Chapter IV

Economic Set-up
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4.1 Introduction:

The economy of a region is primarily dependent on its land resources. Land is the basic resource of human society. Its utilisation shows a reciprocal relationship between the prevailing ecological conditions of a particular region and man. Therefore, the study of general land use is necessary for the utmost utilisation of land asset. This land use pattern has profound influence on working population structure prevailing in a particular region. The economic set-up of a region entirely depends on the working population structure, as one of the fundamental transformations accompanying development process is the changing occupational structure of the working population. The working force is generally classified into primary, secondary and tertiary sectors on the basis of productive activity. With economic development, there is a shift from agriculture and an increase in secondary and tertiary sectors.

With this background in mind, the present chapter attempts at studying, first, the general land use pattern of the region and the amount of diversification of land use in terms of crude and refined indices and then, the working population structure. Lastly, each type of economic activity prevailing in the region will be studied separately. This study will help to identify the areas backward in a particular type of economic activity and to suggest future areas of development.

4.2 Methodology:

The general land use pattern of the Kangsabati basin has been shown with the help of pie graph. Then, the crude and refined diversification indices for each block have been found out following a definite methodology.
4.2.1 Crude Diversification Index:

The extent of diversification in land use can be determined with the help of crude diversification index originally developed by R.C. Tress and subsequently modified by Rodgers and Roy. Symbolically, it may be expressed as

\[ C.D.I. = n \times x_1 + (n-1) \times x_2 + \ldots + 2x_{n-1} + 1 \times x_n \]

where \( x_1, x_2, \ldots, x_n \) are the percentages arranged in descending order of magnitude. The values of crude diversification index range from 400 to 700 in this case. The higher the value of the index, the lower will be the diversification.

4.2.2 Refined Diversification Index:

As the values of crude diversification index increases with the lesser diversification, the refined diversification index has also been calculated with the following formula,

\[ R.D.I. = \frac{\text{Maximum D.I.} - \text{C.D.I.}}{\text{Maximum D.I.} - \text{Minimum D.I.}} \times 100 \]

where C.D.I. is the crude diversification index, R.D.I. is the refined diversification index and D.I. is the diversification index.

In this case, diversification increases with the increasing value of refined diversification index.

4.2.3 Working Population Structure:

Pie graphs have been prepared to show the working population structure of the Kangsabati basin during 1971 and 1981. Then, dominant and distinctive functions of each block have been found out following Nelson's method.

Firstly, the percentages of each working class to total workers have been calculated. The function which has the maximum percentage of working population in it, will be the dominant function. To find out the distinctive function in each block the \( \bar{X}, \bar{X} + 1\sigma \) and \( \bar{X} + 2\sigma \) values have been calculated. When the percentage of working population of a particular function for a block is
higher than the mean value of that function. Then, that function will be the distinctive function for that block. Grades have also been allotted to values exceeding $\bar{x} + 1\sigma$ and $\bar{x} + 2\sigma$. For example, in case of agriculture, if the percentage of workers engaged in agriculture exceeds the mean value of agriculture in one block, then agriculture (a) will be the distinctive function of that block. If it exceeds $\bar{x} + 1\sigma$, then the distinctive function will be $a_1$ and if it exceeds $\bar{x} + 2\sigma$, then the distinctive function will be $a_2$.

4.3 Analysis:

4.3.1 General Land Use:

From the study of the general land use map (Fig.4.1), it appears that the maximum amount of land available for cultivation occurs in the eastern blocks of Medinipur West, and blocks of Medinipur East. The percentage of area available for cultivation to total geographical area decreases from south to north of the basin. Maximum amount of forested land occurs in the upper part of the basin. The percentage of forest cover to total geographical area is maximum in the block of Bagmundi in Puruliya district and the block of Dinipur-II in Medinipur West. The lower part of the basin is completely devoid of any forest cover. Percentages of area under non-agricultural use, barren, unculturable land and cultivable waste are very high in the blocks of Puruliya, Bankura and Medinipur West. Permanent pasture is only found in the blocks of Medinipur East in appreciable amount (Appendix4.1).

From the analysis of the general land use map, it can be said that the blocks of Medinipur in the lower part of the basin are in a favourable position so far as the availability of agricultural land is concerned. This is because of the presence of rugged, hilly and forested terrain in the upper part of the basin. A large amount of land remains fallow due to non-availability of water and other infrastructural facilities.
4.3.2 Crude Diversification Index:

Values of crude diversification index increases from north to south of the basin (Fig. 4.2). This implies that there is very little diversification in the lower part of the basin. The value ranges between 500 and 689 over the basin. In the southwestern part of Puruliya district, the value is less than 600 in most of the blocks, viz., Balurampur, Baghmundi, Barabazar, Manbazar-I, Manbazar-II, Hura and Puncha after which it increases towards south. The value is more than 600 indicating lesser diversification in the blocks of Arsha, Jaipur, Puruliya-I and Puruliya-II. In the blocks of Bankura, the value is up to 642 in some places. The value ranges between 600 and 687 in the blocks of Medinipur, excepting Salbani where it is below 600 (Appendix 4.2).

4.3.3 Refined Diversification Index:

Refined diversification index map presents just the opposite picture (Fig.4.3) where the value decreases from north to south. In most parts of Puruliya, the value is above 40 and at one place, it is more than 60. In the blocks of Bankura, the value is between 20 and 30 after which it decreases to 4 in Debra. The value is again over 10 in some blocks of Medinipur East. This also implies that diversification of land use is high in the upper part of the basin and gradually decreases towards south. In most blocks of Medinipur East, the value is between 4 and 20 (Appendix 4.2).

The upper part of the basin is rugged, billy and forested. A large amount of unculturable land, culturable waste and fallow land are found in the blocks of Puruliya which made the refined diversification index value higher compared to the other parts, whereas in the lower part higher amount of net sown area and culturable land made the diversification value lower. If supplemented with irrigation water and fertilizer, the net sown area can be increased in the upper part and consequently, the diversification value would be lower in that part.
KANGSABATI BASIN
DOMINANT AND DISTINCTIVE FUNCTIONS
1971

- Cultivator (C)
- Livestock (L)
- Agricultural labourer (A)
- Mining & Manufacturing (M)
- Construction (Cn)
- Trade & Commerce (T)
- Transport (Tr)
- Others

D Dominant function

Total Workers
75,000
50,000
25,000

Scale: 10 0 10 20 30 KMS.
4.3.4 Working Population Structure:

The impact of this general land use pattern is reflected on the working population structure of the Kangsabati basin. Since the data in block level are not available, here the police station wise data has been taken into consideration. In times of comparison, the data for two or three blocks are united. During 1971, agriculture remained as the dominant function in almost all the police stations (Fig. 4.4). Agricultural labours were dominant only in Balarampur and Bandua police stations of Puruliya and Haipur police station of Bankura and some western blocks of Medinipur West like Jhargram, Salbani, Keshpur etc. There were many landless labours in these blocks who migrated from other places in search of work. Some poor villagers also worked as labours in fields belonging to others. In all other police stations except Puruliya and Kharagpur, cultivators were dominant. Transport was a dominant function in Kharagpur police station, which gained importance because of its railway settlement. The railway settlement had a profound influence in the Kharagpur town and its adjoining areas as well. As a result, transport engaged a lot of people.

Mining and manufacturing were the distinctive functions in two police stations of Puruliya district, viz., Jhalda and Puruliya town. Occurrence of a number of minerals like limestone, feldspar, china clay etc. made mining an important function. In Puruliya town, mask-making, tusser, cutlery and handtool, brass and bell metal etc. industries were very important. Mining and manufacturing were also dominant in four thanas of Medinipur district, viz., Kharagpur town, Medinipur, Panskura and Tamluk. There were a number of rice mills, cotton mills, printing press, chemical industry, cement works etc. in the above-mentioned police stations which engaged a lot of people. Livestock rearing was distinctive in Puruliya, Manbazar, Jhargram and Tamluk police stations where some amount of pasture was available at that time for rearing of animals. Construction was distinctive in Puruliya town and also in Jhargram and the four eastern police stations.
of Medinipur, viz., Panskura, Tamluk, Mahisadal and Sutahata. In the towns of Kharagpur and Puruliya and in Medinipur police station, trade and commerce was also distinctive. These towns were well-connected through bus and rail services with Calcutta and other important towns and centres of business (Appendix 4.3).

So, it is observed from the map of working population structure of 1971 that agriculture remains as a dominant function in almost all the police stations of the basin except Kharagpur. But no function is distinctive in almost all the police stations of Puruliya district during 1971. In the western part of Medinipur, agriculture is distinctive. But, in the eastern part of Medinipur and in the towns, a number of functions like mining and manufacturing, trade and commerce, transport, construction etc. are distinctive. This implies that secondary and tertiary activities are gradually increasing in the lower part of the basin and also in the towns which are well-connected with a number of neighbouring towns and also with Calcutta.

The working population structure of different police stations in the year 1981 have also been studied (Fig.4.5). As in 1981 census, there are only four classifications of working population, viz, cultivators, agricultural labours, household industry and others; it is not possible to find out the dominant functions of each police station. During 1981 also, agriculture involved maximum percentage of working population in almost all the police stations. Since 1971, the percentage of agricultural labours decreased in the towns of Puruliya and Kharagpur.

Cultivators are distinctive in the police stations of Jaipur, Arsha and Barabazar of Puruliya district and also in Potashpur and Sabong police stations of Medinipur district. During 1971, there was no distinctive function in the above-mentioned police stations of Puruliya district. But in 1981, agriculture involved more people than in 1971. Now, agriculture is improving in these blocks following the improvement of infrastructural facilities like availability of agricultural machineries, irrigation water etc. Agricultural labours are distinctive in the police stations.
of Jamboni, Binpur, Sankrail, Keshiary, Kharagpur and Debra police stations of Medinipur district. Household industry is distinctive in the police stations of Panskura, Tamluk, Moyna, Mahisadal and Sabong (Appendix 4.4).

After studying the working population structure of 1971 as well as 1981, it is found that over most parts of the basin primary activity mainly agriculture prevails. Other primary activities like forestry and mining are found in the upper part of the basin in the district of Puruliya. Secondary activity like manufacturing is found mainly in the lower part of the basin though some of the activities are also found in the upper part. Tertiary activities are developing in the extreme lower part of the basin.

As agriculture is the main occupation as well as source of livelihood of the people living in the Kangsabati basin area and as the economy of the basin is largely dependent on agriculture, it will be discussed in detail in separate chapters. In this chapter, other economic activities except agriculture, will be discussed in detail.

43.5 Forestry:

Forest next to agriculture is the major land use in the upper part of the Kangsabati basin, mainly in the district of Puruliya. As the district lies in a drought-prone area, the scope for improvement of agricultural economy is limited. Hence, forest has a major role to play in improving the economic and social life of people in the area. Approximately, 5,172 hectares of forest have been converted into agricultural land during a period of ten years. Poverty of the growing population and the great demand for wood have been the main causes for this depletion of forests. Forests have been severely ill-used. The per capita forest is 0.65 hectare which is much below the national average (Plate: 16).

The rural population of Puruliya district rely on the forest for meeting their day-to-day needs for fuel-wood, fodder for their cattle and also earning their livelihood. The almost self-sufficient
Plate-16

With their bundles of wood collected from the Ajodhya hills, villagers waiting at Bara Urma bus-stand, P.S.-Balarampur.
economy of the tribals is based on the produces like Sal seed, Kend leave, Tusser etc. derived from forest.

The forest of Puruliya mainly consists of Sal and other miscellaneous species like 'Asan', 'Sidha', 'Bhela', 'Dhaw', 'Bahera', 'Kend', 'Maina', 'Pial', 'Kusum', 'Mahua', 'Kanchan' etc. 'Haritaki', 'Jamun', 'Gilchi', 'Sonalu', 'Amla', 'Haldhu' etc. are found in lesser number. The common herbs and shrubs are 'Bantulsi', 'Kalmegh', 'Karuncha' etc.

Among the minor forest produces Sal seed which yields 19 per cent to 20 per cent of fatty oil is used locally for cooking and lighting. It is used mainly in soap making and manufacture of chocolates. The seeds of Mahua yield 20 per cent to 30 per cent of oil which is used in manufacture of soap and candle. The oil is also used for medical purposes. Mahua flowers are consumed by the tribals as staple food and are also used for brewing liquor. Seeds of Palas are a source of non-edible oil for soap industry. Kusum seeds yield 25 per cent to 27 per cent of oil which is used for cooking and lighting purposes. It is also used in soap, hair oil and as a lubricant. The fruits are eaten by the villagers during dry weather. This is also a good lac host. Karanj seeds yield 18 per cent to 22 per cent of red brown oil which is used for lighting, as grease and lubricant, as medicine, specially in skin disease. Gums are collected from various trees like Sterculia Urens, Boswellia Serrata etc. and are used for manufacture of food articles, pharmaceuticals, cosmetic, polishes, adhesive etc. Collection of Kend leaves and their trade forms an important part of the trade in minor forest produces of Puruliya. In present-day, the minor forest produces are collected and traded through an agency under West Bengal Development Co-operative Corporation.

A number of industrial activities are based on forest resources of the district, viz., saw mill, lac, tusser, mask-making etc. All these will be discussed later on with the discussion of industrial activities.
The forest resources of Puruliya district are decreasing at a fast rate as 35 per cent of the population belongs to traditionally backward class and majority of them rely on forest to meet their basic needs. Approximately, 10,263 hectares of forests have become degraded as the annual consumption of wood by local people far exceeds the annual yield from the forest. Majority of outturn of forest products are taken out of the district to meet the demands of collieries and also transported to the industrial towns like Tatanagar. The social forestry programme taken up in the district has encouraged large-scale planting of trees in areas outside the forest. Now, 1,08,346 hectares of potential area exists in Puruliya for implementing social forestry activities.

Ecology of the region has been greatly disturbed due to ill-use of forest. The number of faunas of the region have also been greatly reduced because of the disturbances of their habitat. The Forest Survey of India gave some recommendations and proposals to save the forests from complete depletion. These are (i) adequate attention must be paid on correct demarcation of boundaries, (ii) the forests must be managed intensively for meeting first the requirement of local people. The per hectare yield must be increased through improvement of existing coppice and by plantation of quick growing species, (iii) social forestry activities should be directed to the areas neighbouring forests where the population are more dependent on forest for their livelihood, (iv) support can be provided by forest department in organising trade of minor forest produces and setting up of processing units under co-operative bodies, (v) the export of forest produce mainly from Jhalda, Banduna and Balarampur must be controlled, (vi) alternative sources of fuel should be developed, (vii) efforts are to be made through wide publicity to achieve local co-operation and mass scale participation in forestry, (viii) strengthening of administrative set-up to protect forest and local fauna and (ix) the proposal of creating wild life sanctuaries should be sanctioned.

The problem of degradation of forest is so big that forest department alone cannot control and the entire Government machinery must work together for protection and preservation.
of forest with the co-operation of local people.

In the middle part of the basin in the blocks of Bankura district, there has been also a sizeable shrinkage in the forest area under Sal which has been replaced by inferior miscellaneous species. The process of flood and wind erosion and the process of deposition of the eroded materials are two distinct aspects of soil erosion. This problem of soil erosion in Bankura district is being tackled jointly by the Department of Forests, Agriculture and Community Developments. Contour bunds have been set up and detailed programme of afforestation is in the process. The Forest Department, West Bengal Government, has already taken up a massive soil conservation programme which includes contour trenching, desiltation dams, gully plugging, construction of check dams and afforestation of blank areas.

The present vegetation of the district consists mainly Sal and also miscellaneous trees like Asan, Mahua, Kend etc.; plantation containing Eucalyptus, accacia etc.; shrubs and blanks with thorny and bushy vegetation.

In Bankura south division, good forest is found to occur only in Ranibandh range. Saw mills are observed to be the principal wood-based industry. Plantation activities have been accelerated since 1965 after the vesting of Zamindari forests. With the advent of special schemes like D.P.A.P. (Drought Prone-Area Programme), I.T.D.P. (Integrated Tribal Development Programme) etc., it received further boosting. Plantations are now being raised with quick growing varieties like Eucalyptus, accacia to supply pulp wood to the paper mills. Miscellaneous plantations and mixed plantations of Asan, Arjun, Cashew, Mahul, Neem, Kusum etc. which yield oil seeds and offer scope for development of cottage industries are also being raised. Fuel wood plantations are also being given special attention. Farm forestry programmes are also being carried out which include distribution of seedlings to local people. Plantation as shelter belt and on roadside are also being raised. Social forestry programme was there in the
district since independence, but the achievement in forestry had not reached the level of expectation.

The overall assessment indicates that comprehensive approach is necessary to improve forest resources and following suggestions are made for future management.

(i) Per hectare outturn of forest should be increased by enforcing rigid protection.

(ii) Some control on the movement of forest produces should be enforced.

(iii) Social forestry programme should be expanded.

(iv) There should be publicity to involve local people in the forest development programme.

(v) Forest activities should be increased to provide employment to local people.

(vi) Intermediaries must be removed from the forest to stop exploitation of local people engaged in forestry.

(vii) More and more small-scale forest-based industries should be developed.

(viii) Incentives and motivations have to be provided to local people to use alternative fuel like kerosene, coal, bio-gas, solar cooking etc.

In the district of Medinipur within the basin, there has also been considerable depletion of forest resources, since there is a large gap between demand and supply in many patches. Forests of the district are being destroyed to the extent of more than 50 per cent including plantations. Afforestation programmes are not being carried out properly. Sal forests are receding at a fast rate owing to biotic factors. Because of the absence of large sized trees in Medinipur East, there is import of timber from outside the district. The people living in the western part of the district consume more fuel wood as they are closer to the forest. Export of fire-wood and poles mainly from the western part is extremely high. As a result, there is perpetual shortage of fuel-wood and poles in the district.
The district is forested in the western and northwestern parts. A line drawn roughly from north to south through Medinipur block separates forested and unforested areas. Sal is the chief species and constitutes 95 per cent of composition of vegetation in east and 82 per cent in the west. Resources of timber other than Sal may be found in non-forested areas particularly in Tamluk and Medinipur north sub-division. Plantations of Eucalyptus scattered all over the district supply pulp wood for paper mills of the State. Among the commercial and miscellaneous plantations only teak trees are found well-grown on roadsides in the blocks of Panskura and Tamluk.

Minor forest produces of the district include edible fruits, Kend leaf, tusser, oil yielding seeds etc. The important forest-based industries are saw milling, mat industry, truck body building, oil extraction etc. Among the cottage industries, tusser cultivation, plate making from Sal leaf, use of Babui grass for rope making, joinery and carpentry, Kend leaf collection and collection of Kalmegh, oilseeds, flowers etc. are important.

Considering various socio-economic aspects, some recommendations are suggested by the Forest Survey of India. These are:
(i) Coppicing of Sal forests should be strictly on 10 years cycle in Medinipur East and 12 years in Medinipur West.
(ii) Felling and removal of trees should be regulated by volume as the supply of pulp-woods in paper mills is very much fluctuating.
(iii) Suitable areas vulnerable to illicit felling should be tackled by identification of beneficiaries mainly in Keshiary and Ludhasuli areas of Medinipur West.
(iv) Removal of species like Kend, Mahua, Arjun from private lands should be regulated.
(v) Public education and voluntary participation of people in social forestry programmes is essential.
(vi) Protection of forests is very important. Alternative sources of fuel may be introduced particularly in Jhargram sub-division.
(vii) Subsidy on coal supply may be contemplated against the annual loss of forest produce.
(viii) Integrated planning is necessary in the district to give employment to people in other sectors.

Thus, studying the forest and forest resources in the three districts seperately which are included within the Kangsabati basin, it is observed that forests are quickly receding in all the three districts. As the economic condition of the people living in these areas are very poor, they depend largely on forests to make ends meet, specially in the upper part. As was found in times of field survey, they have no alternative, but to depend on forests to eke out an existence. Forest Acts can not prevent them from felling trees. Voluntary participation of these people in social forestry programme is necessary. If they plant two or three trees in time of cutting one, only then the problem will be solved to some extent. Subsidies must be given for rearing cattle, weaving textile cloths, poultry farming, rearing cocoon, piggery etc. which will also solve the problem to a certain extent. It was observed during the field survey that though there were a number of schemes to improve the economic condition of people living specially in the upper part of the basin, a very few had reached the local people. Proper attention must be given in this matter.

4.3.6 Minerals:

The western part of West Bengal is endowed with a number of mineral resources specially the district of Puruliya. In the upper part of the basin in Puruliya district (Fig.4.6), a wide range of non-metallic minerals are found, viz., limestone, kyanite, feldspar, rock phosphate, china clay, apatite, fire clay, graphite, baryte, garnet, corundum etc. Among the metallic minerals copper, lead and phyllite are important.

Apatite occurs in a quartz-apatite vein with pre-cambrian phyllites and schists and granite rocks in and around Beldih in Puruliya district. According to an estimate by the Geological Survey of India, there is a reserve of about 3.5 million tonnes of apatite ore of 15 per cent P₂O₅. This rock phosphate in ground form is suitable as a
direct application fertilizer especially for acidic soils.

Sporadic occurrences of apatite ore are also known from Panrkidih, Kutni and Chirugora areas of Puruliya district which are under investigation of the Geological Survey of India.

Tightly folded lenticular bends of crystalline limestone and marble, interlayered with calc-silicate rocks, occur within pre-cambrian schists, quartzites and gneisses in Puruliya district at two principal localities, viz., Jhalda and Hansapathar. The Jhalda deposits can be divided into an eastern sector comprising Jabarban, Harumun, Belamu and Simni areas and a western sector. The reserves of usable limestone of Jhalda group is 2.5 metric tonnes, Jabarban 4.80 metric tonnes and Hansapathar 1.27 metric tonnes. The overall quality of all these limestone is, however, poor.

Many clay deposits are found in the Mahatamara-Taldi-Bandulahar area of Puruliya district. Here a reserve of about 2.25 million tonnes has been estimated by the State Directorate of Mines and Minerals, West Bengal. Kalabani is in Puruliya and Sravandi in Baghmundi also have workable deposits. Except the deposit of Kalabani which contains clay valuable for pottery industry, all other sources contain inferior-grade clay suitable as filler in rubber goods and as powder insecticides.

Occurrences of veins of flaky graphite ore are known within mica schists and khondalitic rocks from Bangora, Gobag and Barasini areas of Puruliya district.

Large deposits of commercially important kyanite has been located in the district, especially in the vicinities of Balarampur, Dabha, Bagmundi and Ichadih. Two narrow kyanite bearing belts can be roughly delineated. One of them runs roughly from Salbani to Ichadih off Balarampur-Baghmundi road to the north of Genrua village. Massive variety of kyanite are found in the valley areas of Dabha. In Ichadih, kyanite occurs along the foothills of Kadalipahar range. Extensive use of kyanite is made in the manufacture of high aluminous refractories. It is also mixed with fire clay for the manufacture of acid refractories, used in ceramic industries. 
Feldspar is an essential constituent of pegmatites. Pegmatites containing commercial feldspar are seen from Belamu and Jhalda area in the west to Malithol, Raghudih, Belamu, Rangumati, Jinamonipur on the east. All the varieties of feldspar can be used in glass and ceramic industries. Other important uses include manufacture of sanitary ware, porcelain ware, roofing materials etc.

The phosphate bearing rocks occur along a shear zone passing south of Puruliya for over a stretch of 50 kms. Beldih produces one of the finest grade of phosphate. The iron content of the Puruliya rock phosphate, however, ranges between 6 per cent and 13 per cent and owing to this high iron content, it is not suitable for manufacture of superphosphate. This is suitable for direct application in acidic soil as fertilizer.

Clay deposits are found in Mahatamara area of Puruliya district, eight km from Jhalda.

The base metal occurrences including copper and lead in low grade schists and phyllites in the southern part of Puruliya district are associated with a shear zone parallel to the main Singbhum thrust belt to the south. The main copper mineralisation is located near Tamakhun. The average grade is 1.5 per cent copper and indicated reserve is about 20,000 tonnes of copper ore.

In Belamu area of Puruliya district, a few anomalous tin-tungsten values have been found following the recent investigation of the Geological Survey of India.

In the district of Puruliya, there are also some non-metallic minerals occurring sporadically, but with economic value which may be exploited by small leases. These are baryte occurring in the mouzas of Nowahat, Hursi, Gunja, Baragram, Malithol and Belamu, mica in the mouza of Sonkupi, graphite in the mouzas of Barasini, Rambundi, Bongora, Kalajhor, garnet in the mouzas of Genrua, Gandudih, Matha, Corundum in Salbani, Paharpur, Bhagabandh, rock crystal in Begunkodar, Uludih etc.
A petro-chemical study of Ichadib-Balarampur-Beldih, Barabazar sector in the southern part of Puruliya unravels the role of hydro-thermal activity towards the formation of mineral occurrences along an east to west trending zone described as shear zone. The hydro-thermal fluid has not only affected different rocks along the disturbed zone, but has also contributed towards the formation of various mineral occurrences.

From the above study, it appears that the district of Puruliya is rich in mineral resources. It is true that commercial mining of all of them are not economically viable and technologically feasible. Still, there are a number of minerals which may not invoke technical problems in course of their appropriate exploitation. The future economy of the blocks in Puruliya district should concentrate upon this almost virgin base for development.

In the blocks of Bankura district within the basin, only wolfram in Ranibandh and Khatra police stations and china clay at several places are of economic importance.

Wolfram gained considerable importance during the World War-II when attempts were made to open up wolfram deposits at Chhendapathar in Ranibandh police station. The mineral is used in manufacturing tungsten carbide and forms an ingredient of a special type of steel. Tungsten ores consisting of wolframite occur here in steeply dipping quartz veins and reefs within pre-cambrian phyllites and quartzites. The mineralisation is sporadic. In the neighbouring Porapahar area, veinlets traversing sheared granites locally host wolfram pockets showing erratic distribution and low level of concentration.

A new occurrence of radioactive substance containing uranium in some barite bearing pegmatite veins is found by some geologists in an area nearly 50 km² around Nawahata village (23 26' N and 86 04' E) in Puruliya district.

The area comprises a part of the pre-cambrian terrain in eastern India, consisting of mica schist, limestone, calc-silicate rocks
granite rocks, basic intrusives, pegmatites and hydro-thermal veins. Small-scale mining activities have been done for different pegmatitic and hydro-thermal minerals, viz, feldspar, quartz, mica, fluorite, barite etc. Except for this area, the occurrence of numerous pegmatite bodies and mineralised hydro-thermal veins are reported all along the shear zone which indicates a good prospect of these valuable minerals in near future.

A few occurrences of impure crystalline limestone and dolomitic limestone and dolomitic limestone with moderate reserves are also known from Bankura district.

Fairly extensive deposits of china clay occur at Kharidungi and Jharia Kacha in Khatra police station, Dalambhija, Raipur-Harihargunj and Radhaamadhab Kunjagarh in Raipur police station. In a hill south of Peripathar village near Ambikanagar in Ranibandh police station, deposits of white clay are found which are outcropping here and there. The first outcrop is at the top of the western portion of the hill, locally called Kharidungi. A second outcrop is about 200 metres to the east of the above deposit. Jharia Kacha deposits occur about 400 metres southeast of the village Kharidungi and are mainly a surface occurrence. This deposit is fairly extensive and the Kangsabati river is within 1.6 km of the locality.

Of the other economic minerals, traces of copper ore are found near Sarangarh, Naraipur and Tamakhun in Ranibandh police station and Mukutmanipur and Damdi in Khatra police station. Garnet occurs as surface detritus near Lepan, Chhendapathar, Dhanjore in Ranibandh police station and Baradi hillock in Raipur police station, the first two occurrences of brecciated hematite quartzite rocks (iron ore) have been recorded from Parapahar and other places. Sporadic occurrences of kankar concretions have been reported at several places. The most important occurrence is at Marosol in Raipur police station. These are locally burnt for lime. Occurrence of galena (lead ore) have been reported from Kama and Banka Kacha in Ranibandh police station. About 1.88 million
tonnes of dolomitic limestone ore present in neighbourhood in Khatra police station. Numerous mica bearing pegmatics are found in Khatra police station. Steatite obtained at Motgoda and Chapadal in Raipur police station and Bhagu and Manla in Ranibandh police station is used for making utensils.

P.S. Chakrabarty of the Department of Geological Sciences, Jadavpur University, found a number of sulphide minerals veins in the Archean tract near the tri-junction of Bankura, Medinipur and Puruliya districts in Ranibandh police station. One of the sulphide minerals veins is exposed near Dungrikuli (22° 53' 25" North 86° 42' 50" East) amidst garnetiferous mica schists and epidiorite schists. The other two quartz veins carrying sulphide minerals were spotted near Burisal (22° 47' 30" North : 86° 42' 30" East) and Kawatanga (22° 47' 15" North : 86° 42' 45" East).

A large part of the district of Medinipur is covered by alluvial and deltaic deposits of the Quaternary period. This vast alluvial tract was earlier thought to be lacking in mineral occurrences, but it has of late assumed importance on account of oil and gas and ground water. Drilling for oil and gas has revealed the presence underneath this alluvial tract of an enormous thickness of marine and mixed sediments from Cretaceous to recent age, unconformably overlying Rajmahal trap and Lower Gondwanas. But, the task of locating the hydro-carbon traps in this part is extremely difficult due to the fact that few available structures are small and rootless and the hydro-carbons are more likely to be located in stratigraphic traps which are difficult to locate by conventional geo-physical survey. Still, a number of efforts are being made by Standard Vacuum Oil Company as well as Oil and Natural Gas Company to locate the hydro-carbon traps.

Scattered occurrences of low grade lateritic manganese ores occur in schists and quartzites of iron ore group at various locations in Medinipur district, mainly in Gohalberia, Katachua, Chandmari Pahar areas.
A few occurrences of graphite have also been located by the Geological Survey of India around Laboni in Medinipur district. Except for these minerals, sporadic occurrences of mica in the Shiarbinda mouza are also of economic value.

From the above study of mineral resources of the Kangsabati basin, it appears that the upper part of the basin is rich in mineral resources. But, they have not been exploited properly due to lack of proper planning, co-ordination and policy decision, dearth of adequate financial resources, limited technical know-how, machineries and equipment and want of sufficient private entrepreneurs. Inputs of men, material and money must increase several times in order to explore and exploit the mineral resources fully.

4.3.7 Industries:

The Kangsabati basin, specially its upper part, is in a non-industrial state of economic development though it is situated on the enriched mineral beds of the Gondwana belt encircled by the gigantic industrial complexes. The lower part of the basin is, however, developing industrially in and around Haldia port at present time.

The industrial scene of the district of Puruliya (Fig.4.6) is dominated by traditional artisan-based units and there are only a few mineral-based, forest-based and steel-based industries which have been developed sporadically. It has been revealed in the post-census analysis of 1971 that there were only 1,570 establishments of manufacturing and repairing services with a total employment of 21,000 persons. Since 1960, there was a continuous fall in the number of registered working factories and though it showed a revival trend in the mid-seventies, the revival had got frustrated in the following years. The condition of small-scale industries is a little bit promising. During the period 1975-'80, the growth of small-scale industries had experienced an annual rate of 20.36 per cent while that of employment
level had registered a rate of 20.86 per cent during the same period.

The existing industries of the district may be grouped into two categories, viz., traditional artisan-based industries and modern industries.

Among different types of traditional artisan-based industries, the most prosperous industries include cutlery, mask making, tusser, brass and bell metal etc.

(i) Cutlery and Handtools:

The cutlery industry has been concentrated in the blocks of Jhalda, Jaipur and Puruliya town mainly owing to the concentration of skilled hands in these areas. This industry has developed only due to the availability of skill and not for local raw materials or local demand. One important item, Augur, apart from different districts of the State, exploits the markets of Assam, Bihar, Orissa, Delhi, Punjab, Tamilnadu, Kerala, Maharashtra and Rajasthan. It is also being exported to some foreign countries, viz., Malaysia, Bangladesh etc. The same is true as regards the raw materials. Most of the cutlery units use scrap materials which are sold in the open markets. These scraps have to be procured from various places, Calcutta being the main centre. The skilled hands of Puruliya transform the scraps into highly demand-oriented products. Attention should be paid on modernisation and expansion aspects of the existing units.

(ii) Lac:

Lac products of this district are famous not only in the economic zones of the country, but they are also important foreign exchange earners. The lac rearing trees like Palash, Kusum etc. cluster primarily in and around Balarampur, Jhalda, Puruliya and Manbazar. But more than 20 processing factories are in Jhalda and Balarampur. In 1981-'82, 2,25,000 metric tonnes lac was produced. Lac rearing engages about 50,000 people every year. A little portion of the lac, i.e., about 10 per cent, is used locally while 90 per cent
is exported. Puruliya alone exports 25 per cent of India's total export of lac and shellac. Another problem faced by the industry is the gradual emergence of some big units with monopoly forces. As these units are engaged both in production and export, they have some cost advantages.

There are a large number of by-products of lac industry which remain untapped because of the lack of technological know-how and commercial application and short-sightedness of the existing entrepreneurs. The bright prospect of the industry depends upon the introduction of various feasible by-products in the present system. The by-products are shellac, lacquerware, paints etc. Lac is also used in electrical insulation and making of gramophone records.

(iii) Brass and Bell Metal:
Centred around Puruliya town, Manbazar and Puncha, this is an age-old industry of the district. Raw materials like tin, zinc, copper are brought from outside the district and only the available skill has led to the concentration of this industry. Presently, the industry is facing twin major problems - one is the scarcity and high prices of raw materials and the other is the change in consumers' tastes and preferences over its substitute products like aluminium, porcelain etc.

(iv) Tusser:
Despite consumers' preference to synthetic clothes, tusser, an important village industry, survives on. Tusser cocoons are reared on Asan and Arjun trees. The tusser units are found in and around Puruliya town. But, in recent times, it is facing problem because of the changes in consumers' preference to synthetic clothes. Dominance of middlemen in the trade is another problem that prevents the producers, who are basically poor, from getting their actual return. However, in 1982-'83, the quantity of raw tusser produced was 2,000 kahan (a kahan is equal to 10 kg to 12 kg green weight or 4 kg of dry weight).

(v) Saw Mill Industry:
Records have indicated that there are about 18 saw mills in the
district. The species of logs used by the industry are Sal, Gomar, Sisoo, Teak, Asan, Jam, Konthal, Peal etc. Nearly 49.57 per cent of the raw materials are imported from other States than West Bengal like Bihar, Orissa and Madhya Pradesh due to inadequate supply of local raw materials.

(vi) Mask Making:
With about 50 units lying in and around Puruliya town, mask making is a thriving business in the district. Raw materials, including paper mache, are found in abundance in the district. The decorative papers produced in these industries have found a market in the foreign soil as well.

Other existing traditional units are bamboo crafts, village pottery, leaf work, carpentry, weaving, musical instrument, leather work, silver jewelry, fishing net, rope making, Dokra, sola works, stone carving etc.

Modern Industry:
The modern industries of the district are primarily steel and refractory units.
There are two mini steel plants at Tamna, a few km away from Puruliya town. One of these steel plants is Bengal Arc Steel Limited which employs 300 workers directly and 150 indirectly. At present, only ingots of different sizes are produced here. It has of late decided to undertake a diversification and modernisation scheme. The only problem of this unit is the non-availability of spare parts from either Asansol-Durgapur region or Calcutta involving additional transport cost and time. The other unit is the Puruliya Mini Steel Plant.

Another important industry is the refractory industry which is developing rapidly due to locational advantages. Currently, there is one such unit at Tamna. The installed capacity of the unit was 800 tonnes per annum which has been increased to 10,000 tonnes recently. One more unit, viz., Pioneering Refractories Pvt. Ltd. is going to be commissioned shortly. The necessary raw materials
for the industry are fire clay, bauxite, kyanite etc. which are imported from Bihar. The unit supplies its product mainly to the steel units located in Asansol and Durgapur of West Bengal and Jamshedpur and Ranchi in Bihar.

After studying the existing industrial structure of Puruliya district within the Kangsabati basin area, it has been observed that industries are concentrated around three belts - Tamna, Balarampur and Jhalsa. Tamna is surrounded by steel towns of West Bengal and Bihar. A good road network and a rail system as well have linked it with these industrial townships. An appropriate planning strategy should, therefore, strike it as a potential pocket for the future industrialisation of Puruliya.

Jhalsa is only a few km from Ranchi where rapid industrialisation is in motion. The national highway-32 carries the flows of goods and traffic. The water resources of Subarnarekha and markets of Ranchi may be exploited.

Balarampur belt has close proximity to the industrial zones of Jamshedpur and Ghatsila. The marketing prospect is also promising.

A well-defined planning effort towards the industrialisation of these growth centres would help to achieve a balanced regional development.

The blocks of Bankura in the Kangsabati basin area are primarily agricultural and there is no immediate scope for setting up of large-scale industries due to lack of raw materials, absence of market and cheap transport etc. There is no hydro-electric, nor any thermal power station in the district. It possesses very limited deposits of commercially important minerals. Only a few small-scale industries are there in the blocks of district. Cotton weaving has always been an important industry. During 1963, there were two handloom weavers' co-operative societies situated in Khatra and Ranibandh police stations.
The manufacturing of lac is another age-old industry that has of late suffered a serious setback owing to the competition of cheap foreign lac. Attempts are now being made to revitalise this industry. A training centre was opened at Khatra in 1955–’56 to produce varnish and sealing wax. Financial assistance is offered to trainees passing out from this centre to organise co-operative societies among themselves.

The mining industry is also of very limited extent. A little quantity of wolfram was mined for sometime by a private firm near Chhandepathar in Ramnibandh police station. The firm exploited the mineral on a commercial scale. As a part of its Labour Welfare Programme, the West Bengal Labour Directorate runs a labour welfare centre at Gorabari with a branch at Khatra.

At present, there is one repair workshop at Gorabari and a number of rice mills, according to the list of Census of Factories: 1979–’80.

Recently, the blocks of Medinipur are industrially developing. New industrial structures are coming up there. There exists a number of forest-based industries like saw milling, mat industry, truck body building etc.

Saw milling units are located in various parts, mainly in areas, where railway network facilities are available, like Kharagpur, Medinipur, Balichak, Panskura etc. Important timbers used are Peasal, Sal, Assan, Gaman etc. Machineries in the saw mills are old-fashioned.

Mat industry is developed in Contai subdivision owing to the non-availability of good agricultural land and saline soil.

Truck body building and repairing workshops are found in Medinipur, Kharagpur and Haldia. The units are small. The timbers for these units are imported from Orissa and northern part of West Bengal mainly.
Plate making from Sal leaf is important at village level and are sold in places like Jhargram, Jamboni etc. Rope making from Babui grass is another important household industry.

Except for these small-scale industries, there are at present a number of registered factories. According to the list of Census Factories: 1979–'80, there is one cotton mill at Medinipur and a clothing factory at Kharagpur; a paper mill at Jhargram, a printers' press at Kharagpur; oil refinery and petro-carbon and chemical industry at Haldia; oil industry at Jhargram; chemical industry at Kharagpur; cement works at Medinipur; an iron and steel company at Kharagpur; engineering corporation at Jhargram; loco shop, electric shop, electric carriage shop, wagon shop, line engineering workshop at Kharagpur and a number of rice mills at Medinipur, Debra, Balichak and Shyamchak.

In conclusion, it can be said that the Kangsabati basin is not developed industrially, though there is ample scope of development, specially in the lower part. In the upper part of the basin where scarcity of water hinders agricultural development, introduction of a number of small-scale as well as forest-based industries can help in economic development of that part. Financial assistance and subsidies must be given to the poor villagers for starting small industrial units in and around some towns like Dalarampur etc. Mining of commercially exploitable minerals will also help to some extent. As physical factors like rugged terrain, scarcity of water etc. are hindering agricultural growth, supply of artificial fertilizers, development of small irrigation projects and availability of loan and subsidies to farmers can help in increasing agricultural output to some extent.

In the blocks of Bankura, the Kangsabati project helps to improve the economic condition to a certain extent. In this part, a number of cottage industries are already prevailing. If incentives and subsidies are given to the villagers to develop small-scale units, this will help the economic development of this part to a great extent.

The lower part of the basin is economically developed to a great extent compared to the other parts of the basin. Fertile land, supply of fertilizers, availability of agricultural credit etc. make it
agriculturally prosperous as well. Of late, industries are emerging in and around Haldia port. Development of more and more industrial units will improve the economy to a great extent in this part. Introduction of high-yielding varieties of seeds and improved agricultural machineries will help in further agricultural development.

4.4 Conclusion:

The overall study of the economic set-up of the Kangsabati basin shows that the economy of the region solely depends on agriculture over most parts though secondary and tertiary activities are developing in the lower part. Compared to the other parts, the amount of land available for agriculture is little in the upper part; forestry which was once prominent is now declining; mining is not important due to lack of finance, technological know-how etc. All these factors along with rugged terrain and scarcity of water hinders economic development of this part. A number of cottage industries can be introduced in this part which will help to improve the economic condition of Puruliya and Jhalda. Development of cottage industries should be encouraged in every village.

The lower part of the basin is agriculturally prosperous, but in the extreme lower part, annual inundation is a problem for agricultural development. Recently, new industrial units are coming up in and around Haldia which is a satellite port of Calcutta. This is well-connected with the big market of Calcutta and enjoys a number of locational advantages. Gradually, it is emerging as an important industrial complex and is responsible for the rapid growth and development of this part.
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