CHAPTER - I

INTRODUCTION
Problem of the Study

Resource development is a process in which natural endowments of a region are transformed into economic and cultural uses for man by scientific management, productive skills and developed technology. India so also Orissa has vast natural resources which have not been utilised fully. This indicates the developing nature of the State and country. It will be the endeavour of the State to utilise the resources to the fullest extent for bringing about the overall development of the State.

Mineral resources and its utilisation are related with the mining and industrial activities and are the sources of national income. Minerals are usually found in or on the earth's surface and are obtained from the earth's surface through the process of mining. The minerals are utilised mainly in the mineral based industries besides other uses like household, transportation and export. As industrialisation in India is designed not only to increase the quantum of value added but also to serve as a means of reducing unemployment by creating job opportunity, removing regional disparity, and uplifting income level of masses, it demands a deeper study of the industrial system.
In Orissa, the first stage of industrialisation was started during the early fifties during the first Five Year Plan when the Hirakud and the Machhkund projects were launched to harness the water resources by constructing multi-purpose river valley projects to boost up the agricultural economy of the State. To meet the huge requirement of cement for the construction work of Hirakud, Orissa Cement Ltd. (O.C.L.) was set up at Rajgangpur in 1951 with the collaboration of Government of Orissa and Dalmia Agencies.1

Orissa, from mineral resources point of view, is not only one of the richest state in India but also is one of the few such privileged ones in the world. It is not far from truth to say that Orissa is the store house of ores and minerals of the country. Orissa represents the paradox of poverty in the land of plenty2. The reason is the lack of proper knowledge and technical knowhow to utilise our resources. We have not yet gone through the process of raising production in fields and factories to banish poverty from the land of plenty and thus have a low percapita income.

All the rock formations in the geological time scale comprising the oldest “Archaeans”, younger coal bearing “Gondwanas” and the “recent” formations of laterites and alluvium make up the land mass of the State. The Archaean by far is the most dominant rock formations
occupying about 80% of the total land mass of the State. These formations bear the minerals and ores that we need for our sustainance and economic development. The geological set up of the State is not only favourable for discovery of a wide variety of valuable ores and minerals but there is distinct possibility of substantial increase in the total stock of the resources.

The mineral reserves of the State are vast and varied contributing about 18.6% of the total reserves of the country. However, in the production front Orissa's contribution is only 10.2%. So the mineral sector has the potential of transforming the economic scenario of the State if exploited properly. The major shortcomings for the industrial development in the State are the poor exploitation of raw materials, non availability of capital and other infrastructures like power, labour, transport and market facility.

The problem lies in the fact that the mineral resources of the region is judiciously exploited and utilised in the mineral based industries set up with advanced technologies to its full capacity, thus making Orissa an industrial State and provide immense potentials for economic development so that the State attains the status of an exporter of finished products in place of the existing status of an exporter of minerals, in decades to come. To remove the glaring regional
imbalances and backwardness of some districts, regional development plans involving mining and industrial activities are needed.

**Previous Studies**

No detailed and systematic work has been undertaken regarding the utilisation of minerals produced in the State in different industries both inside and outside the State. In a state like Orissa, the minerals produced in the State need to be utilised in the State itself.

The vast resources of iron ore have attracted many authors for detailed study. The earliest studies on iron ore in the State in the Gorumahisani and Badampahar area in Mayurbhanj district had been undertaken by P N. Bose (1904), Perin and Weld (1905), Curnow (1914-15), Judd (1915), Dhar (1933-41) and B.B. Upadhaya (1961-62). Narke (1915), A.K. Bose (1921), Dr. Percival (1922), B. Sen (1937) and Dhar (1937-38) have investigated the deposit of Badampahar. The rich deposit of iron ore in the erstwhile state of Kendujhar was brought to light by Frederick Dundes Whiffin. Exhaustive studies of the iron ore deposits of Bonai-Kendujhar belt have been made by H.C. Jones (1934) and M.S. Krishnan (1937). The State Directorate of Mines assessed the deposits of Daitari and Gandhamardan during 1957-58 and 1962-63 respectively. Mineral resources of Bonai-Kendujhar belt have been studied by B K. Acharya (1984). Other recent pioneers on the study of

S.K. Bhattacharya, U.K. Behera and S.K. Jena (1989) have studied the manganese resources of southern Orissa. B.C. Acharya, D.S. Rao and R.K. Sahu (1990) have also worked on the Nishikhal manganese ore deposit. B.K. Mohanty (1993) has reported on the availability of manganese ore in Orissa. R.K. Sahu (1963) has studied geology of the igneous complex around Nuasahi, Kendujhar district with particular reference to economic mineral. O.P. Verma (1964) has undertaken the study of the chromite deposit of Kendujhar district. B.K. Sahu and P.C. Bagchi (1959) have also studied the chromite deposit of Saruabil. Study have also been undertaken by authors from time to time which include P.K. Banerjee, K.L. Chakravorty, T.L. Chakravorty (1984), S. Mukherjee, J.K. Mohanty and R.K. Sahoo (1989). R.K. Sahoo (1995) has studied the chromite resources of Orissa.

N.K. Das and B.D. Rath (1974) have studied the western extension of Talcher coal field. Raja Rao (1982) have undertaken the study of coal fields of Orissa and other states. P.N. Choudhury (1988), P.K. Mohanty (1989) have worked about the geology and coal resources of Gopalpur area of Ib valley coalfield and Chhendipada, Bada
Gunduri block of Talcher coalfield respectively. V.N. Choudhury (1989)\textsuperscript{18} has worked on the coal resources of Ib valley. V.D. Manjrekar, V. Choudhury and K.V.V.S. Gautam (1995)\textsuperscript{19} have undertaken the detailed study of coal resources of Orissa.

The bauxite deposits of the State have been investigated, surveyed and evaluated by the East Coast Bauxite Project comprising Directorate of Mining and Geology, Geological Survey of India (G.S.I) and Mineral Exploration Corporation Ltd. during 1976-80. J.N. Das and R.C. Mohanty (1995)\textsuperscript{20} have undertaken the elaborate study of the Bauxite resources of Orissa recently.

B.D Prusti (1965)\textsuperscript{21} has studied the limestone and dolomite deposits of Orissa. B.D. Rath and R.N. Seth (1995)\textsuperscript{22} have also studied the prospect of limestone and dolomite resources of Orissa. B.D. Dash (1986)\textsuperscript{23} has worked on the geology, exploration and development of graphite ore in Orissa. R.N. Mishra and R.N. Padhi (1995)\textsuperscript{24} have studied the graphite resources of Orissa. A.K. Nanda and B.D. Bhol (1995)\textsuperscript{25} have undertaken the study of fire clay of Orissa.

Besides the above studies, various Government agencies like Directorate of Mining and Geology, Geological Survey of India and Orissa Mining Corporation have also undertaken investigation of mineral resources of the State.
There has been some studies on the industrial prospects of Orissa by different authors. H.B. Mohanty (1957)\textsuperscript{26} has undertaken the industrial survey of Orissa. He has further studied on the location of Iron and Steel Industry in Orissa\textsuperscript{27}. Prof. B.N Sinha (1959)\textsuperscript{28} has studied about the Heavy Industries, their problems and possibilities in Orissa besides the problem and prospect of large scale, medium scale and cottage industries\textsuperscript{29}. Some study has been made by Choudhury and Sinha (1972)\textsuperscript{30} with the specific purpose of analysing our industrial system. A study has been done on the locational aspects of the existing large scale industries in Orissa by K.P. Tripathy (1983)\textsuperscript{31}. The growth of industries in coastal region has been studied by D. Tripathy (1990)\textsuperscript{32} with a case study of industrial planning. J.J. Rao (1990)\textsuperscript{33} has investigated the prospect of chrome based refractories in Orissa. B.K. Mohanty (1992)\textsuperscript{34} has studied the availability of mineral raw materials for iron and steel making in Orissa.

There has been a gap between the production and utilisation of mineral resources. In the present study attempt has been made to assess the rate of exploitation of different minerals and their pattern of utilisation. Since the State is undergoing a transition from agrarian to industrial based economy, the developing industrial scenario is quite complex and should be properly studied and planned. Quite a significant number of industries of large, medium and small size are on
increase day by day. Similarly new reserves of minerals are added and old reserves are being exhausted day by day. As far as possible, the up-to-date information of the industries and minerals in the State has been included in the present study.

Objective of the Study

The objective of the study is to assess the quantity of production of different minerals and to suggest proper utilisation of mineral resources by establishing some new, large and medium mineral based industries in the State. However, the availability of minerals and the recent industrial policy of Orissa aiming at perceptible liberalisation, international competitiveness, quality and efficiency, the infrastructural facilities, finance by the promotional agencies like IDCO, IPICOL, IDCOL and DIC have attracted the entrepreneurs to set up units to utilise the vast reserve of minerals and help the speedy development of the mineral rich state, Orissa.

However, the main objectives of the present study are:

1. To appraise the potential mineral resource of Orissa.
2. To assess the extent of mineral exploitation.
3. To assess the pattern of utilisation of minerals produced, both inside and outside the State including export to other countries.
Hypothesis

The geological set up of Orissa has favoured the State with rich deposits of minerals. While analysing the development of minerals, infrastructure and industries, six hypothesis have been taken into consideration. These are:

1. Spatial variation in the mineral resource base leads to widening regional disparities.
2. Development tends to concentrate in areas of higher concentration of mineral resources.
3. Exploitation and proper utilisation of mineral resources leads to economic development.
4. Infrastructure is a pre-requisite to development of a region.
5. Concentration of mineral resources in an area leads to sectoral change in the economy (from primary to secondary).
6. Development of minerals, infrastructure and industries are interlinked.

Data Base and Methodology

In the present study the region has been delineated with political boundary. The data and informations have been collected from
primary and secondary sources. The study is based on the data of the newly formed thirty districts of Orissa.

Primary sources include collection of data from different industries and mining areas besides their offices located far away from the sites. In spite of persuasion and repeated requests to the authorities complete data could not be obtained. The reasons for this may be the professional secrecy of the industries both in public and private sectors. The data and informations also have been obtained from secondary sources like published and unpublished records, documents, brochures, bulletins, pamphlets etc. From the study it is revealed that the data on the minerals produced and consumed in a year do not tally for reasons like pending from previous years etc. Similarly amount of minerals despatched from mines for export do not tally with actual shipment for similar reasons.

Statistical informations pertaining to minerals were obtained from Directorate of Mining and Geology, Bhubaneswar. Data regarding human resources is available from census reports of Orissa. Data related to forest, agriculture, roads, railways, man power etc. were obtained from Economic Survey of Orissa, 1990-91 to 1993-94. The general informations about the large and medium scale industries were collected from Directorate of Industries, Bhubaneswar. Data related to
Industrial production and consumption of raw materials were collected from different industries. Besides, other data and informations were collected from published and unpublished records of Directorate of Economics and Statistics, IDCO, IPICOL, ORITCO, OMC at Bhubaneswar and Registrar of Companies at Cuttack.

Then the data were processed, tabulated and analysed. Basing on these, maps, diagrams, graphs, charts, etc. were prepared to show the validity of the study.

To assess the status of mineral, industrial, and infrastructural development of the districts, Composite Index method has been used. Multiple indicators of these three categories of development have been taken into consideration. The composite index basing upon which the categorisation has been made is found out by standard score or $\omega$ values suggested by Berry\textsuperscript{35}.

Theoretically the $\omega$ (omega) value for each variable for the thirty districts has been calculated by the formula

$$
\omega = \frac{(x^i - \bar{x})}{S_x}
$$

Where $x^i =$ value of variable for $i^{th}$ region.

$\bar{x} =$ mean

$S_x =$ Standard deviation.
The sum of the \( \omega \) values of each district for different variables has been taken as the composite index for the districts. The method retains the relative differences of regions along the measurements and thus it has been preferred over the ranking method. The districts have been categorised as four groups based on the composite index to identify rich, moderately rich, poor and very poor and presented on a map. Further, to know the overall development of the districts, socio-economic and agricultural development have also been taken into consideration besides the mineral, industrial and infrastructural development.

An in-depth study of the problem of regional imbalances and plannings for industrial development has been carried out. Feasibility of setting up of new industries on the basis of availability of raw materials and infrastructures besides other factors have been found out.

**Organization of the Study**

The entire study has been arranged in six chapters.

The 1st chapter deals with introduction of the present study. The nature of resource development with emphasis on the distribution and utilisation of mineral resources has been discussed in this chapter. It covers problem of the study, previous studies, objective of the study,
significance of the study, hypothesis, data base and methodology and organization of the study.

Problem of the study arises from the fact that though Orissa has abundant resource potential it is lagging behind. It continues to be an epitome of poverty amidst plenty of natural resources. Previous studies show the various works done by geographers and geologists. Some works are geographical and some are geological but these works are concomitant to each other. The objective of the study includes six clear cut objectives necessary for development of mineral resources. The validity of the study has been highlighted while discussing the significance of the study. The study helps in understanding the contribution of mineral resources in development of the State. Hypothesis is of great importance. Here assumptions were made and tested in V\textsuperscript{th} chapter. Data has been collected from primary and secondary sources. Composite index method suggested by Berry has been adopted for regionalization. At last organization of the study has been given in an arranged and systematic way.

Chapter II\textsuperscript{nd} is devoted to physical features and socio-economic profile of the State. The physical features deals with location, shape, size, geology, physiography, drainage, soil and natural vegetation. Geology is discussed elaborately because occurrence of mineral resource
is related with the type of geological formations. Salient features of socio-economic profiles of Orissa such as population, land use, agriculture, industries, transport and trade have been described.

Chapter IIIrd makes a comprehensive study of mineral resources of Orissa. Orissa is blessed with wide abundance of minerals. This chapter comprises definition and types of resources and detailed discussion on spatial distribution and exploitation of major minerals such as iron ore, manganese, chromite, nickel, copper, bauxite, limestone, dolomite, fire clay, china clay, coal, precious and semiprecious stones. Of the total reserves of bauxite ore only Panchpatmali bauxite mines is under exploitation. Nickel, copper, tin and china clay have not been exploited yet. The vast reserves of coal and iron ore in the State need to be exploited in a faster rate.

Utilisation of mineral resources is discussed in Chapter IVth. It covers the four types of utilisation of minerals such as utilisation for domestic or household purposes, transportation purposes, industrial production processes and utilisation for construction, trade and commerce. Utilisation of minerals like iron ore, manganese, chromite, bauxite, limestone, dolomite, quartz, quartzite, china clay, fire clay and mineral sand in different industries has been discussed separately. The process of industrialisation in Orissa has been very slow. In absence of
adequate mineral based industries, exploitation of minerals has remained low and Orissa still is considered industrially and economically backward. Minerals produced in the State is also utilised for construction, trade and commerce. Most of the minerals produced in the State is sent outside the State and country. Thus Orissa possesses vast potential for setting up of mineral based industries. So it is necessary to accelerate the process of industrialisation by massive utilisation of mineral resources by setting up of mineral based industries.

The Vth chapter is devoted to planning of mineral resources and regional development plans. Detail discussion on mineral policy highlighting policy and methods of exploration, exploitation and mining has been narrated besides planning for development of mineral resources, conservation of mineral resources and environmental degradation by mining and manufacturing activities. Mineral exploration in the State is yet to be completed. It has become necessary to gear up the exploration activities by the different agencies. Modern techniques like remote sensing, geophysical survey and high resolution aeromagnetic survey are being adopted for the exploration of minerals in inaccessible areas. Emphasis has been given in the conservation of mineral resources because it is an exhaustible resources. Environmental degradation due to mining and industrial activities are described. Air and water pollution
is the major concern of environmental degradation. Some of the remedial measures have been discussed.

The level of development of different districts as regards their mineral, infrastructural and industrial development has been found out by composite index method suggested by Berry. To find out the overall development, socio-economic and agricultural developments have also been taken into consideration. In this chapter attempts have been made to suggest new mineral based industries for massive utilisation of mineral resources and to reduce the regional disparities. Availability of minerals and infrastructural facilities are the prerequisites for industrial development. Role of roads railways, power, water, land, and promotional agencies as infrastructures in industrialisation has also been discussed.

The VIth chapter is the Summary and Conclusion of all the chapters

References

1. Tripathy, K P., Location and Distribution of Large Scale Industries in Orissa, Uttar Bharat Bhoogal Parishad; Gorakhpur, 1983, P 84.


3 Govt of Orissa, Directorate of Mining And Geology, Bhubaneswar, “A Profile of Mineral Development”, 1986, P 1

5. *Ibid*, P.231


