International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2015): 78.96 | Impact Factor (2015): 6.391

Mineral Distribution of Jammu and Kashmir

Sachin Changotra

Contractual lecturer in GGM Science College Jammu, Dept of Geology

Abstract: ***The mineral and power resources are the backbone of industrial and technological development of a country or region. Moreover, transportation and accessibility, costs, and supply and demand are the major determinants of industrial development. It is often said that the economic prosperity, industrial development, technological advancement and overall social well-being of a region/country are largely dependent on minerals, power and human resources.The mineral and power resources are however, high unevenly distributed and in many cases they are not easily accessible. They are mostly exhaustible. However, large the deposits of a given mineral, the continuous mining will exhaust the ores.***

1. Introduction

A natural inorganic substance possessing a definite chemical composition and almost always in a crystalline form is called mineral. Mineral is formed by the inorganic processes of nature. This definition includes ice as a mineral but excludes coal, natural oil and gas. The only allowable exception to the rule that a mineral must be solid is native mercury (quicksilver) which is a liquid. The state of Jammu and Kashmir is well endowed with forest, and water resources. It is however, deficient in coal, petroleum, natural gas, iron-ore, manganese, thorium, uranium, aluminium, mica, sillimanite, phosphates, dolomite, mercury, silver, etc. Some of the important minerals found in the state are copper, lead, zinc, bauxite, chromium, gold, arsenic, kaolinite, bios-pore, ochre, coal, lignite, slate, marble, sapphire, rubellite, quartz and serpentine. A brief account of the spatial distribution of minerals in the state has been given in the present article

Coal

Coal is the most important of the minerals which helps in the industrial development of a region. Coal is a combustible rock which has its origin in the accumulation and partial decomposition of vegetation. Coals differ in the kinds and manners of preservation of plant material (type). They vary in degree of carbon concentration and in the amount of inorganic impurities. The main types of coal are anthracite, bituminous, lignite and peat.The state of Jammu and Kashmir has very limited coal deposits. It is the Raisi Subdivision of the Udhampur district in which coal of anthracite quality occurs in some widely distributed seams of 30 cm to 6 cm in thickness in association with nummulitic strata. The latter occur as inliers in the Murree Series. Spread over a length of about 80 km (48 miles) and sandwiched between Sirban limestone on the one hand and Murrees on the other, within the Eocene formation the coalfields are unlike the Gondwana coalfields in which the limits are well-defined by faults and/or older rock. The intense and complex tectonic movements, however, have restricted the limit of coalfields up to the extent these can be economically exploited. The high grade of Jammu coal is due to the organic forces, affecting the coalification increase towards the west, thus, carbonizing the original vegetal deposits Middlemiss has estimated the quantity available at 100,000,000 tonnes with mining at ordinary depth. Some of the Riasi semi-anthracite contain 60 to 82 per cent of fixed carbon. Field survey and prospecting conducted by the Geological Survey of India in the 1980s, reveals that lignite, anthracite, and peat deposits are found in small quantities in some areas of the Jammu and Kashmir divisions. The coal deposits of the state do not belong to the carboniferous period. They have their origin to the Lower Tertiary, Eocene, or Oligocene periods, and are found in association with Nummulitic limestone (Murree Series). They have low carbon contents, ranging between 50 to 60 per cent.The major coal deposits of the state are found at Kalakote, Jangalgali, Metka, Ladha, Chinka, Dhansal, Swalkote, Chakar, Dandil, Mohogala, San- gar-Marg, and Kura. Coal has also been reported from the Baramulla, Handwara, and Pulwama districts of Kashmir. Lignite is found at Shaliganga, Chowkibal and Nichahama (Kashmir Division). It has been estimated by the Geological Survey of India that the Kalakote coal mines have a workable reserve of about 5.4 million tonnes up to a depth of about 300 m. An analysis of the Kalakote coal reveals that it is of low volatile anthracite grade with ash content varying from 10 to 20 per cent and fixed carbon about 60 to 80 per cent.InLadda and Jangligali coal field's reserves are estimated to be about five million tonnes. The coal of Ladda also has about 50 per cent carbon and about 20 per cent impurities and moisture contents. The Geological Survey of India has carried out explorations at Mohogala and Metka (Poonch District) and arrived at the result that these places, up to a depth of 300 m have about 9 million of coal. The fixed carbon in the coal of these deposits is about 57 per cent, volatile 30 per cent and ash and moisture 10 and 3 per cent respectively. At present coal is being mined near Kalakote to feed the only thermal power plant of the state at Kalakote. The rated capacity of the plant is 7.5 MW and 35,000 tonnes of coal is being mined annually in its vicinity. The energy generation capacity of the plant may be enhanced substantially if new generators are installed in the Kalakote Plant and new technology is applied for the mining of coal. Lignite deposits are found mainly in the Valley of Kashmir which occur in the Karewa formations, right from NichahomuptoLolab. The lignite seams are, however, associated with clays and loams and are inter-bedded in carbonaceous clays in various localities of Kashmir Division. The major lignite deposits are in are in the vicinity of Nichahom, Chowkibal, Budhasheng, Lanylab, Shaliganga, Raithan and Tangmarg. According to the Geological Survey of India, Nichahom lignite seams occur from north to south, running over a distance of about 85 km and the estimated reserve of lignite in this mine is about 85 km and covering a width of 16 km up to a depth of 8 m. The estimated reserve of lignite in this

mine is about 6 million tonnes. In between Nichahom and Chowkibal a reserve of 8 million tonnes has been estimated. The total estimated reserve of lignite deposits in the state, according to the Directorate of Geology and Mining is about 85 million tonnes, but owing to thin seams and high ash contents, it is mined only at Nichahom in Kashmir. In fact, the lignite of Kashmir Valley contains only 8 to 25 per cent carbon, 30 per cent ash, 15 per cent moisture and 27 per cent volatile matter. Peat—a superficial accumulation consisting of vegetation matter which has become decomposed to a certain limited extent in the cold regions is also found in the Valley of Kashmir. Its deposits are found mainly in the swampy grounds on both the sides of the Jhelum River below Srinagar. Peat is cut and dried before being used as fuel. It is applied in field as a manure. The Kashmiris call peat as demb-tsak.

Natural Gas

Natural gas has not been struck so far in any part of the state. In Jammu Division, areas like Ramnagar, Dharmthal, Nauashara and Rajauri are under investigation for natural gas. Occurrence of dry gas has been reported by the Oil and Natural Gas Commission (ONGC) in the Kashmir Division. The ONGC has proved the existence of 'Dry Gas' at the Silk Factory Road, Ram- bagh (Srinagar). Various indications such as sulphurous water, hot springs, gas seepage, etc., have been noticed in several areas of Jammu and Kashmir which prove that in near future oil and natural gas may be found in the state.

Metallic Minerals

There are a few metallic minerals found in the state. Though at present the state is producing very little metallic minerals, there are evidences which prove that gold and copper have been mined in the Ladakh and Kashmir divisions respectively sine the medieval period. The occurrence of metallic minerals in the state is in isolated tracts and in many cases their exploitation is uneconomic. A brief description of some of the metallic minerals found in the state is given in the following paragraphs.

Iron-ore:

Iron-ore is obtained from hematite and magnetic mainly found in igneous rocks. The state of Jammu and Kashmir does not possess significant deposits of iron-ore. There are however, some workable iron-ore deposits in the Riasi Tehsil of Udhampur district, in association with the Nummulitic Series, which supported a number of local furnaces for the manufacture of munitions of war during the last two centuries. Still no area of iron-ore has been identified in the Kashmir and Ladakh divisions of the state. The non-avail- ability of iron-ore is one of the main reasons for the industrial backwardness of the state.

Gold-

Gold is one of the rare and precious minerals. It is found in hydrothermal veins in the crust or in alluvial grains, placer deposits and conglomerate. Gold bearing quartz veins have been found in areas of Dras, Suru and Indus Valley in the Kargil and Leh districts of Ladakh Division. The gold found in quartz veins gets exposed under the impact of weathering and may be transported by running waster. In fact, particles of gold have been noted as placer deposits in the course of rivers and streams of Ladakh and the terraces of Indus River.Gold has been traced in conglomerate deposits in the valleys of Dras, Suru and Indus, forming a contiguous deposit, ranging in thickness from one metre to four metres. It is estimated that 0.6 gram of gold can be obtained per cubic metre of conglomerate in Ladakh. Alluvial gold-washing is carried on in the sands and gravels of many of the tributaries of the Indus River.

Copper:

Copper is extracted from the ore of chalcopyrite which is found in rocks like serpentine, diorite, chloriteschist and slates. Chalcopyrite a double sulphide of copper and iron is the main copper-ore found at Sumbhar (Anantnag), Lashtial (Baramulla) and Ganderbal. In Ladakh region native type of copper has been reported from areas of Zanskar. Investigations about the occurrence of copper in Doda District have also been started. It is hoped that copper-ore in all the quartz veins of quartzite rocks of the Doda District have appreciable quantities of copper which may be extracted economically.

Lead:

Lead does not occur in nature as the native metal, yet it has been known to man since the earliest times because of its easy extraction from the ore. It is a mineral of great economic importance as it is used largely in numerous in-dustries.The main ore of lead is galena. It is found in hydrothermal veins. Galena is a grey coloured mineral. It has shining metallic lustre, relatively soft and very heavy, often crystallizing in nearly perfect cubes. Galena and other ores of lead are found in association with slate, phyllites graphite-schist and limestone near Ramsu 0ammu Division). About one million tonnes of galena has been estimated in the Ramsu region of the Dodadistrict.In the Division of Kashmir, galena deposits have been reported in Buniyar (Baramulla). The ore of Buniyar deposits may yield 30 to 70 per cent of lead. Several parts of side-valleys of Kashmir are being investigated and there is a strong possibility of lead deposits in the Panjal Trap formations.

Bauxite:

Bauxite is a residual deposit formed under special climatic conditions. It is a mixture of hydrated aluminium oxides, but the name is applied particularly to varieties of the rock laterite rich in hydroxides of aluminium which are the chief ores of the mineral. Bauxite is a mineral of great economic importance. Being light and resistant, it is used mainly in aircraft industry. In the state of Jammu and Kashmir extensive deposits of bauxite are found in Chhakar (Riasi), near Songarmarg, Salal, Panhasa, Baladanu, Sangarmarg, Sukhwal-gali and Khander in the districts of Rajauri and Udhampur.The Geological Survey of India has estimated about 12 million tonnes of bauxite in these fields and the analysis has revealed that the ore contains 60 to 70 per cent of alumina. In 1994-95, the production of bauxite was over 2125 tonnes. A calcined bauxite unit set up by the Kashmissa Industries at Jammu, started production in 1983.

Chromium:

Chromite is used in the manufacturing of refractory bricks for furnace-linings. Its chief metallurgical use lies in its being the raw material of chromium. An alloy of chromium

and iron (ferro-chrome) is used in the making of rustless and stainless steels and armour plates. A large amount of chromium is used in the manufacture of mordants and pigments, because of the red, yellow, and green colours of its salts. The main ore for chromium is the chromite which is found in ultra-basic igneous rocks and serpentinites. The chromite-ore occurs usually as brown or black crystal. In the state, chromite deposits are found in the cretaceous volcanis of Burzil, Dras, Bumbat, Tashgam, and Kargil Valley of Ladakh. It is mainly used in metallurgy.

Zinc:
Zinc is obtained from the zinc sulphide and zinc blend. The mineral is found usually in limestone and veins associated with copper and lead ores. Zinc is found in Buniyar area in association with galena, chalcopyrite and pyrites. Zinc ore is also found in limestone's deposits of Udhampur.

Sapphire:
Sapphire is a blue transparent or translucent corundum (gem). It is naturally occurring oxide of aluminium and contains as much as 52 per cent of aluminium. In India, Jammu and Kashmir is the only state in which sapphire deposits of good quality are found. The famous sapphire mines of poddar near Sumjam in Kishtwar are located at an elevation of 4,500 m in the upper reaches of Chenab River in the Doda District. InKishtwar sapphire was discovered in 1882, and since then mining has been going on intermittently. The precious stone is inter-bedded in the rocks of Salkhala Series and is associated with meta-basic, intruded by a number of pegmatite and quartz veins. The sapphire bearing portions are lenticulars composed of plagioclase, felspars, tourmaline and corundum. The precious stones occur as small prism of 5 mm width and show pyramidal structure. Transparent crystallized corundum occurs in pegmatite veins cutting actinolite-schist lenticles in Salkhala marble at an altitude of 4,500 m. Associated minerals in the pegmatite are prehnite, tourmaline, beryl, spodumene and lazurite.The Mineral Survey of Kashmir has revealed a large quantity of crystallized transparent corundum. The bulk of the output from the mines is confined to what are called 'rock sapphires' valueless for gems and of use as abrasives, watch jewels, etc.

Ruby:
Ruby is red transparent variety of corundum (gem.) It is found in the areas of Zanskar, Sumjam and Poddar in association with sapphire bearing rocks. Ruby occurs in metasediments and meta-basic intruded rocks such as quartz and pegmatites. A highly productive locality for aquamarines was discovered in the Kashmir Valley in Skardu, whence crystals of considerable size and purity were recovered. The gem occurs in coarse pegmatite veins traversing biotitegneiss.

Tourmalines:
Pellucid and beautifully coloured varieties of tourmaline, red, green or blue, are worked as gems. The green variety known as indicolite occurs in the Poddar area of Kashmir where also some transparent crystals of rubellite are found. The latter tourmalines possess greater transparency, but are much fissured. The Geological Survey of India is exploring new sites in the Doda district of Jammu to discover tourmalines.

Besides the above named varieties, other crystallized minerals, when of fine colour and attractive appearance and possessing some of the other qualities of gams, e.g., hardness, transparency, etc., are cut for ornamental purposes in Kishtwar, Doda, Kashmir, Ladakh. Turquoise, opaque, of fine blue colour, usually uncut which is commonly sold in Srinagar is a product of Tibet, or Ladakh. Gem-cutting industry has great potential in Kishtwar, Srinagar, Jammu, Leh and Kargil. There are numerous other non-metallic minerals found in the state, most of which are bedded deposits.

Bentonite:
Bentonite is especial assemblage of clay mineral, in many instances formed by weathering of acid, lavas and pyroclastic rocks. The deposits of bentonite are spread between Bhimber and Kathua in the Jammu Division. These deposits lie, on the gentle dipping slopes of the outer plains of Jammu.Para, Chittopali, Modkali, Uttar Bhimber Bazar and Panipur are the areas of Jammu Division in which bentonite is found. From Bhimber to Kathua there is a continuous bed of bentonite deposit running for a length of about 10 km and about half a metre thick occupying a definite horizon in the Upper Siwaliks.Bentonite is used for cleaning grease spots, soap making, ceramics plaster, and filling paper, washing silk and cotton clothes. It is also known as ' Serati-Mitti'.

Kaolinite (China Clay):
Kaolinite is a clay produced by the decomposition in-situ of the felspar. It is the natural (unwashed) china clay. Kaolinite is found in association with bauxite deposits of Jammu. It occurs between great limestone and breccia and nummulitics and coal measures of bauxite series of the Salal, Songarmar and Chakar areas. The local name of the mineral is Makol. It is used for white-washing purposes. Kaolinite deposits are available upto a thickness of one to four metres in the areas of its occurrence which can be used effectively in pottery making.

Borax:
Borax is deposited as a result of evaporation of hot spring water. It is of use in the manufacture of superior grades of glass, artificial gems, soaps, varnishes and soldering and enameling. Ladakh is the only part of the country in which borax is found. In the form of surface deposits, borax is found in the Puga Valley and Chumathang of the Maheyang area of Ladakh. Annually about 15 tonnes of borax is obtained from these places. There is a project to refine the large reserves of crude borax in the Puga Valley lakes locally and to transport the product by aircraft to the industrial centers of India.

Gypsum:
Gypsum forms large bedded masses or aggregates occurring in association with rocks of a number of different geological formations. Millions of tonnes of gypsum, the alteration product of pyritous limestone of Salkhala age, are laid bare in the mountains of Uri and Baramulla area of Kashmir in a stretch of about 40 km along the strike.Gypsum is an

evaporite mineral found in clays and limestone's, sometimes associated with sulphur. It is an important non-metallic mineral of great economic importance. It is a hydrous sulphate of calcium. Snow-white gypsum with intercalation of quartzite and schists is found in areas of Uri, Ramban, Assar, Batote. The industrial use of gypsum is in the manufacture of synthetic fertilizers, plasters, distempers and in the cement factory. It is also used as a surface-dressing for lands in agriculture, and as a fertilizer, with considerable benefit to certain crops. Gypsum has begun to be used as a source of sulphur in the manufacture of fertilizers. Gypsum mined near Uri is supplied to the Wuyan Cement Factory of Srinagar (Kashmir). Ramban and Assar fields have gypsum deposits of about 19 and 5 million tonnes respectively.

Magnesite:
Magnesite is a mineral of the carbonate group. It is found in irregular veins in serpentine and formed by replacement of dolomite and limestone. In the state of Jammu and Kashmir, magnesite is found in Shergol (Leh-Kargil Road). The recent researches by Rana (1975), Chadha (1978) have discovered good deposits of magnesite in and around Katra (Udhampur) area of the Jammu Division.

Sulphur:
Sulphur is a mineral obtained from iron pyrite or in the neighbourhood of volcanic regions. It is also associated with limestone's, sandstones and salt domes. In the state of Jammu and Kashmir, sulphur is found in areas of recent volcanic activity, around hot springs. Substantial deposits of sulphur have been located in the Puga Valley of Ladakh Division. The Geological Survey of India has estimated a reserve of about 6,000 tonnes of sulphur in the Puga Valley.

Limestone:
Limestone is a carbonate of calcium. Besides, its uses as building stones, and as lime and cement raw material, limestones, if of the required purity, have important uses in the chemical, alkaline, sugar and metallurgical industries. It is found in Manasbal, Bern, Achabal, Barwar, Verinag, Wuyan, Jan- galgali, Salal, Riasi, Basohli, Kalakote and Khalsi (Ladakh).

Slates and Phyllitics:
Slates and phyllites are the metamorphic rocks of great economic importance. Slate is obtained from the vicinity of Banihal, Ramban and Ramsu. It is being used successfully for roofing. In Marpathri near Gulmarg about ten million tonnes of good quality of roofing slate has been estimated by the Geological Survey of India.

Mineral Paints:
A number of rock and mineral substances are employed in the manufacturing of paints and colouring materials. Substances which are suitable for this purpose include earthy forms of hematite and limonite (ochre, geru), refuse of slate and shale quarries, possessing the proper colour and degree of fineness; graphite; laterite, orpiment; barytes, asbestos, mica, steatite, etc. Large quantities of red and yellow ochre in association with graphite-bearing slate occur in the Salkhala System of deposits in the Uri Tehsil of the Baramulla District of Kashmir Division.

Sand and Bajri
Quantities of sand, pebbles and shingles are available in the Chenab and Tawi rivers and the numerous Nallas and hilly-torrents of the state. Sandstones are in abundance along the Jammu-Srinagar National Highway and the Jammu Punch Road in the Siwaliks and Murree tracts which are being used for building materials. Mineral resources as discussed are exhaustible and therefore, should be used judiciously. The exploitation and conservation of mineral resources largely depends on the technological stage, the location of mineral ore with reference to transport and market. The exhaustible mineral resources deserve special attention. A scientific policy about their exploitation and utilization needs to be formulated.

Minerals Conservation and Environmental Protection:
Extraction of minerals is our economic necessity. Our economic structure which is quite complex hinges on industries. These industries draw their raw materials from minerals, forests and agriculture. The large-scale and heavy industries, economic and commercial activities are largely dependent on minerals and metals. The process of extraction of mineral resources and its use in various ways generate a wide range of environmental changes—sometimes having far reaching consequences. While these wasting assets have evoked formulation of national policies for their proper conservation, little has been done to ensure rehabilitation of land adversely affected by mining activities. Since we cannot sustain our economy and society without industrial development, it is imperative to utilize the resources judiciously and to manage the mining industry scientifically. The damage caused to the environment may be reduced if the following steps are taken by the government, the contractors and the people who are directly or indirectly involved in the mining industry.

1) There should be a legislative provision for full responsibility of treatment and environmental rehabilitation on excavated areas squarely on the mining agencies. There should be legal binding on the mine owners to restore the land they have damaged.2. There must be compulsion for stacking and preserving topsoil in order to cover back the excavated parts with debris produced and then put a cover of soil over it so that crops and grasses may be grown over it.
2) There should be incentives for successful programmes of land restoration, soil conservation and afforestation.
3) There should be serious attempts to stabilize the slopes, not only during the excavations but also afterwards to ensure that stability is maintained in future also. For this purpose, there should be construction of drainage network, and retaining walls.
4) There should be restriction on mining in the geo-dynamically sensitive and ecologically fragile parts of the mountains.6.

Deeper excavation on the surface or underground digging causes the water table to sink locally, resulting in the wells and springs of the vicinity going dry. Mining of limestone, etc., in the neighbourhood of towns and villages therefore should be restricted.7. The miners should be provided safe drinking water by the mine-owners.8. The deep depressions formed by deep mining can be converted into lake to

develop picnic spots or they may be used for dumping municipal and industrial wastes. These waste dumps may be subsequently covered with topsoil and afforested.9. There should be more research to develop the new technology for the optimal extraction of minerals which may be eco-friendly.10. There should be environmental awareness among the masses who can help in the restoration of the degraded mining tracts

Acknowledgement

I would like to thank my teacher and also my mother Prof Dr.Alpana Vohra, Associate Professor GGMSC college Jammu for providing me latest GSI India booklets and books that helped me a lot.