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# MINERAL RESOURCES

**Minerals** are naturally occurring, inorganic, crystalline solids having a definite chemical composition and characteristic physical properties.



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# USE AND EXPLOITATION

The main uses of minerals are as follows:

- (i) Development of industrial plants and machinery.
- (ii) Generation of energy e.g. coal, lignite, uranium.
- (iii) Construction, housing, settlements.
- (iv) Defense equipments weapons, armaments.



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- (v) Transportation means.
  - (vi) Communication- telephone wires, cables, electronic devices.
  - (vii) Medicinal system- particularly in Ayurvedic System.
  - (viii) Formation of alloys for various purposes (e.g. phosphorite).
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- (IX) Agriculture – as fertilizers, seed dressings and fungicides (e.g. zineb containing zinc, Maneb-containing manganese etc.).



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Based on their properties, minerals are basically of two types:

- ▶ (i) **Non metallic minerals** e.g. graphite, diamond, quartz, feldspar.
- ▶ (ii) **Metallic minerals** e.g. Bauxite, laterite, haematite etc.



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**Table 2.3.1. Major reserves and important uses of some of the major metals**

<b>Metal</b>	<b>Major World Reserves</b>	<b>Major Uses</b>
Aluminium	Australia, Guinea, Jamaica	Packaging food items, transportation, utensils, electronics
Chromium	CIS, South Africa	For making high strength steel alloys, In textile/tanning industries
Copper	U.S.A., Canada, CIS, Chile, Zambia	Electric and electronic goods, building, construction, vessels
Iron	CIS, South America, Canada, U.S.A.	Heavy machinery, steel production transportation means
Lead	North America, U.S.A., CIS	Leaded gasoline, Car batteries, paints, ammunition
Manganese	South Africa, CIS, Brazil, Gabon	For making high strength, heat-resistant steel alloys
Platinum group	South Africa, CIS	Use in automobiles, catalytic converters, electronics, medical uses.
Gold	South Africa, CIS, Canada	Ornaments, medical use, electronic use, use in aerospace
Silver	Canada, South Africa, Mexico	Photography, electronics jewellery
Nickel	CIS, Canada, New Caledonia	Chemical industry, steel alloys



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**Table 2.3.2. Major uses of some non-metallic minerals**

<b>Non-metal Mineral</b>	<b>Major Uses</b>
Silicate minerals	Sand and gravel for construction, bricks, paving etc.
Limestone	Used for concrete, building stone, used in agriculture for neutralizing acid soils, used in cement industry
Gypsum	Used in plaster wall-board, in agriculture
Potash, phosphorite	Used as fertilizers
Sulphur pyrites	Used in medicine, car battery, industry.





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## Some Major Minerals of India

- ▶ (a) Energy generating minerals
- ▶ **Coal and lignite:** West Bengal, Jharkhand, Orissa, M.P., A.P.
- ▶ **Uranium (Pitchblende or Uranite ore):** Jharkhand, Andhra Pradesh (Nellore, Nalgonda), Meghalaya, Rajasthan (Ajmer).



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- ▶ **b) Other commercially used minerals**
- ▶ **Aluminium (Bauxite ore):** Jharkhand, West Bengal, Maharashtra, M.P., Tamilnadu.
- ▶ **Iron (haematite and magnetite ore):** Jharkhand, Orissa, M.P., A.P., Tamilnadu, Karnataka, Maharashtra and Goa.
- ▶ **Copper (Copper Pyrites):** Rajasthan (Khetri), Bihar, Jharkhand, Karnataka, M.P., West Bengal, Andhra Pradesh and Uttaranchal.





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# ENVIRONMENTAL IMPACTS OF MINERAL EXTRACTION AND USE

- ▶ The issue related to the limits of the mineral resources in our earth's crust or in the ocean is not so significant. More important environmental concern arises from the impacts of extraction and processing of these minerals during mining, smelting etc.



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- ▶ (i) Jaduguda Uranium Mine, Jharkhand □ exposing local people to radioactive hazards.
- ▶ (ii) Jharia coal mines, Jharkhand □ underground fire leading to land subsidence and forced displacement of people.
- ▶ (iii) Sukinda chromite mines, Orissa □ seeping of hexavalent chromium into river posing serious health hazard, Cr<sup>6+</sup> being highly toxic and carcinogenic. of groundwater.

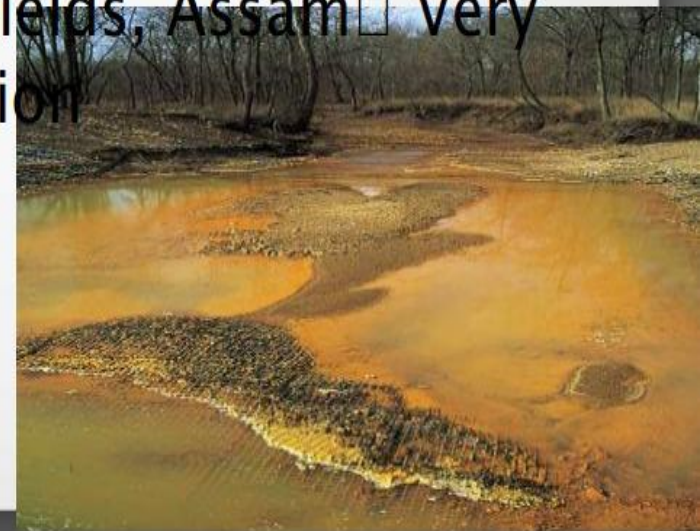




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- ▶ (iv) Kudremukh iron ore mine, Karnataka □ causing river pollution and threat to biodiversity.
- ▶ (v) East coast Bauxite mine, Orissa □ Land encroachment and issue of rehabilitation unsettled.
- ▶ (vi) North-Eastern Coal Fields, Assam □ Very high sulphur contamination





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## Impacts of mining:

- ▶ Mining is done to extract minerals (or fossil fuels) from deep deposits in soil by using sub-surface mining or from shallow deposits by surface mining.
- ▶ The former method is more destructive, dangerous and expensive including risks of occupational hazards and accidents.



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- ▶ **The environmental damage caused by mining activities are as follows:**
  
- ▶ (i) Devegetation and defacing of landscape
  
- ▶ (ii) Subsidence of land
  
- ▶ (iii) Groundwater contamination:





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- ▶ (iv) Surface water pollution
- ▶ (v) Air pollution:
- ▶ (vi) Occupational Health Hazards





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## CASE STUDIES

### ▶ Mining in Sariska Tiger Reserve in Aravallis

The Aravalli range is spread over about 692 km in the North-west India covering Gujarat, Rajasthan, Haryana and Delhi. The hill region is very rich in biodiversity as well as mineral resources. The Sariska tiger reserve has gentle slopy hills, vertical rocky valleys, flat plains as well as deep gorges. The reserve is very rich in wild life and has enormous mineral reserves like quartzite, Schists, marble and granite in abundance. Mining operations within and around the Sariska Tiger reserve has left many areas permanently infertile and barren. The precious wild life is under serious threat.



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We must preserve the Aravalli series as a National Heritage and the Supreme Court on December 31st, 1991 has given a judgement in response to a Public Interest Litigation of Tarun Bharat Sangh, an NGO wherein both Centre and State Government of Rajasthan have been directed to ensure that all mining activity within the park be stopped. More than 400 mines were shut immediately. But, still some illegal mining is in progress.