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B. Sc. (Bio.) Botany, III rd year

Paper III - Environmental Botany

Topic - Mineral resources of planet earth, Conservation of mineral resources.

Nature has blessed us with a wide variety of resources. These resources are very vital for the existence of living being especially the human beings. They are sources of materials which meet our requirements of food, energy and shelter etc.

What is a resource ?

A resource is anything we get from the environment to meet our needs and wants.

Natural Resources :-

The raw materials available in the environment that organisms use for their survival. They may be either Biotic (Plants and Wildlife) or Abiotic (water, air, soil and Minerals) in nature.

Natural resources can be defined as "those parts of nature that can provide goods and services for humans including opportunities for recreation, the appreciation of scenic beauty and the disposal of wastes.

Mineral Resources

Minerals are non-renewable raw materials extracted from the earth's crust - the upper layer of the lithosphere.

"Any naturally occuring inorganic substance found in the earth's crust as a crystalline solid is called a mineral."

Non-renewable resources are those natural resources that are available only in limited amounts and are not easily replaced by nature e.g. coal, petroleum oil, natural gas, mineral and metal ores.

Minerals can be divided into two groups:

(i) Metallic, eg. iron, copper, silver, platinum, gold etc.

(ii) Non-metallic eg. stone, salt, sand, phosphates, sulphur, asbestos, corundum etc.

India produces 89 minerals out of which 4 are fuel minerals, 11 metallic, 52 non metallic and 22 minor minerals. Together, these minerals constitute one fourth of the world's known mineral resources.

Minerals are basic raw materials for many industries. The metallic minerals include iron-ore, chromite, zinc concentrates, copper-ore, gold, bauxite, lead ores and manganese ore. Non-metallic, are magnesite, dolomite kaolin, barytes, limestone, gypsum, apatite, phosphorite and fluorite.

An ore is a mineral deposit containing enough of a metallic element to permit it to be extracted and sold. The higher the concentration of metal in the ore, the higher is its grade.

India is the world's largest producer and exporter of mica. The main mica producing States Bihar, Jharkhand, Andhra Pradesh and Rajasthan. India ranks 3rd among the chromite producers of the world. The chromite deposits occur in Orissa, Andhra Pradesh, Bihar, Mysore and Karnataka. India ranks 4th in iron ore, 3rd in coal, lignite and barytes, 6th in bauxite and manganese ore, 8th in aluminium and 4th in crude steel in the world. Bauxite found in Tamilnadu, Uttar Pradesh Karnataka, Western Bihar and Maharashtra while Gypsum occurs in Rajasthan and Tamilnadu state.

A few minerals such as gold and silver, occurs as free elements other scarce metals are lead, copper, zinc, platinum, mercury and molybdenum. But most minerals are compounds of ten elements and these make up 99.3% of the earth's crust. Some minerals such as aluminium, iron, titanium, magnesium chromium and manganes are abundant metals found in earth's crust.

Origin of Mineral Resources

A rock is a naturally occuring solid that contains one or more minerals. The largest and slowest of the earth's cyclical processes is the rock cycle and involves the formation and the modification of rocks in the earth's crust and mantle.

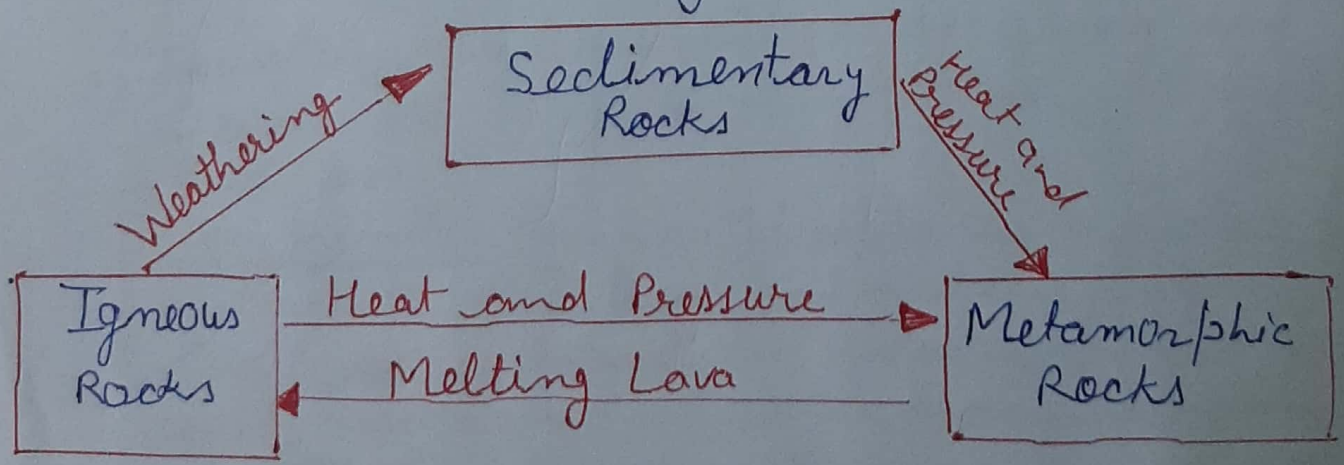
There are three mayor types of rocks:

(1) Igneous rocks: They are formed by the cooling, hardening and crystallizing of various kinds of lavas and differ widely in their chemical composition. Rocks containing a high proportion of quartz (60-75%) are classified as acidic, whereas those containg less than 50% quartz are classified as basic. The common igneous rocks are granites (acidic) and basalts or the Deccan Trap (basic).

(2.) Sedimentary rocks - They are derived from igneous rocks and are formed by the consolidation of fragmentary rock materials and the products of their decomposition deposited by water. Ex. Sandstone, limestone, conglomerate and shale.

(3.) Metamorphic rocks :- The word "metamorphic" comes from Greek and means "To change form." They are formed from the igneous or sedimentary rocks by the action of intense heat and high pressure or both resulting in considerable change in the texture and mineral composition. The common metamorphic rocks are gneiss from granite, quartzite from quartz or sandstone, marble from limestone and slate from shale.

The Rock Cycle



Minerals and their uses

Minerals resources

Metallic

Iron is used to make steel. Small amount of nickel, cobalt, manganese and chromium are added to steel to make stainless steel. Stainless steel is an alloy. Nickel used for coins, metal plating, Chromium for refractory, chemicals and metallurgy, Copper for gold jewellery, silver and electrical products. Lead for gasoline paints, pipes, batteries. Aluminum for building materials, electrical wiring, utensils, air crafts and rockets, Platinum for equipment, industrial catalyst and jewellery. Radium - radiography and in medical and other industrial uses. Tin for tin plate, cans, containers, chemicals etc. zinc for chemicals, brass, electrodes, die-casting galvanising, solder etc. Gold and silver for Jewellery, dentistry, alloys, photography and in utensils etc. Potassium for fertiliser, photography and glass.

Non-metallic such as phosphorus for chemicals detergents, fertilisers and medicine. Sulphur as a fertilisers, iron and steel industries, insecticides acid, medicines and corundum for Abrasives

Metallic liquid such as Mercury is used in electric switches, Thermometers, dentistry etc.

Mining: This includes extraction, processing and disposal of minerals. This not only disturbs and damages the land, but also pollutes the soil, air and water. The land that has been destroyed due to mining is known as mine spoil. Such destroyed lands can be reclaimed to a semi-natural condition by revegetation to prevent further degradation.

Conservation of Minerals Resources.

Due to increased human population more and more resources are required to meet the ever increasing human requirements. There is a great pressure on the existing natural resources and we can say that these natural resources are being over exploited. The non-renewable resources are being depleted and would exhaust one day. Today many of the natural resources are being damaged as a result of human activities. Efforts are being made to check the wasteful and injudicious use of minerals by recycling and adopting more efficient technologies, exploiting untapped deposits and by deep sea-mining. In process of recycling, used and discarded items are collected, remelted and reprocessed into new products, such as aluminium cans, iron scraps. Finding new uses for glass, plastics, ceramics and synthetic fibres and using them as substitutes for exhaustible minerals is in progress.

Some minerals present in products can be recycled. eg. silver, gold, nickel, steel lead, copper and zinc. Recycling and reusing not only renew the mineral resources, but also help in saving land from disruption of mining, reducing pollution and consumption of energy, reducing the amount of solid waste that is disposeable and durable and repairable products should be encouraged to be used again. Manufacturing industries should use the waste products of one manufacturing process as the raw materials for the production of other products.

References –

1. Botany for degree students by Dr. B.P. Pandey.
2. Natural Resource Managment from IGNOU.