

NATURAL RESOURCES

- **Resource** – A Resource is a stock or supply of something useful. Resources can be manmade or Natural.
- **Natural Resources** – A Resource which exists in nature is called a Natural Resource. It is not produced by any human being; rather it is available in nature itself. Human beings and other animals depend upon these resources for their existence.
- **Natural Resources present on the earth are:**
- **Air** – The atmosphere which contains different gases such as Oxygen, Nitrogen and carbon dioxide which are required for the survival of life on earth.
- **Water** – The **hydrosphere** which covers almost 75% of the Earth surface. It is a home to an abundance of animals and plants and is also required for the survival of life on earth.
- **Land** – The upper crust of the earth is called Lithosphere where different kinds of soils are found which are necessary for the growth of plants and are a home to several vitamins and minerals.
- Life on Earth is possible because of the presence of these three major sources. A zone where the lithosphere, the atmosphere and the hydrosphere intersect and the life sustains is called the **Biosphere**
- The other way round in which carbon cycle is formed is that, all the living organisms are constituted of major parts of carbon. When these animals and plants die, their bodies are decomposed by the microorganisms into simpler form and release carbon to the atmosphere, either in the form of carbon or the oxides of carbon, like carbon dioxide or carbon monoxides.
- The resources which we obtained from nature are called natural resources.
- There are two components of ecosystem, **biotic and abiotic**
- The circulation of chemicals between the various components of environment is called biochemical cycle.
- The increase in the temperature of the atmosphere due to pollution is called green house effect.
- The gas which causes green house effect is **CFC**.
- The thick layer of O₃ molecules above the atmosphere is called **ozone layer**.
- **The biosphere can be divided into two parts:**
- **Abiotic Components** – The non-living things such as air, water and land
- **Biotic Components** – The living things such as plants and animals.

- **Air:**
- The air or the atmosphere comprises of various gases. Life is present on the earth because of these gases especially oxygen. Other planets such as Mars and Venus contain majorly carbon dioxide (95% to 97%) that is why life cannot exist there.
- **How much carbon dioxide is produced on earth?**
- The Eukaryotic cells and some prokaryotic cells generate energy by breaking down glucose molecules. This results in the production of carbon dioxide.
- The process of combustion also leads to the release of carbon dioxide in the atmosphere. How the amount of carbon dioxide is regulated on the earth.

- The plants present on the earth utilize carbon dioxide present in the atmosphere and release oxygen as a byproduct in the process of photosynthesis.
- The Marine animals make their shells in water using carbonates dissolved in water
- **The atmosphere of the earth helps in maintaining its temperature**
- The presence of gases around the earth prevents an increase in the temperature of the earth during the daytime.
- The atmosphere prevents the harmful radiations of the sun from reaching the Earth's surface.
- The atmosphere prevents the heat of the earth in escaping the earth's surface during the night time.
- Moon has no atmosphere hence it faces extreme temperatures ranging from -190 degrees to 110 degrees.
- **Winds:**
- The changes in the earth's atmosphere are responsible for Winds, Storms, Breezes and Rains.
- The formation of water vapour in the atmosphere can take place due to the heating of water bodies and activities of living organisms.
- The atmosphere can heat up as the earth, water bodies and land, radiate back the heat they absorbed. The land gets heated up or cooled down faster than water.
- As the air gets heated, it rises above which leads to winds.
- **Winds in the coastal regions**
- During the daytime, the land in the coastal areas gets heated faster than the sea. As a result, the air above the land rises above and creates a region of low pressure. Then, the air above the sea moves to this region of low pressure. This creates winds in the coastal area during the day.
- During the night time, the land cools down faster than the sea. The air above the sea being warmer rises above and creates an area of low pressure over the sea. As a result, the air above the land moves towards the sea. This causes winds at the night time in the coastal regions.

- **Other factors that also affect the formation of winds**
- **Uneven heating of the Earth's atmosphere**
- **The rotation of the earth**
- **The presence of mountains on the earth**
- **The formation of Clouds**
- **As the water bodies on the earth get heated up water vapour is formed which is carried out in the atmosphere through hot air.**
- **When the air rises it expands and cools down. The water vapour present in the air also cools down and forms tiny water droplets.**
- **There are other particles such as dust present in the air. These particles act as a nucleus to these droplets.**
- **The droplets condensate further and form large droplets and thereby the clouds. Once they become very heavy, they fall off on to the ground as rain.**
- **If the temperature of the air is very low it results in snowfall at some places.**
- **The winds flowing in an area also affect the rainfall of that place.**

➤ **Air Pollution**

- The presence of harmful substances in the air leads to pollution of the air. It can severely affect the health of living organisms and the quality of the environment.
- **What causes Air Pollution?**
- **Burning of Fossil Fuels** – When coal and petroleum are burnt they release sulphur and nitrogen oxides which are harmful agents. They also release unburnt carbon particles in the air called Hydrocarbons.
- **Exhaust from Industries** – The industries release harmful gases and smoke in the air that contains carbon monoxide and organic compounds that decrease the quality of the air.
- **Mining** – During the mining process harmful chemicals are released in the air that leads to air pollution.
- **Indoor Activities** – Cleaning agents and paints used in houses release harmful chemicals which pollutes the air
- **Suspended Particulate Matter** – The particles such as dust often remain suspended in the air and degrade its quality. SPM is one of the major causes of air pollution in the cities.
- **What are the effects of Air Pollution?**
- **Acid Rains** – Rains often contain acidic compounds that can affect animals, plants and crops.
- **Harmful diseases and allergies** – Inhalation of harmful substances can lead to diseases such as heart problems and cancer and allergic reactions in the skin and eyes.
- **A decrease in the visibility** – The suspended particles in the air affects the visibility and also lead to the formation of smog in the cold weather.
- **Global Warming** – The temperature of the earth rises due to the presence of greenhouse gases in it such as carbon dioxide and methane.
- **Ozone Layer Depletion** - The air pollution leads to depletion of the outer covering of the ozone layer around the earth's atmosphere.
- **Water:**
- The different forms of water present on the earth are:
- Water Vapour – found in the atmosphere
- Saline Water – found in seas and oceans
- Freshwater – found in frozen ice caps, snow-covered mountains, underground, rivers, lakes and ponds
- **Why water is a necessity for life?**
- The presence of water in a region decides the biodiversity of that area to a great extent.
- The cellular processes take place in the water-like-medium.
- A major constituent of blood is water which allows it to carry substances throughout the body.
- Water helps in regulating the body temperature in animals and human beings.
- It prevents the tissues, organs and cells from drying out by keeping them moist.
- Water helps in digestion of food.
- Water helps in the removal of waste products out of the cells.
- Plants also require water to transport food through different parts such as the stem and leaves and also in the process of photosynthesis.
- **Water Pollution**
- Water pollution occurs when harmful substances such as chemicals and waste materials like garbage are present in water that affect its quality and the presence of life in it.

➤ **The causes of Water Pollution**

- Waste from Industries – The industries often release chemicals directly into water bodies such as rivers and seas which contaminates it.
- Sewage – The waste produced from households is often released into the water which gives rise to harmful bacteria in the water.
- Mining Activities – The metal wastes obtained from mining activities harm the organisms present in water
- Usage of Fertilizers and Pesticides – The chemicals present in fertilizers and pesticides are extremely harmful to aquatic animals, plants as well as animal consumption.

➤ **The Effects of Water Pollution**

- Addition of unwanted substances such as fertilizers pesticides and industrial wastes can make it poisonous and extremely harmful for consumption.
- It can also lead to an increase in bacteria that causes severe diseases like Cholera.
- Water pollution can lead to a decrease in the amount of Oxygen and nutrients in the water which affects the aquatic life.
- Water pollution can cause changes in the temperature of water. An increase in temperature is not suitable for all the aquatic animals especially their eggs.

➤ **Soil (Land)**

- The upper layer of the earth called crust stores different nutrients that can help in sustaining life on earth. But they are generally bounded in rocks and mountains. Over a large course of time, these rocks breakdown through some chemical, biological and physical processes which leads to the formation of a nutrient-rich soil.

➤ **Soil Profile**

- The soil is found in several layers which are arranged as the soil is formed.
- The layers of the soil are also called as **Horizons**.
- These layers have different types of soil particles and colour and hands are differentiated on this basis.
- The **soil profile** is defined as the vertical section of soil that represents the sequence of layers to the soil.
- The layers of the soils help in understanding the usage of that soil.
- The soil mainly consists of four layers. Such a soil is called **Mature Soil**.
- Some types of soils consist of two layers only. They are called **Immature Soils**.

➤ **The layers or Horizons of soil**

➤ **The Topsoil or Horizon A or the Humus Layer**

- This layer of soil consists of organic matter and decomposed substances.
- It is dark in colour, porous and can hold air and water in good amounts.
- Due to such quality, many living organisms are found in the topsoil, for example, the earthworms, fungi and bacteria.

➤ **Horizon O**

- Some soils contain a layer of organic matter which consists of a large amount of decomposed leaves and humus. It is called the organic layer of the soil.

➤ **Subsoil or Horizon B**

- It lies below the topsoil. It is hard and compact than the topsoil.

- The subsoil has a light colour because it does not contain much humus.
- The subsoil does not contain much organic matter other but contains minerals in good quantity and metal salts like iron oxide.
- When farmers plough their field, they often mix the topsoil and subsoil so that the crops can grow easily.
- **Horizon C or Regolith**
- This layer lies beneath the subsoil layer.
- It is very hard and consists of stones and partly weather pieces of rocks. There is no organic matter in this layer. The roots of plants and trees cannot penetrate up to this layer.
- **Horizon R or Bedrock**
- This is the last layer of the soil which consists of unweathered rocks
- **Factors Affecting the formation of Soil**
- **The sun –**
- It is responsible for breaking down the rocks into smaller pieces and forming cracks in between them.
- The sun's radiations heat up the rocks during the daytime. As a result, the rocks expand.
- But during the night, these rocks cool down and therefore contract.
- All the parts of the rocks may not cool down or heat up at the same time.
- All this leads to the formation of cracks in them and ultimately breaks them down.
- **Water –**
- Water gets into the cracks of the rocks and freezes down there.
- This leads to whitening of the cracks.
- Flowing water often carries pieces of rocks away and on that path they get broken down into smaller pieces as they rub against each other and also due to the pressure of the flowing water. This is one of the reasons why soil is formed far away from the parent Rock.
- **Winds –**
- Winds can wear down the rocks and break them.
- Strong winds rub against the rocks and break them or wear them down just like water.
- Winds also carry away the soil or sand from one place to another.
- **Living organisms –**
- Lichens that can grow on the rocks and secrete a certain substance that can powder down a rock which leads to the formation of soil.
- Small plants such as moss often grow on rocks and break them down.
- It may also happen that the roots of different plants and trees get into the rock's surface and break it down or widen the cracks.
- Soil is a mixture of various substances It contains the following:
- Small pieces of rocks
- Bits of decayed living organisms called the **Humus**
- Microscopic organisms
- Minerals and nutrients
- **Factors that decide the type of Soil**
- The amount of humus present in the soil – the more the humus the more porous and deep the soil is.

- The number of microscopic organisms in the soil – they help in keeping it fertile
- The parent rocks – they decide the minerals that are present in the soil
- All these factors also decide which kind of plants will grow in that soil.
- **Topsoil** – The upper layer of the soil which contains all living organisms and humus is called topsoil. The quality of topsoil in a region decides the biodiversity of that place.
- **Soil Pollution**
- We know that soil contains different types of substances all of them are responsible for the sustenance of the biodiversity. When the useful components get removed from the soil, it loses its fertility and leads to a decrease in the microscopic life in it. This phenomenon is called soil pollution.
- **The causes of Soil Pollution**
- Long usage of fertilizers and pesticides leads to the killing of the microorganisms present in it. Without these organisms, the soil would not get recycled and replenished. Earthworms get killed because of the pesticides. They are the ones that lead to the formation of humus in the soil.
- Flowing water and winds can carry away the soil particles and often lead to exposure of rocks.
- Deforestation can also lead to soil pollution as the uprooting of trees exposes the soil to rains and winds. Industrial activities like mining and extraction of minerals can lead to a mixture of harmful chemicals in the soil and decay its quality.
- **The effects of Soil Pollution**
- It severely affects the growth of plants.
- It can lead to infertility of soil and thus would restrict agriculture on such land.
- The fertilizers decay the quality of the soil.
- It can affect the health of human beings who consume food grown in soil which has large amounts of fertilizers and pesticides mixed in it.
- It can change the structure of soil thus decaying the growth of useful bacteria and other microorganisms in the soil.
- **Soil Erosion** – It a process in which the upper layer of the soil gets washed away thus leading to degradation in the soil's quality.
- **How can the roots of plants prevent soil erosion?**
- The roots of the plants bind the soil together and prevent the winds and flowing water to sweep away the soil particles.
- The plants also lead to the movement of water inside the soil and allow it to reach the deeper layer leading to an increase in the water retention of the soil and the underground water levels.
- **Biochemical Cycles**
- A biochemical cycle refers to the natural cycle of the earth through which a chemical substance or matter moves through the biotic and abiotic components of the earth. These components always interact with each other and form a stable system in the biosphere.
- There are four main biogeochemical cycles
- The Water Cycle
- The Nitrogen Cycle
- The Carbon Cycle

- The Oxygen Cycle
- **The Water Cycle:**
- The water cycle refers to the continuous movement of water from the sky to the ground and then back again. The water cycle can be divided into different stages:
- **Evaporation** - Water from the Earth evaporates into water vapours and travels up to the atmosphere.
- **Condensation** – The water cools down and forms clouds up in the atmosphere.
- **Rainfall, Snowfall or Precipitation** – The water then falls back to the ground
- The water that falls on the earth and travels through different pathways before it finally falls back into the sea and oceans via rivers. Some of the water is also being utilized by the plants, animals and human beings present on the earth. But the journey of water continues in the form of the water cycle.
- **The Nitrogen Cycle**
- The nitrogen cycle refers to the passage of nitrogen in the atmosphere where it transforms from simple elemental form to complex molecules and vice versa.
- **The Importance of Nitrogen**
- It is present in abundance (78%) in the air.
- It is an essential part of proteins and amino acids and therefore the main component of DNA and RNA.
- It is a common element found in alkaloids and urea.
- **Different phases of the Nitrogen Cycle**
- **Nitrogen Fixation**
- Nitrogen generally exists in its inherent form but in order to be accessed by most living organisms, it must be converted into the organic form.
- This process of conversion of Nitrogen into organic form is called nitrogen fixation. There are two types of nitrogen fixation:
 - ❖ **Biological Nitrogen Fixation**
 - The biological nitrogen fixation process takes place with the help of certain bacteria that are present in the soil, the roots of the plants or sometimes they also live in association with the plants.
 - These microorganisms, called **Nitrogen-fixing Microorganisms**, convert the nitrogen into nitrates and nitrites. **For Example**, Rhizobium and Cyanobacteria called Anabaena are nitrogen fixing bacteria
 - **Physical Nitrogen Fixation**
 - ❖ **Natural Nitrogen Fixation**
 - Another thing that allows nitrogen fixation is lightning. The temperature and pressure on the earth rise during the lightning which results in the formation of nitrogen oxides. These oxides dissolve in water and form nitric acids which fall on land along with rainfall.
 - ❖ **Industrial Nitrogen Fixation**
 - Industrial processes such as the creation of ammonia and nitrogen-rich fertilizers also lead to nitrogen fixation.
 - **Nitrification** - The ammonia present in the soil is then converted into nitrates and nitrites by the bacteria. This process is called **Nitrification**. **For Example**, Nitrobacter is a nitrifying bacterium.

- **Assimilation** - The various nitrogen compounds are utilized by plants and animals. Plants form amino acids with these nitrites and nitrates. The amino acids are further used to make proteins in plants. This is the process of assimilation.
- **Ammonification** - When the plants and animals die or excrete wastes the nitrogen present in the organic matter enters the soil. The decomposers present in the soil break down these nitrogen compounds into Ammonia. This process is called ammonification. **For Example**, Bacillus and Clostridium are ammonifying bacteria.
- **Denitrification** – In wet soils, it becomes difficult for the microorganisms to breathe. A special type of bacteria called the denitrifying bacteria converts the nitrate oxides present in the soil into oxygen and nitrogen. The oxygen is utilized by the organisms in the soil and the nitrogen is set free. This process is called **Denitrification**. As a result, nitrogen is given back into the environment. **For Example**, Pseudomonas and Clostridium are denitrifying bacteria.
- **The Carbon Cycle**
- The carbon cycle refers to the process in which carbon is exchanged among the biotic and abiotic components of the earth.
- **Importance of Carbon**
- Carbon can be found on earth as
- Carbon dioxide
- Carbonates and hydrocarbons in minerals
- Carbon is present in all life forms in proteins, fats, vitamins and carbohydrates
- The internal skeleton (endoskeleton) and external skeleton (exoskeleton) in animals is made up of carbon salts.
- Plants convert carbon into glucose molecules during photosynthesis
- **How carbon is released back to the atmosphere?**
- **Respiration** – Animals utilize the glucose and gain energy from that and then release carbon dioxide through respiration
- **Combustion** – Burning of fuels for different requirements such as cooking, industrialized processes, transportation and heating leads to the release of carbon dioxide in the atmosphere
- **The Greenhouse Effect**
- **Greenhouse** – It is a house like structure made up of a transparent material such as glass. This provides plants with an appropriate environment that supports their growth, especially in the cold regions. This is possible because the greenhouse traps the heat inside it and prevents it from going out.
- **The Greenhouse Effect** - Several gases are present in the earth's atmosphere which prevents the heat entering the atmosphere from moving out of it. When the amount of these gases increases in the atmosphere, the temperature of the earth rises. This leads to severe problems like an increase in the sea levels due to the melting of the glaciers. This whole phenomenon is termed as the greenhouse effect.
- **Greenhouse Gases** - The gases that cause greenhouse effect are called greenhouse gases such as carbon dioxide, methane and ozone.
- **Global warming** - The phenomenon in which the average temperature of the earth increases due to the presence of greenhouse gases is called **Global Warming**.
- **Effects of Global Warming and Greenhouse Effect**

- **Increase in the Average temperature of the Earth** - Global Warming and greenhouse effect has lead to a severe change in the climate of the earth and an increase in the global temperature which can severely affect the biodiversity on earth. One of the major consequences is the melting of ice caps on the earth.
- **Increase in the temperature of the oceans** - This affects the aquatic life to a great extent. Many aquatic animals cannot survive in hot water.
- **Severe weather conditions** - Many parts of the world are facing extreme hot or extreme cold climate due to the increase in Earth's temperature. As a result, some places receive heavy rainfall while others face droughts.
- **Warmer Winters** - The winter season in many places on the earth has decreased due to global warming.
- **Infertile lands** – Many irrigational areas can become infertile for agriculture due to change in the weather conditions of a place. Therefore, it also affects the agricultural pattern and availability of food all over the world.
- **Effect on animals** - The migration and hibernation of many animals are affected due to change in the climate of the Earth. Global Warming can also lead to the extinction of many animals because of their inability to adapt according to the changing environment.
- **Flooding of islands and coastal areas** - The melting of ice caps has resulted in increased sea levels all over the world.
- **Increase in diseases** - Global warming and the greenhouse effect lead to spread of diseases related to the heart, respiration and eyes all over the world. Apart from these, global warming leads to infectious diseases like cholera, malaria and dengue.
- **The Oxygen Cycle**
- Oxygen cycle refers to the maintenance of the amount of oxygen present in the atmosphere.
- **Importance of oxygen**
- It is the second most abundant gas present in the atmosphere (21%).
- It is found in the earth's crust as oxides in metals and minerals.
- It is found in combined form in carbon dioxide
- It is also found in biological compounds like proteins, nucleic acids, carbohydrates and fats.
- **Oxygen is required in three processes:**
- Combustion
- Respiration
- Formation of Nitrogen oxides
- Oxygen is returned back to the environment by the process of **photosynthesis** only. That is why it is very important to grow more and more plants so that more amount of oxygen can be returned back to the atmosphere.
- **The Ozone Layer**
- The upper layer of the atmosphere of the Earth is covered by a gas called Ozone (O₃). This gas is poisonous in nature but it doesn't affect the life as it is found far away from the biosphere.
- The Ozone Layer acts as a shield and prevents the harmful ultraviolet rays of the sun from reaching the Earth's surface. In this way, it allows the survival of life on earth.
- **The Ozone layer depletion**

- It has been discovered that the Ozone Layer is getting depleted from the earth's atmosphere. A hole in Ozone Layer has been found over Antarctica.
- This is mainly because of the presence of the **Chlorofluorocarbons (CFCs)** in the atmosphere. These are released due to industrial processes, refrigeration, aerosols, foams and solvents.
- The chlorine and fluorine present in these on reaching the Ozone Layer react with it to form complex compounds and it thus results in depletion of Ozone.
- If the Ozone Layer would deplete the ultraviolet rays of the sun would under the Earth's atmosphere which could lead to **severe effects** such as:
 - An increase in the risk of having skin cancer
 - Damaging the eyes
 - The weakening of the immune systems
 - Skin allergies
 - Decay in the growth of plants and animals
 - Breakdown of the natural carbon cycle

FILL IN THE BLANKS

1. The atmosphere of the earth is heated by radiations which are mainly **re-radiated by land and water**
2. If there were no atmosphere around the earth, the temperature of the earth will **increase during day and decrease during night**
3. **It will become poisonous and kill living forms** if all the oxygen present in the environment is converted to ozone.
4. One of the following factors does not lead to soil formation in nature **polythene bags.**
5. The two forms of oxygen found in the atmosphere are **ozone and oxygen.**
6. The process of nitrogen-fixation by bacteria does not take place in the presence of **elemental form of oxygen**
7. Rainfall patterns depend on **the number of water bodies in an area**
8. The nitrogen molecules present in air can be converted into nitrates and nitrites by **a biological process of nitrogen fixing bacteria present in soil**
9. **photosynthesis** is not a step involved in the water-cycle operating in nature.
10. **Ammonia** is not a green house gas.
11. **Transpiration** is not involved in the carbon-cycle.
12. 'Ozone-hole' means **thinning of the ozone layer**
13. Ozone-layer is getting depleted because of **excessive use of man-made compounds containing both fluorine and chlorine**
14. **Ozone layer depletion, Green house effect, Global warming** is a recently originated problem of environment.
15. When we breathe in air, nitrogen also goes inside along with oxygen the fate of this nitrogen is that **It comes out with the CO₂ during exhalation**

16. Top-soil contains the following **Humus, living organisms and soil particles.**
17. Major source of mineral in soil is the **parent rock from which soil is formed**
18. Total earth's surface covered by water is **75%**
19. Biotic component of biosphere is not constituted by **air.**
20. An increase in carbon dioxide content in the atmosphere would not cause **abundance of desert plants.**
21. Oxygen is returned to the atmosphere mainly by **photosynthesis.**
22. Low visibility during cold weather is due to **unburnt carbon particles or hydrocarbons suspended in air**
23. Growth of Lichens on barren rocks is followed by the growth of **moss.**
24. Marked temperature changes in aquatic environment can affect **breeding of animals**
25. Soil erosion can be prevented by **raising forests.**
26. without vegetation cover if rain falls on soil Rainwater causes **loss of surface soil**
27. Oxygen is harmful for **nitrogen fixing bacteria.**