



A CASE STUDY OF ROCKS AND MINERAL RESOURCES OF CHHATTISGARH STATE

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ABSTRACT

A state which is going to established Mineral based Industries without importing any major raw minerals from other state. The state is rich in power, Water and Human Resources besides workable economic deposits of almost all major and minor mineral. In Bastar which is a Tribal belt region of Chhattisgarh state and is also known for its Natural forests, Rivers and Topographical features like Plateau, Caves and Water Falls. Minerals and underlying Rock Formations and abundance Sources attracts Mineralogist and Construction Industries. Along with extraction of valuable Ores from the area many other Major Civil Engineering activities are being conducted in this region related to underground construction for defense, underground tunnel for Water Power project, underground Mining of rock slopes, Roads, Bridges, three big Steel and Iron Industries and so many small scale industries. The rocks are used as building and road metals, raw materials for cement manufacturing and it is made with much economy and stability. The checking of suitability of rocks for construction of different type of structures including Industrial Building, Bridges, Towers, Over head and Underground Water Tank and Roads etc by conducting systematic study of Engineering properties of rocks is required.

KEYWORDS Natural forests, Rock Formations, Rock slopes, Rock Mass, Metallogenic and Mineralogic.

INTRODUCTION

Chhattisgarh has a wide variety of rocks as Igneous, Sedimentary and Metamorphic. Some of them are large economic deposits while few of them are reported only as occurrences. The Large amount deposits of Coal, Iron Ore, Limestone, Bauxite, Dolomite and Tin ore are located in different parts of the Chhattisgarh state. Recently identified diamondiferous kimberlite in Raipur district is also likely to yield substantial quantity of diamonds. The deposits of Gold base-metals, Quartzite, Soapstone, Steatite, Fluorite, Corundum, Graphite, Lepidolite, workable size Amblygonite of identified. The Occurrences of Garnet, Amethyst, Beryl, Andalucite, Kainite, Sillimanite and rare precious Mineral Alexandrite is reported in the different parts of the State.

The deposits of grey, pink, red and black granites (Dolerite, Amphibolite and Gabbro), and Flagstone of grey, black and purple shades are widely located in the different part of state and that are suitable for dimension stone and decorative purposes. The major multinationals and national players in the field of Mineral Exploration are working in the state. The richest resources of minerals are available and more than 28 Minerals are found in the State. The Minerals explored in the year 2005-06 the worth was Rs. 5600 Crores (excluding Atomic Minerals, Oil and Natural Gases). The mineral revenue contributed Rs. 737.85 Crores) in the state. The Classification of Rock Mass and their Engineering Properties could also be undertaken to suggest the

stability aspects of underground constructions and mining activities of that areas.



Fig.1-Minerals in Chhattisgarh

GEOLOGICAL FORMATIONS



Fig.2-Crotons of Chhattisgarh

One of the most important geological terrain in the Indian shield comprising litho logical sequence ranging in age from Achaean to Recent in the state. The EW trending Central Indian Shear Zone (CIS) sub-divide this region into two provinces viz the Bastar Croton (Province) in the south and the Singh Bhum Croton in the north State predominantly comprises of Achaean to Lower Proterozoic Metamorphoses including Granite Gneissic complex with enclaves of Bengpals supra crystals, N-S trending Banded Iron Formation of Bailadila Group, rocks of green stone belt (Sonakhan Group), rocks of Chilpi Group and Dongargarh granite etc South and South Eastern parts of the state. Central part of the State is occupied by the calcareous & Arenaceous Sedimentary rocks of Proterozoic age belong to Chhattisgarh Super group.

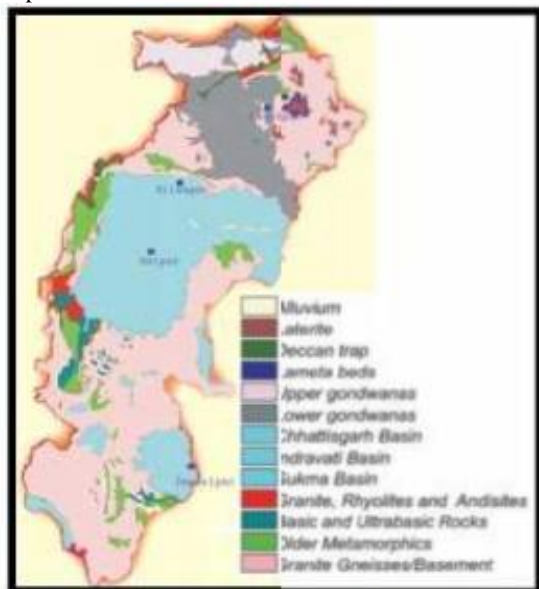


Fig.3- Geological Map of Chhattisgarh

The North and North Eastern part of the state has been covered with Gondwana sediments of Mesozoic period and Deccan Traps. The Traps often capped by laterites of Cainozoic age. Quaternary alluvium is mostly confined to major river valleys in the State.

IMPORTANT MINERALS OF STATE

The perfect geological set up to host a number of economic mineral deposits are found in the Chhattisgarh state. In the area multiple major thermo tectonic events, cover in principal Metallogenic and Mineralogenic episodes has been observed. More than 28 known minerals are available and the state is the richest in mineral wealth. The important mineral is Diamond in which the name of the State is intimately associated.

The Coal, Iron ore, Limestone, Dolomite, Bauxites and Tin ore and Tin ore, occurs only in Chhattisgarh state in India. The Atomic minerals and precious metal gold also occurred in the state.

IMPORTANT MINERALS

S. No.	Kind of Minerals	Quantity found in the State
1.	Iron ore	2336 M.T.
2.	Coal	39545 M.T.
3.	Bauxite	198 M.T.
4.	Lime stone	8225 M.T.
5.	Cassiterite	31.84 M.T.
6.	Dolomite	935 M.T.
7.	Gold	3 M.T.
8.	Corundum	50 M.T.
9.	Quartzite	26.10 M.T.

Table-1: Minerals & Available Quantity

The other minerals include Corundum, Clay, Quartzite, Fluorite, Beryl, Andalusite, Kyanite, Sillimanite, Talc, Soapstone and Garnet Vast reserves of granite of various attractive shades, which can be used as decorative stones, are located in the different part of state. Thegranulites facies rocks could clearly be delineated to form separate belt in southern part of Bastar Division inc luding the Bhopalpatnam, Granulites belt.

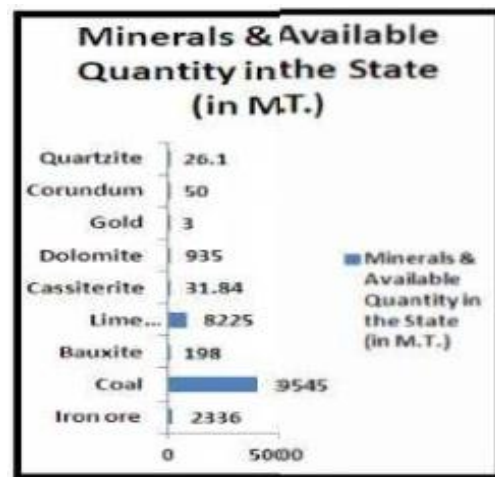


Fig.5- Minerals & Available Quantity

Iron Ore

The world-class iron ore deposit up to 68% Fe available in the large amount in the state. More than 2300 million tones of superior grade Hematite iron ore are found in the state, which constitute one fifth of total Indian iron ores.



Fig.6-Iron Ore (Hematite)

The 23 million tons iron ore were produced in the Chhattisgarh State in the year of 2004-05 and ranked 3rd in the country and it is accounting 16 % of the overall the national production of the country. Jindal Steel Power Ltd. and Bhilai Steel Plant are working in the state. More than 76 sponge iron units are operational in the State. NMDC Iron and Steel plant is under construction and two more Tata Steel and, Essar Steel has signed MOUs with State Government. to set-up steel plants in the Chhattisgarh State

Bauxite

The state has approximately 198 million tones bauxite in the different parts of the state and it is 7 % of the total national reserves of India. The state, ranks 5th in the country in extracting bauxite by contributing 9.5 % to the national production.



Fig.7 Bauxite

The State aluminum reserves support extraction units of BALCO situated in the Korba district of Chhattisgarh state and Hindalco in Uttar Pradesh. Aluminum extraction hub has been proposed in the state which will house more than 100 units to manufacture various aluminum produces.

S.No	Area of Occurrence	Quantity in M.T.
1.	Mainpat area, Surguja	31.23
2.	Kandraja block, Mainpat, Surguja	10.10
3.	Jamirpat area surguja	40.50
4.	Pendrapat area, Jashpur	12.93
5.	BodaiDaldali, Kabirdham	6.12
6.	Keshkal area, Kanker	6.44
7.	AsnaTarapur, Bastar	1.50

Table-2: Area & Available Quantity

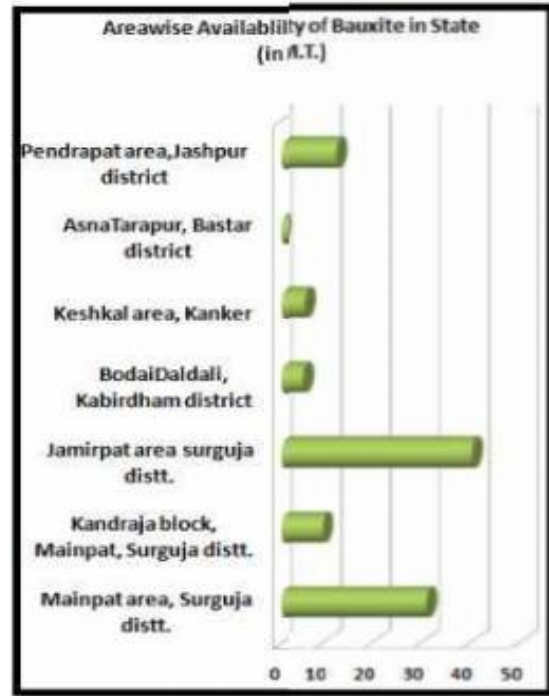


Fig.8- Area wise availability of Bauxite in the State

Limestone

The contribution of the state is 5% to the national reserves with over 8225 million tones limestone of high grades. The rank of state is 5th in limestone production sharing 10 % of the national tally. Further, 7 major and 4 minor Cement production units are operational. The Cement grade limestone deposits of various magnitude have been identified in the different part of state.



Fig.9- Lime Stone

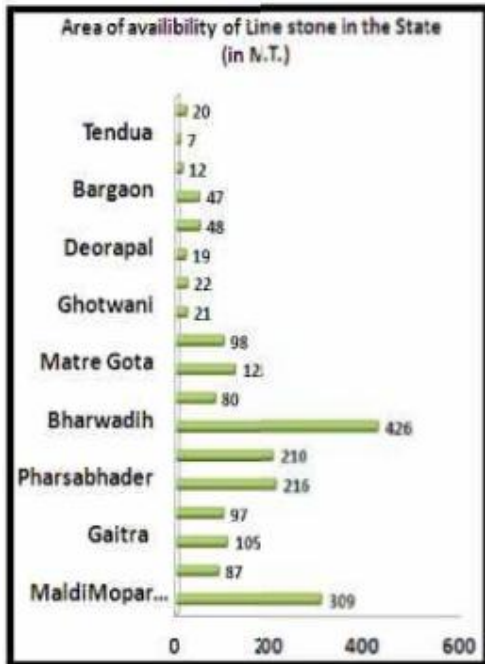


Fig.10- Area wise availability of lime stone in the state

Kanger limestone belt extends over a length of 30 km from Dhurvara to Kotomsari and Pekela limestone belt of about 5 km and Potanar limestone belt about 8 km stretch located near Jagdalpur in bastar district of the state

S.No	Area of Occurrence (District)	Quantity in MT
1.	MaldiMopar Karmadih, Raipur	309
2.	Chandi area, Raipur	87
3.	Gaitra area, Raipur	105
4.	Mohra area, Raipur	97
5.	Pharsabhader, Raipur	216
6.	Kukradih, Raipur	210
7.	Bharwadih, Raipur	426
8.	Achhoti area, Durg	80
9.	Matre Gota, Durg	121
10.	Semaria, Durg	98
11.	Ghotwani, Durg	21
12.	PotanarBaranji , Bastar	22
13.	Deorapal, Bastar	19
14.	Sivni-Alnar, Bastar	48
15.	Bargaon, Janjgir	47
16.	Tendua, Bilaspur	12
17.	Tumribor, Rajnandgaon	7
18.	Ranjitpur- Kawardha	20

Table-3 Area & Available Quantity

The hug deposits of BF grade limestone are located in the Bilaspur district of sate. The 2373 million estimated Lime stone of recoverable reserves is found in Raipur district of Chhattisgarh state.

Dolomite

The Dolomite available in the state is mostly of flux and refractory grade and is being used in steel and iron

industries.



Fig 11. Dolomite

The state has 13% of the total Indian dolomite deposits with The 935 million tones reserve of dolomite deposits estimated in the state and it is about 13 % of total Indian deposits. The state ranks 2nd in dolomite production sharing over 26 % of national production.

Coal

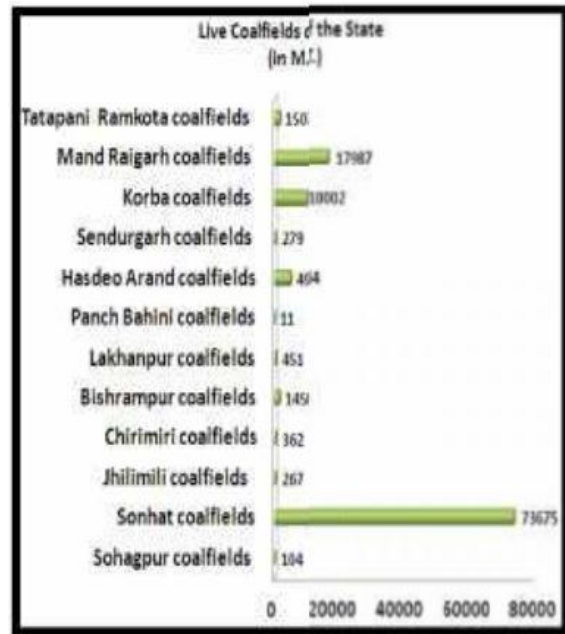


Fig. 13.- Live Coal fields & Available Qty.

The state contributes 16 % of the total deposits of coal in India. The 9545 million tones of coal have been estimated in 12 coal fields of the state. The main deposits are located in the Raigarh Surguja , Korea and Korba districts.

S.No	Live Coal Field of State (District)	Quantity in M.T.
1.	Sohagpur Coal fields in Sarguja	104
2.	Sonhat Coalfields Semi coking Non-coking inSarguja	73675
3.	Jhilimili Coalfields in Korba	267
4.	Chirimiri Coalfieldsin Korba	362
5.	Bishrampur Coal fields in Sarguja	1450
6.	Lakhanpur Coal fields in	451

	Sarguja	
7.	Panch Bahini Coalfields in Sarguja	11
8.	Hasdeo Arand Coal fields in Sarguja- Korba	4964
9.	Sendurgarh Coalfields in Korba- Korba	279
10.	Korba Coalfields in Korba	10002
11.	Mand Raigarh Coal fields in Raigarh	17987
12.	Tatapani Ramkota Coalfields in Sarguja – Korba	1507

Fig. 4 Live coal fields & available Qty.

The state ranks 2nd in coal production by contributing over 18% to the total national output. All the coal deposits of the state are of power grade. NTPC and CSEB in the Korba are the major producer of thermal power in the State and a new plant NTPC has been recently established in the seepat Bilaspur district.



Fig. 14 Coal

The more power generation unit can be established in the state. The 10000 MW capacity Power plants are expected to materialize by 2011. The 9 coal blocks have been allotted to different-different companies for captive uses.

Tin Ore

The 9.90 % Tin ore of India are available in the Chhattisgarh state only in India and it is about 31.84 million tones in quantity.



Fig. 15 Tin Ore

In the dantewada district the Tin ore occurred at Tongpal, Katekalyan and Padapur-Bachel area. A tin Smelter unit

is working at Jagdalpur of district Bastar.

Corundum

The important quality of precious and semi precious corundum are found in Bhopalpatnam, Uloor and Sonakukanar areas of Dantewada district.



Fig. 16 Corundum

The 59 tones of corundum reserves have been estimated in the state. The Corundum cutting, polishing industries are working in Bastar. The semi precious stones are marketed in the gems industry in Hyderabad.

Diamond

The diamonds are located in the rivers of the state. The discovery of diamondiferous kimberlite in Manipur area of Raipur district has attracted global attention. The six kimberlites in Manipur area and two kimberlites in Tokapal area have been discovered so far. The 8 blocks have been demarcated to host kimberlites in Chhattisgarh based on structural controls.



Fig. 17 Diamond

The potentially diamondiferous kimberlites have been identified in Behradih- payalikhanda area of Raipur district. The all major mining companies as De Beers, ACC, Rio Tinto, BHP Billiton and Geo Mysore Services are engaged in reconnaissance operations and prospecting of minerals

Gold

The gold bearing good quality rocks are demarcated in Raipur and Mahasamund district of State. Placer gold panning is widely recorded in Jashpur, Kanker,

Mahasamund and Bastar district.



Fig. 18 Gold

Three tones gold reserves are estimated in the state. The global mining companies like ACC Ria Tinto and Geo Mysore Services Pvt. Ltd. are working in reconnaissance and prospecting operations for gold deposits in the state.

MINERAL EXPLORATIONS

There is huge potential for search of high value and scarce minerals, associate with the deep and shallow mantle originated basic and ultramafic intrusive rocks



Fig.19-Mineral Explorations Equipments

The indication of finding of acidic melt associated mineral deposits of moderate to shallow depth are also found in the Sate. To explore such mineral potential, high investments is required. Potential blocks for exploration of Diamond, Gold and Poly-metallic Minerals have been opened up for investment, which may facilitate investing of explore the potential, followed by mining leases for exploration.

The thousand tons of Iron Ore are being excavated and supplied to different part of country and abroad every year from the State. The Bauxite is also one of the important ore which is being excavated in hug amount and supplied for use of aluminum factories every year. The huge quantity of different types of Rocks are also excavated and supplied for different purposes.

MINERAL BASED INDUSTRIES

In the Chhattisgarh State so many heavy, medium

and small scale mineral based industries are functioning. The state is reach in minerals deposits, power, water and human resources. Adequate quantity of raw minerals is available for sustaining the conventional industries like thermal power generation, calcinations, aluminum extraction, cutting and polishing units (for gem and dimension stones), ancillary unit for derived from the cement and iron industries.



Fig.20- Cement Manufacturing Plant



Fig.21- Steel & Thermal Power Plant

The alkali metals lithium, rubidium and cesium and other rare metals like Heryllium, Gallium, Tantalum, Niobium etc are the raw materials for the sensitive high-tech equipments, instruments and spare in the era of precision and sophistication.

The National Mineral Development Corporation (NMDC) Kirandul Bachel Chhattisgarh is the one of biggest Mineral Exploration Industry in the India and the requirement of Iron ore through-out the country is fulfillment by NMDC Kirandul bachel Chhattisgarh itself. The NMDC Kirandul also supplies the Iron ore to the Japan and hundreds of Small Scale Industries like Sponge Iron Industries etc.

The ESSAR Industry is also working at Kirandul Chhattisgarh for transportation of Iron ore from Kirandul to Vishakhapatnam through pipe line. The three Mineral Based major Iron & Steel Industries are going to established in the state viz. NMDC Iron & Steel plant at Nagarnar Jagdalpur, Tata Steel Plant at Lohandiguda

Jagdapur and ESSAR Iron & Steel Plant at Bacheli Dantewada. The more than hundred mineral based small scale industries like Sponge Iron plant are working in the different part of Chhattisgarh State.

CONCLUSION

Chhattisgarh has the plenty of mineral resources and sources of construction materials. The construction material is obtained from the quarries where rocks lying in region and each rock formation has a unique 'character' that not only bears the imprint of its geological history, but also control its future behavior in engineering works. Some of these, such as colour and grain size can be observed directly, but others characteristics such as strength durability, can be measured only by specific testing procedure. The history and genesis of the rocks has been studied by the geologist's traditionally, where as Engineer's has been to predict the performance of these materials in works at to be constructed. Chhattisgarh state has immense potential of Minerals and Rocks for prospecting exploitation of these for wide industrial use and export to other State and Abroad also. .

The classification of Rock Mass and Geological and Engineering properties of Minerals and rocks available in the area could be undertaken to suggest the stability aspects of underground constructions and mining activities of that areas and excavation of rocks and minerals in better ways to support appropriate use and export.

The large amount of Iron Ore is being excavated and supplied to different part of country and abroad every year from the Chhattisgarh State. The other ores like Bauxite are also being excavated and supplied for use of manufacturing of aluminum to the different type of factories in large amount every year. The various types of rocks and coal quarries are in operation and huge amount of rocks, minerals and coals is being supplied for different-different purposes within the state and different parts of country.

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