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Minerals and Energy Resources in India: Distributions, Measures & Challenges

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ABSTRACT

India is endowed with a rich variety of mineral resources due to its varied geological structure. Paper explores the distribution of mineral resources in India is uneven. Minerals and power resources are very important for economic growth and development. Minerals classified as metallic, non-metallic and energy minerals. Coal is the most important and abundant fossil fuel. Mineral resources are the very important material basis for socio-economic development. India produces as many as 95 minerals, which includes fuel, metallic, non-metallic, atomic and minor minerals. Mineral fuels comprise coal, petroleum, natural gas and atomic or radio- active minerals. Iron ore is the essential mineral and the backbone of industrial development.

Key **words: Resources, minerals, energy, producer, reserve, conservation and development**

INTRODUCTION

Mineral belts support an important role in resource distribution. A mineral is a natural substance of organic or inorganic origin with defined physical and chemical properties. Minerals are unevenly distributed on Earth. Firewood and fossil fuels are the two major conventional energy sources. Firewood and cattle dung cake are most common in rural India. Good quality minerals are available less in quantity and are also non-renewable resources, which once exhausted, can't be replaced immediately. Minerals are of two basic types-metallic and non-metallic. Metallic minerals, like iron, nickel, manganese, tungsten etc., are ferrous, since they have iron content. Some non-ferrous metallic minerals are gold, silver, copper, tin etc. India's offshore mineral reserves include gold, diamond, copper, nickel, cobalt, copper, manganese, and rare earth elements.

The non-metallic minerals may or may not contain organic matter. Coal and petroleum are organic in nature, while mica, limestone, graphite and gypsum are inorganic. Minerals such as coal and iron are of industrial importance; mica, manganese, copper, lead and zinc are of economic importance; and coal, petroleum, thorium and uranium are of national importance. "The tradition of mining in the region is ancient and underwent modernization alongside the rest of the world as India has gained independence in 1947" (Khullar, 2006: 631)

India is the leading producer of some of the minerals and contains a diverse and significant store of these minerals. Of the 89 minerals produced in the country, 4 are fuel minerals, 11 metallic, 52 non-metallic and 22 minor minerals. India is the largest producer of mica blocks and mica splitting; ranks second in the production of chromites, barite, talc and steatite; ranks third in the production of coal, lignite, and bauxite; fourth in iron ore, fifth in steel, seventh in zinc, eighth in c0pper, tenth in aluminum and eleventh in mica. "Under the British Raj a committee of experts formed in 1894 formulated regulations for mining safety and ensured regulated mining in India. The committee also passed the 1st Mines act of 1901 which led to a substantial drop in mining-related accidents" (Padhi, 2003)

Iron ore, copper ore, chromites ore, tine concentrates, gold, manganese ore, bauxite, lead concentrates and silver account for the entire metallic production. Limestone, magnetite, dolomite, baryte, kaolin, gypsum, apatite, steatite and fluorite account for 92% of non-metallic minerals. India has a large number of economically useful minerals and they constitute one-quarter of the world's mineral resources. "A 'Mineral Resource' is a concentration or occurrence of material of intrinsic economic interest in or on the Earth's crust in such form, quality and quantity that there are reasonable prospects for eventual economic extraction" (Hustrulid, William A. 2013)

About two-thirds of its iron deposits lie in a belt along Odisha and Jharkhand border. Other haematite deposits are found in Madhya Pradesh, Kamataka, Maharashtra and Goa. Magnetite iron ore is found in Tamil Nadu, Jharkhand and Himachal. Bituminous coal is found in Jharia and Bokaro in Jharkhand and Ranigunj in West Bengal.

Lignite coals are found in Neyveli in Tamil Nadu. Next to Russia, India has the largest supply of manganese. The manganese mining areas are Madhya Pradesh, Maharashtra and Jharkhandu Odisha area. Chromite deposits are found in Jharkhand, Cuttack district in Odisha, Krishna district in Andhra Pradesh and Mysore and Hassan in Karnataka. Bauxite deposits are found in Jharkhand, South-West Kashmir, Central Tamil Nadu, and parts of Kerala, Uttar Pradesh, Maharashtra and Karnataka.

Belts of high quality mica are Bihar, Andhra Pradesh and Rajasthan. Gypsum {reserves are in Tamil Nadu and Rajasthan. Nickel ore is found in Cuttack and Mayurhhanj in Odisha. Copper ore bearing areas are Agnigundala in Andhra Pradesh, Singhbhum in Jharkhand, Khetri and Dartiba in Rajasthan, and parts of Sikkim and Karnataka.

The Ramagiri fields in Andhra Pradesh, Kolar and Hutti in Karnataka are important gold mines. The Panna diamond belt is the only diamond producing area in the country, which covers the districts of Panna, Chhatarpur and Satna in Madhya Pradesh, as well as some parts of Banda in Uttar Pradesh. Petroleum deposits are found in Assam and Gujarat. Fresh reserves were located off Mumbai Coast. The potential oil bearing areas are Assam, Tripura, Manipur, West Bengal, Punjab, Himachal, Kachchh and the Andamam. India also possesses the all-too-valuable nuclear Uranium as well as some varieties of rare Earths.

The mineral wealth of India at present comprises an adequate range of useful products that are necessary for the industrial development of the country. An appraisal of the reserves shows that while in respect of minerals essential for basic industries-coal and iron-«the reserves are ample, the country is deficient in a fairly long list of vital minerals like ores of copper, tin, lead, zinc, nickel, cobalt and in sulphur and most important of all, petroleum. “In geology and mineralogy, a mineral or mineral species is, broadly speaking, a solid substance with a fairly well-defined chemical composition and a specific crystal structure that occurs naturally in pure form” (John P. Rafferty, 2011)

The position with regard to aluminum ore, refractories, abrasives, limestone etc., may he considered as fairly adequate while in respect of titanium and thorium ores and of mica, the country has considerable reserves. Until recently, mineral exploration and their utilization in the country received little attention. Except for coal, iron ore and petroleum required for internal use, the majority of minerals were extracted in India for the purpose of bulk export without any processing and fabrication. These exports brought but a small return to the country.

Nearly a hundred minerals are known to be produced or mined in India, of which nearly 30 may be considered more important and the rest seem to be capable of material development in future with the expansion of industries. It should be made clear at the outset that though progress has been made in the survey of mineralized areas in recent years and the principal mineral regions have been ascertained, exploration of mineral resources has not been thorough or complete in most cases and present estimates are just rough guesses. The power resources in India comprise coal, oil and hydroelectricity. India’s coal mining is centered mainly in Bihar and West Bengal.

The total workable reserves of coal down to a depth of 1000 ft are estimated at 20000 million tonnes, of which the good quality coal would amount to 5000 million tonnes. The reserves of coking coal, however, are small, amounting to only 2000 million tonnes. As against relatively meager resources of coal and oil, the hydroelectric resources of India are considerable with estimates varying from about 30 to 40 million horse-powers. India possesses large quantities of high grade iron ore and may be classified as one of the countries which can reasonably expect a long continued development of heavy industry; though, in proportion to the population, these reserves are lower than the main ore regions of the world.

Incessant mining and plundering of mineral resources has disastrous effects on the ecosystem of a region. Water scarcity has increased, river beds are getting damaged and even the biodiversity is getting hampered. In India, over the years, a national mineral policy has evolved. The policy addresses certain new aspects and elements like mineral exploration in the sea-bed, development of proper inventory, proper linkage between exploitation of minerals and development of mineral industry, protection of forests, environment and ecology from the adverse effects of mining, enforcement of mining plan for adoption of proper mining methods, optimum utilisation of minerals, export of minerals in value-added form and recycling of metallic scrap and mineral waste.

The Mines and Minerals (Regulation and Development) Act, 1957 lays down the legal framework for the regulation of mines and development of all minerals other than petroleum and natural gas. The Central Government has framed the Mineral Concession Rules 1960, for regulating grant of prospecting licenses and mining leases in respect of all minerals other than atomic minerals and minor minerals. The State Governments have framed the rules in regard to minor minerals.

"Minerals are classified by key chemical constituents; the two dominant systems are the Dana classification and the Strunz classification. Silicate minerals comprise approximately 90% of the Earth's crust" (Klein, Cornelis; 1993:440)

The Central Government has also framed the Mineral Conservation and Development Rules, 1988 for conservation and systematic development of minerals. These are applicable to all minerals except coal, atomic minerals and minor minerals. New regulations from 2012 onwards have stated that any mining activity would, at first, require clearance or permission from the Ministry of Environment and Forests.

CONCLUSION

Major mineral resources of the country include coal, Manganese ore, iron ore, Bauxite, chromite, natural gas, diamond and thorium. Our policymakers should ensure that they create no more 'ecological refugees', people who are rendered homeless due to mindless mining in their dwelling places. Only then can minerals provide rich returns to the economy and strengthen it. Due partially to the lack of government documents and supervision, mine operators became more opportunistic, in other words, companies tended to take the risk of doing illegal things and gain more profit. Moreover, the social actions may not sufficient. Despite the fact that the water quality was somewhat improved, the concentration of iron ore in water was still unacceptable in some period.

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