

Mineral Resources

What are minerals?

Minerals are inorganic natural substances & 1 of the natural resources of a country.

How are minerals formed?

- Hot magma which contains crystals.
- Some are formed near or o the surface. Occur when mineral-rich fluids evaporate.
- Many minerals form crystals.

Mining process:

Open-Cast Mining: Some minerals like coal & iron often lie near the surface.

Underground Mining:

1. **Adit Mining:** Horizontal digging done in hilly districts. They are dug into the side of a valley or hill to reach for minerals as in Sor coalfield near Quetta.
2. **Shaft Mining:** Vertical shafts are dig. The problems faced can be dangerous gases that may also be present underground, with the risk of poisoning and explosions, causing the tunnel roofs to collapse. Another hazard is flooding.

Metallic and Non-Metallic Minerals: Metals such as gold & copper occur in pure form such as "metallic elements," but most are found as "ores," which are chemical compounds containing a high proportion of the metal.

Metallic Minerals	Non-Metallic Minerals
Iron Ore	Rock Salt
Copper	Gypsum
Chromite	Limestone

Metallic ores are cut or blasted from surrounding rock. The ore is crushed and the worthless rock is removed.

Metallic Minerals	Non-Metallic Minerals
Economically more valuable.	Economically less valuable except for power resources. E.g. Coal, Oil.
Generally hard, tough and shiny.	Softer, rough and doesn't shine.
Can change shape without breaking.	Breaks away when shape is changed.
Can be stretched and compressed.	Cannot be stretched nor compressed

Many are good thermal & electrical conductors.	Poor thermal & electrical conductors.
More reactive with water & acid.	Less reactive with water & acid. (except limestone & salt)

Cement is made of limestone or chalk used in construction industry.

Quarrying: Quarrying is an open excavation from which any useful stone is extracted for building & engineering purposes.

Mining Industry in Pakistan: There are few deposits of metallic minerals, but substantial deposits of some non-metallic minerals

Mining & Economic Development: Development is essential for the economic development of Pakistan.

Industrial Uses: Used in construction industry which boosts up the infrastructure. If metallic & non-metallic minerals are produced domestically, there can be industrial development. Export can be done for revenue & foreign exchange.

Name	Description & Uses
a) Rock Salt + Water	White/pink in color & overlain by gypsum & clay. Used in cooking, preservative purposes & for the manufacture of Soda ash, etc. for laundries, textiles & tanning.
b) Brine	Used in chemicals & fertilizers.
Limestone	Used in cement, bleaching powder, glass, soap, paper etc. treats sugarcane wastes to produce alcohol fuel. Painted on barks.
Gypsum	Grey, white, pink. Used to make cement & Plaster of Paris. Spread on Saline soil to reclamation land for farming.
Clay	Used in ceramic industry, cement. Endures high temperature.

Agricultural Uses: Cement is used for lining canals, making dykes in agricultural fields, building of reservoirs for irrigation etc. Metallic minerals are used for making agricultural implement, tractors, gates of the barrages etc.

Improving Balance of Payment equal to value: Export of metallic minerals have high value in the international market increasing values of export & increase foreign exchange in earning.

If Pakistan produces minerals domestically, it might not need to import minerals. This will save precious foreign exchange resources, e.g. mineral oil.

Employment in the Mining Industry: Boost in employment as there are more opportunities in industries & other mineral-based industries.

Generation of Electricity: Minerals such as coal, oil, and natural gas produce thermal electricity, this way electricity crisis can be avoided. If Thar Coal Fields are fully utilized, Pakistan's electricity problems can be resolved.

Development of Remote Areas: Extraction promotes economic development of remote areas such as Balochistan Plateau & Western Mountains where other activities such as farming are not possible.

Increase in GDP (Gross Domestic Product): Increase in Domestic income & improved financial position.

Problems of the Mining Industry:

Lack of Financial Resources: Not enough investments, or financial resources.

Lack of Technical Experts: Few hi-tech experts. Experts in Pakistan move to foreign countries for better opportunities. Mining activities result in low production of minerals & health hazards to miners.

Inaccessible Mineral Deposits: Some minerals are found in areas where transport links are poorly developed.

Security of Mining Companies: Many foreign companies are reluctant to carry out mining operations in Pakistan due to terrorist activities on employees.

Low Priority given to Mineral Extraction: Development requires:

- a) Infrastructure facilities.
- b) High cost mining machinery.
- c) Hi-tech knowledge.
- d) A large Industrial Market to exploit minerals.
- e) Training of miners on modern lines.

Institutional Mismanagement: Most departments are corrupt resulting in low productivity in the mining sector.

Effects of Mining on the Environment:

They may lead to gradual environmental degradation and changes in the physical environment such as cut down of vegetation resulting in soil exposure & nature

deformation. During the process, rocks are blasted resulting in vibration, minor earthquakes, water pollution & noise pollution. Unfilled depressions may be flooded.

The Cycle of Environmental Degradation as a result of Mining:

1. Starting extraction of minerals.
2. Vegetation cut down resulting in soil exposure.
3. Natural landscape deformed due to construction of roads & miners' houses.
4. Rock blasting or digging of earth.
5. Depressions caused by subsidence of land may become flooded.
6. Noise pollution & vibration from blasting. (triggers minor earthquakes)
7. Traditional mining methods are hazardous to the health of miners.
8. Land pollution due to mining waste.
9. Water supply polluted from mineral waste.
10. Air pollution from dust & smoke.
11. Environmental loss.

Sustainable Development & Mining:

Sustainable: Utilizing resources in such a way that you are meeting the demands of your current population without compromising the needs of the future.

How can mining be done along sustainable lives?

- The government should consider the concept of sustainable development when making policies which affect the minerals & metals industry.
- The application of science & technology to enhance the industry's competitiveness & environmental protection.
- The discharge of toxic substances & the release of heat, in such quantities or concentrations which is harmful to the environment, should be strictly checked in order to ensure that serious or irreversible damage is not inflicted upon ecosystems.