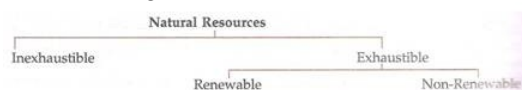




#### Solution LAQ - 1:



Natural resources are living and non-living components of nature which are used by humans to meet their requirements. Since natural resources are available only from the Earth, they are called Earth resources.

Based on their abundance, natural resources are of two main types, inexhaustible and exhaustible.

(a) Inexhaustible natural resources: They are natural resources which occur in such abundance that they are not likely to get exhausted despite continuous use, e.g., air, water, solar energy.

(b) Exhaustible natural resources: They are natural resources which are available in limited quantity. They may get depleted by continuous and indiscriminate human consumption. Exhaustible resources are of two kinds, renewable and non-renewable.

(i) Renewable resources: They are exhaustible resources which get replenished regularly. These are both living and non-living resources which can replenish themselves by quick recycling, e.g., forests, wildlife, soil and underground water. Renewable resources can last for ever if they are used responsibly.

(ii) Non-renewable resources: They are exhaustible resources which once used cannot be replenished. Thus, these resources are non-living and cannot replenish themselves by recycling and replacement. If not used carefully they will ultimately get exhausted. Their increased consumption results in quicker exhaustion, e.g., minerals, fossil fuels such as coal and petroleum.

#### Solution LAQ - 2

Air contains oxygen. The latter is needed by most organisms and plants for all respiration to go on. It is therefore rightly called the breath of life. Air is an inexhaustible natural resource. In a world without air, there would be no plant or animal life, no winds, clouds or rain, no fires and no protection against harmful solar radiations. This is because the atmosphere covers the Earth, like a blanket. Air is a bad conductor of heat. The atmosphere keeps the average temperature of the Earth fairly steady during the day and even during the course of whole year. The atmosphere prevents the sudden increase in temperature during the daylight hours. And at night, atmosphere slows down the escape of heat into outer space.

#### Solution LAQ - 3

The introduction of chemicals, particulate matter, or biological materials into the atmosphere that cause harm or irritate living organisms or damage the natural environment is known as air pollution.

The major causes of air pollution can be in the form of solid particles, liquid droplets, or gas. There are many different chemical substances that contribute to air pollution. These chemicals come from a variety of sources. Among the many types of air pollutants are nitrogen oxides, carbon monoxides, and organic compounds that can evaporate and enter the atmosphere.

Air pollutants have sources that are both natural and human.

Humans contribute substantially more to the air pollution problem.

Forest fires, volcanic eruptions, wind erosion, pollen dispersal,

evaporation of organic compounds, and natural radioactivity are all among the natural causes of air pollution. Though some pollution comes from these natural sources, most pollution is the result of human activity. The biggest causes are the operation of fossil fuel-burning, power plants and automobiles that combust fuel.

Effects of air pollution on human beings:

- (i) SPM (suspended particulate matter) causes asthma, bronchitis and allergic cold.
- (ii) Pollutant gases cause irritation in eyes, throat and lungs. Heart related diseases tend to increase.
- (iii) Hydrocarbon vapours not only damage the internal organs but also cause cancer.

Solution LAQ - 4

The ozone layer is a deep layer in the stratosphere, encircling the Earth, which has large amounts of ozone in it. This layer shields the entire Earth from much of the harmful ultraviolet radiation that comes from the sun. Ozone is a special form of oxygen, made up of three oxygen atoms rather than the usual two oxygen atoms. It is formed when some type of radiation or electrical discharge separates the two atoms in an oxygen molecule ( $O_2$ ), which can then individually recombine with other oxygen molecules to form ozone ( $O_3$ ).

Reduction in the concentration of ozone layer is called ozone depletion. Ozone depletion is caused by certain chemicals called ozone depleting substances. They include chlorofluoro carbons, methyl bromide, nitrogen oxides and chlorine.

Effects of ozone depletion: Depleting ozone layer allows more ultraviolet (UV) radiations to pass through it, which reach the earth's surface. These UV rays cause various harmful effects on human beings, animals, plants and environment such as:

- (i) Skin cancer.
- (ii) Damage of eyes.
- (iii) Damage of immune system.
- (iv) Decreased crop yields.

Solution LAQ - 5

Sources of water pollution:

- (i) Sewage - Organic wastes are contributed as domestic and commercial sewage by food processing plants, dairy farms, piggeries, poultry farms, slaughter houses, breweries, tanneries, etc. Animal excreta is discharged into fields or dumped into pits reaches water bodies through run off and leaching, particularly during the rainy season.
- (ii) Industrial wastes - Effluents of mills and industries such as paper mills, petroleum refineries, etc., contain large quantities of harmful chemicals including acids, alkalis and heavy metals (e.g., mercury salts from paper industries) that are discharged into water bodies (rivers and lakes).
- (iii) Synthetic soaps and detergents - Water containing soaps and detergents is discharged from houses and certain factories.
- (iv) Fertilizers and pesticides - Fertilizers and pesticides are being used excessively in the fields to increase crop production. These are washed by rainwater into water bodies and pollute them.
- (v) Petroleum oil - Drilling and shipping operations are common in the oceans. Leakage of petroleum oil during such operations or due to accidents results in water pollution.
- (vi) Solid particles - Rain erodes soil and carries silt to water. Tiny suspended particles of clay and dust also settle in water from air. These soil particles cause turbidity.
- (vii) Thermal pollution - Discharge of hot water from industries and thermal plants into water body changes the normal temperature of the water. The content of oxygen decreases. Reduced oxygen content kills aquatic animals and reduces the rate of decomposition of organic matter which, therefore, accumulates.

Harmful effects of Water pollution:

- (i) Human diseases - Diseases such as typhoid, cholera, dysentery,

jaundice and hepatitis are caused due to water pollution.

(ii) Disturbance in ecological balance - All types of water pollutants affect the life forms living in the water. These pollutants can encourage the growth of some life forms and harm some other life forms hence affecting the balance between various organisms.

(iii) Removal of desirable substances from water bodies - With increase in the amount of organic wastes in water, bacteria multiply rapidly and use up the available oxygen. Lack of oxygen kills the fish and other animals.

Solution LAQ - 6

(i) Eutrophication is nutrient enrichment (i.e., addition of nitrates and phosphates) of water body that results in the growth of aquatic plants, especially algae causing colouration of water known as algal bloom. It leads to depletion of dissolved oxygen in water resulting in killing of aquatic organisms (e.g., fish).

(ii) The phenomenon of increase in the concentration of harmful non-biodegradable substances in the body of living organisms at each trophic level of the food chain is called biomagnification. Two heavy metals which are biomagnified are mercury and cadmium. Due to biomagnification fish-eating predatory birds such as kingfishers and loon become poisoned.

Solution LAQ - 7

Living organisms need water because it plays a vital role in the reactions taking place within organism's cells and body. Water acts as a universal solvent, providing a medium for the chemical reactions to occur. Substances are also transported from one part of body to the other in the dissolved state. Therefore, it is necessary for the organisms to maintain a distinct level of water within their bodies in order to stay alive. Terrestrial life forms require fresh water because their bodies cannot tolerate or get rid of the high amounts of the dissolved salts in saline water. So, water sources need to be easily accessible to animals and plants to survive on land.

Thus, availability of water decides not only the number of individuals of each species that are able to survive in a particular area, but it also decides the diversity of life there.

Solution LAQ - 8

Soil is a mixture of small particles of rocks and humus (i.e., organic matter obtained from decaying of living organisms or their wastes). Temperature variations due to radiations of the sun, rain water, winds and living organisms influence the formation of soil from the rocks involving two processes: weathering and paedogenesis.

Breakdown of bigger rocks into small, fine soil particles is called weathering. It may occur due to physical, chemical or biological means. Under the influence of solar radiations, rocks heat up and expand. At night, these rocks cool down and contract. Since all the parts of rocks do not expand and contract at the same rate, cracks appear in the rocks and ultimately the large rocks breakdown into smaller pieces. Flow of water through or over the rocks makes the cracks bigger. Flowing/falling water also has an erasing effect on the rocks. On freezing the water expands in rock crevices and breaks the rocks. Similarly, strong winds continue to rub against hard rocks and erode them. Growth of lichens, mosses and other plants also influence the formation of soil by eroding the rocks over which they are growing.

Paedogenesis: This process concludes the decomposition by bacteria and fungi, during which organic materials are broken down, leading to humification and mineralization. Detritivores such as nematods, earthworms, etc., consume organic matter and add excretory nitrogen to it. Thus, addition of organic matter (humus) from dead and decomposed plants and animals, is the final stage in soil formation.

Solution LAQ - 9

Soil pollution is caused by solid wastes and chemicals. The slag heaps from mines spoil the beauty of sites of mines. Pulp and paper

mills, sugar mills, oil refineries, power plants, chemicals fertilizer manufacturing units, iron and steel plants, plastic and rubber producing complexes are some major contributions to soil pollution. Most industrial furnaces and thermal power stations produce fly ash, which is a grey, powdery residue of unburnt material, and causes pollution. This fly ash hampers the growth of crop plants and also decreases crops of orchards. Domestic waste also adds a large amount of solid wastes. Modern farming practices involve the use of large amounts of fertilizers and pesticides. Use of these substances over long period of time can destroy the soil structure by killing the soil microorganisms that recycle nutrients in the soil. It also kills the earthworms which are helpful in making the rich humus. Fertile soils can quickly become barren if sustainable practices are not followed.

#### Solution LAQ - 10

The removal and transportation of top soil from its original position to another place with the help of certain agents such as strong winds and fast running waters, is called soil erosion.

##### Causes of Soil Erosion:

1. Strong winds: The soil which is uncovered and loose, is eroded, when it is exposed to strong winds. The winds carry away the fine soil particles to other places.
2. Heavy rains: When rain falls on the unprotected top soil, rain water washes it down into the streams and rivers, etc.
3. Human actions: Human activities such as expansion of urban areas has led to removal of vegetation from certain regions. The bare land is thus exposed to agencies (winds, rains) of soil erosion.

##### Effects of Soil Erosion:

1. Loss of fertility and desertification: Soil erosion results in the displacement of the top soil from one region to another, thus, reducing its fertility. When the top fertile soil is constantly removed from a region, only infertile sub-soil is left behind. In such a soil, only sparse vegetation can grow. This way, soil erosion gradually turns lush green areas into deserts.
2. Landslides in hilly areas: Barren hills or hills with sparse vegetation are constantly exposed to heavy rain fall that makes the top soils of hills loose. Due to soil erosion, rock pieces of various sizes and loose soil from hills, suddenly slide down the steep slopes of mountains/hills. This phenomenon is called landslides. When these rock pieces and soil block the narrow river bed they result in floods. Sometimes, landslides block the roads and disrupt hill-life.
3. Flash floods: Vegetation in the hilly regions absorb a lot of rain water and keep the top soil intact. Barren hills or hills with sparse vegetation cannot absorb much rain water and thus can not keep the soil intact. So, heavy rains result in rapid movement of water in the areas resulting in flash floods in lower areas causing enormous loss to life and property.

##### Prevention of soil erosion:

1. Intensive cropping: If the fields remain covered with crops throughout the year, their top soil will not be exposed to winds or rains. In such a condition, no soil erosion will occur.
2. Sowing grasses and planting xerophytes: Soil should not be left uncovered. Sowing grasses on barren soil or planting of xerophytes will bind the loose soil. The roots of grasses and xerophytes hold the soil in place. Vegetative cover on the ground also helps in percolating water into deeper layers of soil.
3. Terrace farming (terracing): In terracing the slopes are divided into a number of flat fields to slow down the flow of water. In hilly regions, small crop fields are thus formed in the form of steps on terraces for cultivation of crops. Such terrace farms reduced the flow of rain water down the slopes of hills. Moreover, eroded soil from upper regions of hills gets deposited in lower terraces.

#### Solution LAQ - 11

The continuous process by which nitrogen is exchanged between organisms and the environment is called nitrogen cycle. Nitrogen is

an essential nutrient, needed to make amino acids and other important organic compounds, but most organisms cannot use free nitrogen, which is abundant as a gas in the atmosphere.

Nitrogen cycle involves the following steps:

(i) Nitrogen fixation: This process involves the conversion of atmospheric nitrogen into nitrates, which are soluble in water. This is done by various nitrogen fixing bacteria. Example - Rhizobium, blue green algae and bacterium Azotobacter.

(ii) Ammonification: It is the process of decomposing complex, dead organic matter into ammonia. This is done by microorganisms living in the soil.

(iii) Nitrification: It is the process of conversion of ammonia into nitrites and then into nitrates. This is done by nitrifying bacteria. Example - Nitrosomonas and Nitrobacter.

(iv) Denitrification: It is the process of reducing nitrates present in the soil to release nitrogen back into the atmosphere. Example - Pseudomonas.

The decomposers help in decomposing the dead bodies of plants and animals, and hence act as cleansing agents of environment. The decomposers also help in putting back the various elements of which the dead plants and animals were made, back into the soil, air and water for reuse by the producers like crop-plants, e.g. the decomposers like purifying bacteria and fungi decompose the dead plants and animal bodies into ammonia. This ammonia is converted into nitrates by nitrifying bacteria present in soil. These nitrates act as fertilizer in the soil and are again absorbed by the plants for their growth. Thus, the nitrates act as fertilizer in the biosphere so that the process of life may go on and on like an unending chain.

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