

SRI JAI NARAIN PG COLLEGE, LUCKNOW
DEPARTMENT OF BOTANY

MINERAL RESOURCES

A mineral is a naturally occurring substance, representable by a chemical formula. It is usually solid and inorganic, and has a crystal structure. A mineral occurs naturally in the earth's crust. More than two-thousand minerals have been identified and most of these are inorganic, which are formed by the various combination of elements. However, a small proportion of the earth's crust contains organic materials, as well as single elements such as gold, silver, diamond, and sulphur.

Types of Minerals: Minerals can be of two basic types

1. FUEL (coal, oil and natural gas) and...
2. NON-FUEL minerals resources.

FUEL Minerals are usually considered separately and not included in Minerals

NON-FUEL minerals are sub-divided into:

1. METALLIFEROUS (i.e. gold, silver iron) &
2. NON-METALLIFEROUS (i.e limestone, potash)

METALLIFEROUS Minerals:

These are metals that are hard, conduct electricity and heat with characteristics of lustre or shine. Such minerals are called metallic minerals. For example Silver, Chromium, Tin, Nickel, Copper, Iron, Lead, Aluminium, Gold, and Zinc.

Metalliferous Minerals are again of two types:-

1. Ferrous metallic minerals
2. Nonferrous metallic minerals

Minerals that contain iron are called ferrous mineral. Example of ferrous minerals are Chromites, Iron ore etc..

Minerals that do not contain iron are called as non-ferrous minerals. Example of nonferrous minerals are the ores of lead, silver, gold, and copper.

NON-METALLIFEROUS Minerals

These is a group of chemical elements which when melted do not generate a new product. Example: Dimension stone, halite, sand, gypsum, gravel.

Exploration for Mineral Resources:

Mineral exploration is shaped by geologic factors but cultural factors and other variables define the favourable areas. The factors include:

- Accessibility to major highways and railways
- Archaeological evidence of ancient metal works
- Historical evidence of previous mining activity
- Accidental discoveries.
- Availability of geological information about rocks.
- The demand for the minerals.

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Extraction of Minerals

Metallic mineral deposits (often referred to as 'ores') are rocks that contain economically valuable concentrations of metals. They are found in ore bodies that can be formed in different ways, for example, through hydrothermal, magmatic, metamorphic, sedimentary, and precipitation processes. The metal concentration in the ore bodies can be tens of % for some metals (e.g., iron) down to parts per million for more valuable metals (e.g., gold) – it depends on the value of the commodity in question.

Minerals ores are unevenly spread in the crust of the Earth, and the understanding of the distribution of ores in relation to specific geologic environments has been developed in recent decades. Compared to the industrial minerals (that in most cases can be used directly after mining or with some simple modifications), metallic ore minerals typically need to be treated to extract the pure metals, using various multiprocessing methods depending on the metals of interest.

Mineral Extraction Methods are highly dependent on the form and location of the deposit. Minerals that are buried deep down in the crust are excavated in subsurface mines, as is the case with many diamond and metal deposits. If the mineral deposit is found close to the surface, it may be worked using open-pit Quarries such as those for many rocks like clay and limestone or large low-grade metal deposits. Minerals can also be extracted from the seafloor, a largely untapped region that has great potential for the future (e.g., the ferromanganese crusts and nodules that might be regarded as resources for a variety of elements in the future).

IMPACTS OF MINING

1. Environmental Conflicts:

- Clash between commercial interests (Supported by people seeking employment) and groups anxious to preserve the aesthetic qualities of local lands.
- Development of ghost towns left behind after the closure of the mining operations.
- Clash between native people claiming land rights and international mining companies using the land for mining.

2. Economic Impacts

- Promotion of economic growth in the country - employment, consumer goods etc.
- Industrial development of peripheral regions - markets, transportation, energy, schools etc
- Creation of enclaves where mining communities remain isolated from the larger society

3. Environmental Impacts:

- Transporting, refining and processing of minerals creates air and water pollution.
- Acid drainage (from abandoned mine sites) pollute ground and surface water.
- Mining has caused ground subsidence in such places as Long Beach, CA and Houston, Texas.
- Surface mining creates an eyesore for mine waste (overburden or spoil).
- Erosion of mine waste chokes streams and fills dams and reservoirs
- Oxidation of sulphur rich rocks form sulfuric acid which flow into streams and lakes to destroy fish and habitat.

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- Water runoff from piles of spoil materials results in increased sediment load in streams and causes floods
- Surface mining creates noise and dust and destroys wildlife habitat, at least temporarily.
- Surface mining causes groundwater levels to fall thereby drying up municipal and agricultural wells in adjacent lands.

India's Mineral resources

The total mining and metal industry in India was worth over \$106.4 billion in 2018. The nation's coal reserves are the fourth largest in the world. India's other natural resources include bauxite, chromite, diamonds, limestone, natural gas, petroleum and titanium ore.

Conservation of Mineral Resources

The total volume of consumable minerals resources is just 1% of all the minerals present in the earth's crust. However, the consumption rate is so high that these mineral resources which are non-renewable will get exhausted very soon. Here are some of the measures to conserve minerals:

- Use of minerals in a planned and sustainable manner.
- Recycling of metals.
- Use of alternative renewable substitutes.
- Technology should be improved to use the low-grade ores profitably.