoid of any coal.

The Barakar Measure has 14 coal seams. These are mostly of inferior quality coal with low moisture content including one like Chunch-Begunia coaking coal. This area comprises of massive sandstones covering 40 sq.miles in West Bengal.

There are twelve coal seams in the Raniganj Series with wide extension. At present, there are 110 collieries in the district having a total capacity of 17.7 lakhs tonnes per annum. Regarding utilization efficacy, it is high volatile non-coking coal which is best in India with export potentiality. Dishergarh seam is the principal blendable coal that is essential for steel plants.

Raniganj field is one of the oldest fields of India. At the beginning many small coal-mines were under the supervision of many private companies with an average employment of 78 persons per day.

Coal was known to exist in the district in as early as 1774 and was actually worked in 1777. In 1330 considerable extension of work in mines was made. After that the collieries at Mongalpur, Damulia, Narayanpur, Barakar

12 Data (unpublished) collected from Dishergarh Colliery, Eastern Coalfields Limited.
and Narayankuri were opened. These mines belonged to The Bengal Coal Co., and The Equitable Coal Co., The Raniganj Coal Association etc. The field lies between $23^\circ 35'\text{N} - 23^\circ 51'\text{N}$ latitude and between $86^\circ 45'\text{E} - 87^\circ 20'\text{E}$ longitude. It is concealed by the overlying laterite and alluvium but in others formed from decomposition of rocks.

In 1956, The National Coal Development Corporation Limited (N.C.D.C.) was formed for the development of coal mines in the public sector. A large number of mines were opened up since then with considerable progress. At that time small holding, old and inefficient machineries did not allow higher production. In order to improve the production, the Govt. of India nationalised the coking coal mines in 1972 and the non-coking mines in 1973. Thus the collieries were brought under unified control, re-organised and modernised, so that the existing resources could be exploited in the best possible manner and in the best interest of the nation.

After nationalisation, a large number of small units were taken over which were subsequently regrouped. These are now under the control of Eastern Coalfields Ltd. At present there are ten collieries in the district of which Pandaveswar in the north and Sodepur in the south stretch into the district of Birbhum and Bankura respectively (Sketch 7). After nationalisation most of the mines were regrouped and many closed mines were opened. In 1984, out of 124 collieries, one hundred and eleven coal mines were in operation. Collieries of Pandaveswar, Bankola, Sripur and Dishergarh help to absorb 68.7 thousand workers. They are colliery workmen. The number of monthly rated workmen is small here. But the number of daily and piece-rated workmen is huge. Some categories of workmen are employed on a temporary work basis and they cannot get job in the collieries during rain, due to the waterlogged condition of some of the mines. At that time those men go back for rural work.*

* Report from Coal India Ltd., Calcutta; and Eastern Coal Ltd., Dishergarh.
Iron Ore

The barren Ironstone shale measures include boulders of reddish brown ironstone. This is collected from the weathered surface of Ironstone shales. This occurs chiefly as nodules in the Ironstone shales, $\text{Fe}_2\text{O}_3$ percent in the ores ranging between 43% and 65%. Formerly, the ores used to be smelted at the Kulti Iron Works.

Fire Clay

These are found both above and below the coal seams as bands in coal-seams and also separately in the sandstone sequence. Plastic fire-clay is found in many places such as Gowrardhi, Barakar etc.

Clay

Below the laterite and soft sandstone, deposition of soft carbonaceous clay occurs. These are dark grey in colour and are worked by M/s. Burn & Co. Ltd. for pottery. Good quality white and yellowish clay is also found in sandstone which is useful for the manufacture of bricks and tiles.

Sand Deposits

A huge quantity of sand-deposits for the purpose of sand-stowing in the collieries occurs on the beds of Damodar, the Barakar and the Ajoy.

Building Stones

Different varieties of massive Barakar and Talcher sandstones are used as building stones, milestones and for making utensils also.
Road Metals

Different mineral stones such as Quartz, Dolerite, laterite suitable for road metals, are mined in the western plateau fringe 13.

INDUSTRY

West Bengal occupies a significant position in the industrial picture of the country. Three industrial belts in different parts of the State account for high industrial labour concentration. The large scale manufacturing belt among these three is located in the western part of the district of Barddhaman. As the district is blessed particularly with coal, large-scale manufacturing industry tended to concentrate in and around the mining area, particularly in the western part of the district.

Moreover, the district is well connected with the Calcutta port by the Eastern Railway and the National Highway No.2. The infrastructure facility is sufficient for urban growth. Electricity is supplied from D.V.C. and State Electricity Board. The district lies in the hinterland of Calcutta Port and is one of the most industrialised zones of eastern India. (Sketch 8)

The industry had its beginning during the British period, when coal production in Ranigunj was started (1854). The first blast furnace for smelting iron on a large scale was built at Kulti in 1974, when the first railway line was constructed from Calcutta to Ranigunj for the supply of coal. The plant was not particularly a success due to mismanagement. It was remodelled in 1889. But the attempt to manufacture steel at Kulti was in vain due to the poor supply of iron ore. In 1923, the decline was marked owing to the establishment of a steel plant at Hirapur by the Indian Iron & Steel Co. and the introduction of a blast furnace at Burnpur. The Steel Corporation of Bengal was established in 1937 when the Burnpur and Kulti enterprises were merged with this works at Burnpur. The Indian Iron & Steel Co. and the Steel Corporation

of Bengal were amalgamated as the Indian Iron & Steel Co. in 1959. The works of IISCO were established at Burnpur. The company's management was taken over by the Central Govt. in 1972.14

Though emphasis was given mainly to agriculture, irrigation and power and though the investment for the industry was minimum, some large-scale units were established in the district during the First Five Year Plan. Those were the Chittaranjan Locomotive Works, Hindustan Cable Ltd., Alucom factory at Jaykaynagar, etc.

The Second Plan was based on a policy perspective of industrialization. A major emphasis within the industrial sector was on heavy, basic and capital intensive industries. As Barddhaman district is rich in coal reserves, it found a suitable base for planned industrial expansion. In framing agricultural programme it was also noticed that it would be essential from the national point of view to grow the modern agricultural implements and to produce fertilizer and chemical plants for agricultural production. Following this policy the large scale iron & steel plant at Durgapur was set up in 1959 followed by a number of ancillary and subcontracting industries.

The rich coal resources in the west and a rich agricultural land in the east served by a fairly good irrigation system, led to a simultaneous growth of large scale manufacturing units in the west and agro-based industrial units in the east. The total number of districts registered factories was 427, employing 112.2 thousand industrial workers in 1982. The registered factories are classified by the National Industrial Classification of Central Statistical Organisation.

The growth and pattern of different types of industries are being studied here from 1960-82 (Table A & B). A complete twenty-two years study not only brings out the industrial picture of the district sectorally, it also reveals the trend of the spatial mosaic over these two decades.

**TABLE - A**
percentage share of different types of industrial units and their manpower (1982)

<table>
<thead>
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<th>Sl. No.</th>
<th>Types of Industries</th>
<th>% share of industrial units</th>
<th>% share of manpower</th>
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<tr>
<td>1</td>
<td>Agro-based industries</td>
<td>35.36</td>
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<tr>
<td>2</td>
<td>Forest-based industries</td>
<td>3.51</td>
<td>2.97</td>
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<tr>
<td>3</td>
<td>Chemical Industries</td>
<td>5.85</td>
<td>3.88</td>
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<tr>
<td>4</td>
<td>Refractories</td>
<td>7.96</td>
<td>6.55</td>
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<tr>
<td>5</td>
<td>Basic Metal Industries</td>
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<td>54.12</td>
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<td>6</td>
<td>Engineering Industries</td>
<td>16.63</td>
<td>22.87</td>
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<tr>
<td>7</td>
<td>Others (Miscellaneous)</td>
<td>25.07</td>
<td>6.59</td>
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**TABLE - B**
Growth rate of different types of industrial units and their manpower (1960-82)

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<thead>
<tr>
<th>Sl. No.</th>
<th>Type of Industries</th>
<th>Growth rate of Units</th>
<th>Growth rate of Manpower</th>
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</thead>
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<td>Agro-based industries</td>
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<td>Basic-metal industry</td>
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<td>Engineering industry</td>
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<td>Others</td>
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<td>Barddhaman (District)</td>
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