CHAPTER - III
ECONOMIC FRAMEWORK OF THE AREA UNDER STUDY
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3.1 INTRODUCTION:

At the outset it may be mentioned that Orissa is one of the most backward states in the country. Such backwardness is characterised by low income levels, higher dependence of population on poorly developed agriculture, larger proportion of population belonging to scheduled tribes, lack of urbanisation, inadequate infra-structure etc. All these characteristics are found in three districts of the study area in larger measure than in the backward state Orissa itself.

Therefore, it is proposed to present a general survey of economy of the area under study, i.e. Western Orissa, in the present chapter. The matters in this chapter is so processed and arranged as to serve as parametre for the study and discussion of the demographic aspects, such as, distribution and density of population, the level of income and their bearing on the economic framework of the area and the resources available and their role on the economic potentiality of the region. A general survey of economy necessitates an overall appraisal of important sectors of production, infrastructure,
state of employment as well as per capita income. The nature and extent of economic backwardness of the area is examined in greater details in the following paragraphs with due importance on human resources and other resources and infrastructures, which forms the economic background of the study.

3.2 DEMOGRAPHIC ASPECTS:

3.2.1 Rural-urban Distribution:

One of the indicators of economic development of a region is the extent of its urbanisation. In this respect the three districts are unfavourably placed. The urban component of their population was hardly 3 percent in 1981, in Phulbani it being as low as one percent. This is because except the district headquarters and a few solitary towns there are no urban locations in these districts. Thus in 1981 there were only nine towns in the three districts, of which five had a population of under 20,000 each. In case of Phulbani there were only two towns with a population of 26,088 and 18,206. Even the existing urban centres do not display the true urban characteristics such as factory locations, repair and servicing facilities, etc. in any significant measure. These towns instead of being the focal points of growth for the surrounding areas are merely the centre of civil administration and marketing.

Even the rural population is concentrated in scattered and small-sized villages throughout the districts (Fig.No.3.2.2). Thus 80 percent of the rural population of these districts lived in villages with less than 1,000 population each. In case of Phulbani, half of
the total population was concentrated in tiny villages with population not exceeding 400 persons each. Such a preponderant rural character of the population with practically no dependable transport facilities renders the movement of men and material extremely difficult and the population has little opportunity of being exposed to modern influences (Table.3.2.1).

3.2.2 Density of Population:

The three districts under study cover an area of 33,209 sq.kms with a population 2.59 million (1981) which account for 21.3 per cent of area and 14.7 per cent of the population of the state (Table. No.3.2.2). Consequently, the pressure of population in these districts taken together is much lower than that in the state (Table No.3.2.3). This pressure widely varies from district to district. Thus the density of population per sq.km. in 1981 was 138 in Bolangir, 97 in Kalahandi and 86 in Phulbani (Fig.No.3.2.2).

However, the disadvantage of higher density of Bolangir is offset by the availability for cultivation of larger proportion of total area (45%) in Bolangir as compared to those in Kalahandi (22%) and Phulbani (15%). As a result of such land-man ratio the cultivated area per capita in the three district is nearly the same but slightly higher than that in the state as a whole.

3.2.3 Tribal Population:

In addition, these districts are subject to another handicap viz. a sizeable proportion (29.7%) of their population is tribal
(Fig.No.3.2.4). Those people live in far off interior region within the forest their primary activity being confined to the cultivation of land by primitive methods, hunting and collection of forest produce. In some of the other districts of Orissa the tribal people are being absorbed in the mainstream of life by working in mines, factories, road construction etc. But the tribal population of these three districts are not yet exposed to such forces of economic advancement. Among these districts the tribal component of the population is the highest (42%) in Phulbani where it is largely concentrated in two sub-division, viz. Phulbani and Baliguda (Table No.3.2.4).

3.2.4 Occupational Pattern:

The low income level representing the economic backwardness of these districts is partly explained by heavy dependence of their population on agriculture and allied activities. Thus in 1991, 78.6 percent of the working force in these district comprised agricultural workers (Fig.No.3.2.5). This was higher than the corresponding proportions in Orissa (73.8%) and India (69.5%). Factory employment where the income levels are generally higher is practically extremely limited in these districts (62%). The few small factory units that exist at present relate to rice milling, saw mills handlooms and metal works. As the output generating sectors are poorly developed consequently trade and transport activities are also unimportant in these districts. Thus in 1981, trade and commerce accounted for only 1.3 percent of working force.
3.2.5 Income Level:

The level of living of people in any region can best be judged either by their income or expenditure. In both these respects the state of Orissa is placed almost lowest in the country. Thus in 1989-90 with Rs.1666.8 per capita income\(^1\): the state occupied the last but one position among the Indian States. This income was 6 percent of all India level and a little over half of the highest per capita income of Rs.3079 in Maharashtra. Similarly, the per capita monthly expenditure in Orissa in 1989-90 was lowest, it being Rs.138.6 in rural areas and Rs.164.8 in urban areas (Table.No.3.2.5). Apart from the extremely overall low levels of income and expenditure indicated by the above figures, the appalling poverty of the more backward sections of the population can be gauged by the fact that nearly one-fifth (20-26\%) of the rural population in the State belonged to the monthly expenditure group\(^2\) of 0-150 rupees. This percentage for Orissa was highest among the states followed by Madras with a wide gap at 11.65 percent.

The three districts of the study region having a larger component of rural and tribal population are even more backward than the state as such. Recently, the Government of Orissa conducted a study\(^3\) to ascertain in the impact of planning on the standard of living of people in the State. For this purpose the state was divided into four regions of which Western Orissa was one. This region comprised of three districts, viz. Bolangir, Kalahandi and Phulbani, being covered by the present study. The study revealed that the per capita monthly expenditure in rural areas was lowest in Western
Orissa region (Rs.132.2) the corresponding figure for the state being Rs.151.7 (Table.No.3.2.6). Similarly, per capita daily consumption of cereals was lowest in this region (456 gms) the state average being 690 gms 1988-89. Though all the three districts covered by this study form an economically backward region in the state it is neither possible for lack of detailed information for it is essential to determine here the order of their overall backwardness.

Structurally, the economy of the state as also of the districts is heavily dependent on agriculture and allied activities. This is not because agriculture is well developed here but due to the fact that opportunities of gainful work in other spheres such as manufacturing and trade are extremely limited. Thus in 1989-90 the contribution of agriculture to the state income of Orissa was 67 percent as against 52.3 percent for all-India while manufacturing industries contributed 8 percent (all India 15.7%) and trade 4.5 percent (all India 11.4%).

3.2.6 Literacy Rate:

One of the recognised factors contributing to economic progress of any region is the extent of educational and technical skills acquired by its people. Even judged by lower but more basic standard of mere literacy rate, Orissa state as a whole and the three districts under study to a larger degree are placed low. According to the census of population held in 1981 a person above the age of four who could with understanding both read and write was regarded literacy\(^4\) even with this extended concept of literacy the literacy
Fig 3.2.6.
rate in these districts was about 24 percent as compared to the State average of 41 percent and national average of 52 percent. The literacy rate for female population for the districts was as low as 3.7 percent. Among these district, Kalahandi was the most backward district in this respect (Fig.No.3.2.5).

Apart from literacy a better idea of this aspect could be had from the enrolment figures at various stages. In this respect the education commission found that Kalahandi and Bolangir districts in the sphere of higher primary stage (Classes III-VI) and Kalahandi and Phulbani districts in the sphere of secondary education stage (Class IX-XI) were among the five most backward districts in the entire country. This is reflected in the fact that enrollment in higher primary stage was only six per 1,000 population in Kalahandi and nine per 1,000 population in Bolangir and in secondary education stage the enrolment was only three per 1,000 population in Kalahandi and Phulbani.

With regard to college education there were only eleven colleges in the three districts in 1988-89. Of these six were in Bolangir and three was in Kalahandi and two in Phulbani district. Even these colleges had very few students on roll. Thus out of eleven colleges five colleges had on an average enrolment of 500 students only. It was only in Rajendra College, Bolangir, that the number of students was quite high (2390) Low enrolment in these colleges, excepting the Rajendra college is partly due to the fact that four of them were recently started and three are exclusively for women. However,
very low enrolment points out of the under-utilisation of the existing facilities for higher education.

3.2.7 Employment:

The problem of unemployment in the Western Orissa Region as in many other regions of the country is great and challenging. It is not due to heavy pressure of population but due to the limited employment avenues caused by low rate of economic development. The state have been making sustained efforts through the five year plans and small scale development schemes to reduce the intensity of unemployment and under-employment in this region. Special efforts such as, rural works programmes, rural industrial projects and crash schemes for stepping up rural employment, were taken up by the Government on significant scale during the past few years. In spite of all these, the magnitude of the problem has not changed appreciably. The problem of educated unemployed is increasing in serious proportions day by day. As per register of Employment Exchanges\(^5\), there were 1.5 lakhs educated unemployed in 1988-89.

3.3 RESOURCES:

The quantitative and qualitative characteristics of the population these districts have been discussed above. It is worthwhile now to examine why this population is economically very backward. The explanation to this is found in the availability of the natural resources of this region and the extent of their current exploitation. The main resources of these districts are mineral, forests, and arable land. The only known minerals in this region are bauxite, limestone and graphite. But their known occurrences are few and the meagre output of these minerals is mostly sent out of these districts. As
regards the forests 25 percent of the area of these districts is covered by them. The important products are timber, bamboos and kendu leaves. A major portion of the timber is sent out of the districts either in form of logs or sawn timber (railway sleepers and planks). Very small produce is being utilised by a few small scale industries for making furniture, window frames and door frames. Bamboos are exported from these districts to feed paper mills in other districts of Orissa and one unit in West Bengal. Kendu leaves are mostly collected through contractors coming from outside the state who usually employ tribal population for this purpose. On the whole the impact of forest on the economy is rather insignificant.

3.3.1 Land:

Thus the major resource of the economy of these districts is arable land. However because of the primitive methods of farming, lack of irrigation facilities and the cultivation of land being mostly confined to one season the farm output is low. Nearly 90 percent of the cultivated area is devoted to foodgrains which are mostly consumed by the local people. This leaves marginal surplus which is their only source of cash income for buying other requirements. The few commercial crops grown in the region are potatoes, sugarcane, tabaco, oilseeds, cotton, etc. but the total area under all these crops amount to hardly 10 percent of cultivated area. The produce of these crops are by and large used locally. Since major portion of the land is cultivated under rainfed conditions, the consumption of inputs such as fertiliser, better seeds, pesticides, etc. is confined
to a few select farmers having irrigation facilities. That is why the average yields currently obtained are much lower than what the land is capable of producing.

As a consequence of the dependence of agriculture mostly on monsoons, the region though falling in a high rainfall zone is subjected to occasional droughts because of wide fluctuations in year to year rainfall. That is why several villages in this region are declared as famine-stricken from time to time and the government has to grant remission of land revenue.

Like agriculture and industry, transport is also inadequately developed in these districts. The only means of transport in this region are railways and roads. As regards the former the railway route passed through Bolangir and Kalahandi districts, leaving out the entire district of Phulbani. Even with regard to roads which are the main means of communication the three districts, though forming a contiguous region, are not interconnected by them. Thus while Phulbani and Kalahandi are not directly linked by road. Further the total road length in this area is small. Thus in 1985-86 there was a total road length of 1,316 kms. in the three districts which give a road length of 4 kms per 100 sq.kms. of area, the corresponding figures for the state being 5.3 kms and for the country 26 kms. However, because of low density of population in these districts, the road kilometreage when related to population is not that unfavourable. Apart from the low road length in overall terms inter-district and intra-district links are few and far between. Since
the region is traversed by several rivers, rivulets and streams flowing from west to east, many areas within these districts remain cut off not only during the rainy season but even thereafter for two or three months. In Kalahandi district, out of 17 blocks, 7 blocks remain unconnected for eight months in a year. For travelling from the district headquarters Bhawanipatna to Nawapara a subdivision office, one has to pass through two other districts. Thus communication within the districts is extremely difficult and as such these have remained unopened for ages.

3.3.2 FOREST RESOURCE:

Western Orissa has 19659.2 sq.kms. of forests covering about 42.3% of the total geographical area of the region and 32% of the total forest area of the state. A revenue of 6.8 crores was generated by forest in 1988-89. This formed 38.7% of the total forest revenue earned by the state during the same period. On the other hand, employment in forests which according to census of 1981 was roughly 2.6% of the total work force of the region. This percentage is however, less than the state average. This means that inspite of larger forest area and larger forest earnings, employment provided by forest is less than state. It proves that the people of the region benefit less from the forest than they ought to have done. Though region is rich in forest resources, due to the inadequacy of infrastructural facilities the forest based industries could not be developed adequately in the region. There are however, numerous places where forest based industries can be developed profitably with encouraging governmental support.
No detailed survey of the forests has so far been done to assess the quality of various timbers for different purposes. Even 4 inch maps which are considered essential for good forest management are yet to be prepared by the Survey of India. For planning of any industry based on forest resources, a thorough knowledge of the available resources, their quality and quantity is necessary. However, in the absence of any detailed resource survey, an approximate assessment of out-turn of various species in the area has been attempted on the basis of sale notices of forest produces. It has been assumed that in the future, the same pattern of forest exploitation will continue. The out-turn of forest produces are available in table no. 3.3.4 for 1987-88, 1988-89, and 1989-90. Most of the bamboos have already been given on lease to three paper mills of the Orissa State and all of them are outside the districts of Western Orissa. As such no bamboo in bulk is available in the area for any new industries. In the Experimental Garden of Forest Department at Kalinga (Phulbani District), pine and eucalyptus have been successfully grown. If these varieties are taken up for plantation on a large scale immediately, these will provide good soft wood for paper pulp. In Balangir and Khariar divisions, plantations of economic timber (teak) has been taken up by Forest Department. After some years this will not only provide timber for furniture industry but also for plywood production. In Western Orissa the main problem for forest resources is of "Podu" (shifting cultivation). Unless stern measures are taken to stop this practice, there may not be much resources left in the region in future.
3.3.3 Mineral Resources:

Mineral resources constitute one of the most important bases of the economic structure and development. Industries, power, transport and trade largely depend on mineral development. In any study of economy therefore, mineral has to be given sufficient coverage. The minerals constitute one of the most important and valuable resources of the study area. The following paragraphs will reflect the mineral resource potential of the area under study (Fig.No.3.2.6).

Physiographically Orissa is an extensive plateau sloping gently towards the coastal plain in the east along the Bay of Bengal. The Mahanadi flowing east across the state divides the plateau into two regions: the northern plateau is a continuation southwards of the Chota Nagpur plateau of Bihar while the southern highlands are composed of the hill ranges of the Eastern Ghats.

Geologically, the northern plateau is made up of Archean and Dharwarian metamorphics with Gondwana sediments along the Mahanadi tract. The former is the source of the rich iron and manganese ores as well as chromite and limestone. Two coalfields are located in the Gondwana rocks of the central Mahanadi tract.

The districts of Kalahandi, Bolangir and Phulbani are situated in the southern highlands, composed of rocks belonging to the Eastern Ghats cycle of the Archeans and are not as rich in mineral resources as those in northern Orissa. Thus, while occurrences of coal, iron, manganese ore, bauxite, graphite, kankar, galena, china clay and
quartzite are known, the deposits tend to be either small or of a low grade. The known reserves of mineral deposits in the three districts are summarised in table.\(^\text{10}\)

At present, only the graphite deposits in Kalahandi and Bolangir districts are being worked. There are altogether 20 mines, 10 in each of the districts. Of these, five in Kalahandi\(^\text{11}\) and eight in Bolangir\(^\text{12}\) use mechanical power; the others do not use any kind of mechanical power. These 20 mines provided employment to 391 persons, 112 in Kalahandi and 279 in Bolangir. Three small beneficiation plants have been installed in Bolangir, at Patnagarh, Titlagarh and Mahanilaha; their capacities range from two to five tonnes per day. Production data for graphite are not published as per the Atomic Energy Act of 1948.

Stringers of coal have been reported from Gochhapara and Katrangia in Phulbani district.\(^\text{13}\) But, they have not been explored in any detail. In the present context of slack demand for coal and the existence of over-capacity in the coal mining industry, the development of any new field would have to be deferred during the next five or six years at least.

The deposits of iron ore in this tract are small. This is particularly so in comparison with the large rich ore occurrences in northern Orissa and in the Bailadilla ranges to the south-west in adjoining Bastar, Madhya Pradesh. Also the metal content of the ores in the tract is low being only 50-51 percent as against the 60 per cent and more in northern Orissa and the 64-66 percent in
the Bailadilla ranges. In the light of the current emphasis on high grade ores whether for internal or external markets, the Kalahandi deposits can only be considered as marginal deposits.

Similarly, the manganese ores are also of low grade. The ores from Phulbani, Upardoshe, Podkona and Nishikal in Kalahandi contain 14 to 55 per cent manganese, 1 to 34 per cent iron and above 0.17 percent phosphorous, going up to 2.49 percent. An average analysis of the Bolangir ores gives 25 to 34 percent manganese, 23 to 34 percent iron and 0.22 to 0.53 percent phosphorous. Current specifications for ores for standard grade ferro-manganese stipulate 48 per cent minimum of manganese, 6 percent minimum of iron and 0.12 percent maximum of phosphorous; therefore, the manganese ores of Kalahandi and Bolangir cannot be used for this purpose. It is the high Phosphorous content which would prove more crucial in the rejection of these ores. It may also be pertinent to note here that attempts to reduce the phosphorous content of Indian manganese ores have not been successful so far. Ore export possibilities must also be deemed to be non-existent for the same reason. On current trends additional ferro-manganese capacity does not appear advisable. There is one such plant at Rayagada in the neighbouring district of Koraput. This plant even now draw on high grade ores from Madhya Pradesh and Maharastra for the bulk of its ore requirement of 38,600 tonnes a year. Even if double stage smelting were to be introduced to use low grade ores, this plant must perforce prefer the low grade ores, closer in Koraput district itself.
Bauxite occurs in the high plateau of Kalahandi and Bolangir and the adjoining districts of Koraput and Sambalpur. The more important occurrences in the three districts under review are Khariar and Karlapat in Kalahandi and the Gandhamardan plateau on the Bolangir-Sambalpur border. The bauxites are low in silica and high in iron.

### TABLE 3.3.2

Occurrence of Minerals (Percent Weight)

<table>
<thead>
<tr>
<th>Area</th>
<th>Aluminia</th>
<th>Silica</th>
<th>Titania</th>
<th>Iron-oxide</th>
<th>Combined water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Karlapat-Kalahandi</td>
<td>52.53</td>
<td>3.20</td>
<td>4.20</td>
<td>7.56</td>
<td>27.24</td>
</tr>
<tr>
<td>Gandhamardhan-Bolangir-Sambalpur</td>
<td>52.20</td>
<td>3.42</td>
<td>1.36</td>
<td>18.62</td>
<td>23.70</td>
</tr>
<tr>
<td>Chandgiri-Koraput</td>
<td>56.80</td>
<td>2.56</td>
<td>2.42</td>
<td>8.98</td>
<td>27.20</td>
</tr>
</tbody>
</table>

While the Geological Survey of India had estimated a reserved of just under one million tonnes, the State Mining and Geology Department estimates a total of 3.3 million tonnes, inclusive of Koraput.

### TABLE 3.3.3

Estimated Reserve of Alumina

<table>
<thead>
<tr>
<th>Area</th>
<th>G.S.I.a (All grades)</th>
<th>State Mining and Geology Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kalahandi-Khariar</td>
<td>--</td>
<td>0.356b 50</td>
</tr>
<tr>
<td>Karlapat-Polingpadar</td>
<td>--</td>
<td>0.840b 48-51</td>
</tr>
<tr>
<td>Bolangir</td>
<td>--</td>
<td>1.000b 48-51</td>
</tr>
<tr>
<td>Koraput</td>
<td>--</td>
<td>1.120c 48 and above</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>0.997a</td>
<td>3.316</td>
</tr>
</tbody>
</table>
According to Roy Choudhury the intensity of 'bauxite formation' appears to be low in Orissa\textsuperscript{15} though the bulk of the bauxite produced, about 95 percent, goes into the extraction of the metal aluminium, the mineral is used in the manufacturer of refractories, synthetic abrasives, alumina cement, ceramics and chemicals and, for clarifying oils, etc. The specifications indicated in the following table generally apply for the various uses.\textsuperscript{16}

**TABLE 3.3.4**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Alumina</th>
<th>Silica</th>
<th>Iron oxide</th>
<th>Titania</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metallurgical</td>
<td>50-55</td>
<td>0-15</td>
<td>5-30</td>
<td></td>
</tr>
<tr>
<td>Abrasive</td>
<td>Min.55</td>
<td>Max.5</td>
<td>Max.6</td>
<td>Min.2.5</td>
</tr>
<tr>
<td>Chemical</td>
<td>Min.55-58</td>
<td>Max.5-12</td>
<td>Max.2</td>
<td></td>
</tr>
<tr>
<td>Refractory</td>
<td>Min.59-61</td>
<td>Max.1.5-5.5</td>
<td>Max.2</td>
<td>Max.2.5</td>
</tr>
</tbody>
</table>

Min = Minimum  Max = Maximum
The prime requisite for the metallurgical grade ore is high alumina content. Easy digestibility in the caustic leach would be another favourable criterion. A wider tolerance is permissible now-a-days, but would require the 'modified' or 'combination' processes to be adopted.

As can be seen from the specifications indicated earlier the bauxite suitable for aluminium extraction may not be acceptable to the other consuming industries. Thus the manufacturers of fused alumina abrasives stipulate low silica (2-3%) though up to about 7 percent can be tolerated since it affects furnace efficiency. Iron content is not critical. Titania above 3.5 per cent is preferred. Lime and magnesia affect grain size and should be low.

In the manufacture of refractories silica should be low. Excess titania, over 3.75 percent lowers the refractories while more than 2.7 percent iron oxide causes warping of the bricks. Lime, magnesia and potash should be low.

Chemical grade bauxite primarily used to make aluminium sulphate and for clarification, desulphurisation and decolourising various lubricating, fuel and animal and vegetable oils should be low in iron oxide, under 2 percent. The alumina content should be readily soluble in sulphuric acid.

As sufficient number of analysis are not available for the deposits in Orissa to assess their suitability for the various uses above: nor can the analysis now available be considered typical since the estimates of reserves take in to account material with
48 percent alumina, against the 52 and 56 percent contents in the analysis. Thus while the material appears to be suitable for the extraction of the metal very little can be said about its suitability for the other uses at this stage.

It is understood that a letter of intent has been issued to a private sector company to establish a 30,000 tonnes per year aluminium smelter in the adjoining Koraput district.\textsuperscript{10} It should be noted that such a level of production must now be considered as minimum annual scale, even in India. The new facilities proposed and under implementation in Madhya Pradesh, Maharashtra and Mysore, both in the private and public sectors range from an initial 30,000 tonnes going to 100,000 tonnes a year in the second stage in Mysore, an initial 50,000 tonnes a year in Maharashtra to an initial 100,000 tonnes a year in Madhya Pradesh. Expansions of the older smaller plants are underway. With the currently indicated reserves of 0.3 million tonnes in Orissa, a 30,000 tonnes a year aluminium production can be sustained for 22 years a 50,000 tonnes a year scale for 13 years and a 100,000 tonnes a year scale for 6\frac{1}{2} years, assuming 100 per cent mining recovery. It is possible that a smelter plant be set up here and alumina obtained either in part or full from elsewhere. For against the original intention to set up an aluminium smelter in Gujrat, current proposals are to produce only alumina for the present.

Even so, it must be mentioned that firm proposals, excluding the aforesaid letter of intent in Orissa, various stages of implementation elsewhere in India, would bring the total aluminium capacity
to 330,000 tonnes a year against the present capacity of 113,000 tonnes and the production of 95,800 tonnes (in 1987). Thus it appears likely that the proposed facility in Koraput may well go beyond the Fourth plan before it takes a firm shape.

Any proposal to utilise these bauxites for other uses would necessarily entail further detailed investigations to cover the variations in chemical composition. This work again need done only after a firm decision on the proposed aluminium plant is taken. Such an investigation may keep in view the possibility of producing calcined alumina for diverse used. At present the other users are dependent on the integrated aluminium plants for their requirements of alumina the captive fused alumina plant in Kerala owned by an abrasive manufacturer being the exception.

Different grades of calcined alumina can be produced under rigorously controlled conditions from 'Bayer' alumina grain:

1) Calcined alumina-standard grade (with about 0.5% soda) for use in
   (i) Abrasives
   (ii) Ceramics (high alumina composition like capacitor and resistor cores, spark plugs, grinding balls, etc)
   (iii) Refractoriess
   (iv) White-wares,
   (v) Glasses and enamels
   (vi) Flame sprayed alumina coatigs on metals.
2) Low soda alumina (Maximum 0.13% soda)
   (i) High grade electrical insulators
   (ii) Electronic industry because of its excellent
dielectric properties
   (iii) In missile and nose cones.
3) Hydrated alumina
   (i) Iron-free alum (as distinct from commercial
        alum) for use in paper industry and to make
        aluminium acetate to dye textiles, aluminium
        stearate, aluminium resinate, light aluminium
        hydrate for the pharmaceuticals industry.
   (ii) Cracking catalyst in petroleum refining
   (iii) Pigments and fillers.
4) Tabular alumina
   (i) Special high alumina refractories and castables
        containing 90-99 percent alumina.
   (ii) Special electrical insulators.
   (iii) Catalysts support in high temperature reactions
   (iv) Filler in plastics, in epoxy and polyester
        resins
5) Activated alumina
   (i) Dessicant for ethylene, catylene, natural gas
        oxygen nitrogen butane, gasolines, etc.
   (ii) In lube and transformer oils

Graphite deposits are found in all the three districts. Those
in Kalahandi and Bolangir are being worked. The more important
occurrences are:
Kalahandi-Densurgi, Ketupara and Singjharan.

Bolangir-Bakbahal, Brahmani, Matupali Dharukhaman and Tentulikunti

Phulbani-Tumudibandh.

The graphite is of the flaky variety and the run of mine material generally contains 40-70 percent fixed carbon. By and large the graphite is upgraded by handpicking and sorting then the residue is milled, sized, washed and thereafter panned or winnowed. Three small beneficiation plants have been set up in Bolangir district at Titlagarh and patnagarh, with daily capacities up to five tonnes. The 'upgraded graphite is belended with imported graphite to make crucibles in a few units.

The final product analyze 70.90 percent carbon. While this is easy further refining of graphite is very difficult. According to the U.S. Bureau of Mines "Probably in no other industry has such a large proportion of mills failed to make commercial recoveries" very often the graphite marketed in other countries is a blend of material from different mines and/or with synthetic graphite. Recently a plant to produce synthetic graphite has been set up in India. Thus with an assured supply of pure synthetic graphite, appreciable expansions cannot be envisaged in mining low grade graphite and its benefication to a medium grade product.

Kankar, a nodular variety of limestone occurring in the soil horizon, is found in Phulbani district. Often it is impurex and can be used only to make building lime; at best it may measure up to being cement grade like in Haryana. But with the quantities now
indicated, between two and three lakh tonnes only a small scale cement unit of about 30 tonnes per day can be sustained. In such units the cost of production is usually high about Rs.15-20 a tonne more than in conventional large scale units. Such units are favoured in remote areas, but availability of fuel in close proximity to the proposed site would appear to be a precondition. Also to be considered is the fact that there are two large scale cement units fairly close by, viz. at Rajgangpur and Bargarh with a total annual capacity of 766,800 tonnes of portli and cement and 150,000 tonnes of pozzolanic cement; additional slag cement capacities are also likely from the Talcher complex and the Rourkela Steel Plant slags. It is true that at present Phulbani is rather isolated from the rest of the state, but as communications improve, which has been suggested elsewhere in this report the economics of any small cement plant would necessarily become more unfavourable.

Among the other minerals the Geological survey of India is investigating the occurrences of galena. China clay mica and and quartzite occurrences do not appear to be of any economic importance.

The above analysis shows that the known mineral occurrences in these three districts with the possible exception of bauxite are of marginal viability and cannot sustain any heavy mineral-based industry, be it in metals or non-metals. Among the non-resource based mineral industries are glass and ceramics. Though their products are strictly speaking consumer goods the markets for these generally develop when the 'Society' has achieved a certain degree of sophistication rather than in a 'backward' tract.
3.4 CONCLUDING REMARKS:

Thus, it is observed that the key sectors of the economy of the region is under-developed. The potentials are however great and even in the present state the region's contribution to the G.N.P. is significant. This is particularly true in respect of mineral and forest products. The soil of alluvial plains and erosional plains of the region is generally fertile and offer much scope for the development of agriculture. The numerous rivers flowing through these plains have large irrigation potential, which if exploited would facilitate more intensive cultivation of land. On the other hand the hilly regions are not so fertile, but its agricultural deficiency is amply compensated by its rich forest and mineral resources. It has the larger reserves of mineral and forest resources. But due to inadequate infrastructural facilities, that could not be utilised and exploited properly for the economic upliftment of the region.

The three districts of the region under study exhibit the characteristics of economic backwardness in a very acute form. Even the planned efforts made during the last 40 years in Orissa had little impact on these areas. Consequently their economy has remained stagnant over the years. This can be attributed largely to the fact that in the absence of other resources the bulk of the population has to depend on single economic activity. Namely agriculture. Even here the output from land is meagre because most of the agricultural land is cultivated only during the rainy season. The handicap in agriculture mainly arises from the lack of irrigation facilities which if available could enable better utilisation of land. Therefore the study of the problems of these areas could be conducted on the following lines:
(a) To examine the irrigation potential so that the prospects of intensive cultivation could be ascertained.
(b) to suggest the line of agricultural development in those areas where irrigation possibilities are ruled out and (c) to assess the scope of development in other sectors.

The development of facilities for transport, power, education and technical skills could then be planned to cater to the requirements of agriculture and industry. Special attention needs to be given in this region to see that the tribal population also get the benefits of development.

REFERENCES:

7. Basic Road Statistics, Govt. of India, P-256-257.


