

Introduction

Life on earth depends on resources like soil, water, air, and energy from the sun.

The different resources available on the Earth are land, water, and air.

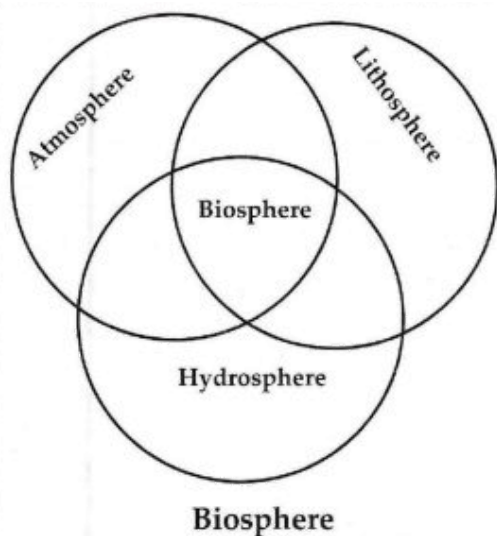
Resources on the earth

Lithosphere: The outermost crust of the earth.

Hydrosphere: Water covers 75% of the earth's surface. It is also found underground.

Atmosphere: The air that covers the whole of the earth like a blanket.

Biosphere: The life-supporting zone of the Earth where the atmosphere, hydrosphere, and the lithosphere interact and make life possible is known as the biosphere.



Air

Air is a mixture of different gases like nitrogen, oxygen, carbon dioxide, and water vapor.

Role of Atmosphere

Atmosphere acts as a protective blanket for the earth.

Air is a bad conductor of heat; it keeps the average temperature of the earth constant.

At night, it slows down the escape of heat into outer space.

The Movement of Air: Winds

The movement of air from one region to the other creates winds.

During the day, the direction of the wind is from sea to land. This is because the air above the land gets heated faster and starts rising.

During the night, the direction of the wind is from land to sea. This is because, at night, both land and sea start to cool.

Rain: Rain is formed by evaporation and condensation of water through the water cycle in which the distribution of water takes place.

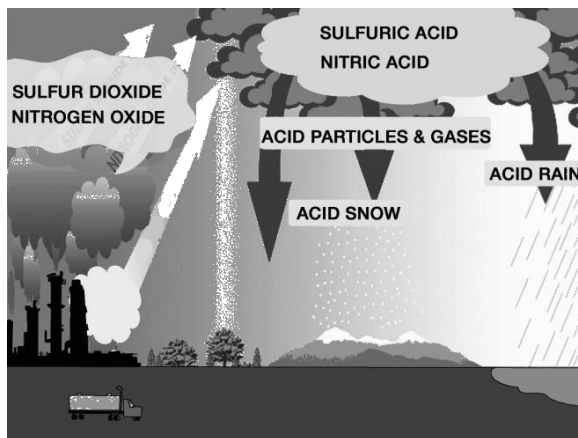
Air Pollution: When air is contaminated by unwanted substances which have a harmful effect on both the living and the non-living, it is referred to as air pollution.

☑ Air pollution can cause:

- **In humans:** Respiratory and renal problems, high blood pressure, eye irritation, cancer.
- **In plants:** Reduced growth, degeneration of chlorophyll, mottling of leaves.

☑ Acid Rain

- When fossil fuels are burnt, gases like sulphur dioxide and nitrogen dioxide (NO₂) are released.
- These gases are dissolving in water form nitric acid and sulphuric acid.



Water: A wonder Liquid

- 75% of the extra surface is covered with the hydrosphere
- Major part of the water is found in seas and oceans and is saline.

- It maintains a uniform temperature of the body.
- All cellular processes take place in a water medium.

Water Pollution: Water Pollution is the contamination of water bodies due to human activities.

☒ **Effect Water Pollution**

- Irreparable damage to many ecosystems
- Destroys animal habitats
- Decrease in potable water
- Disrupts food chain
- Can cause many diseases among humans

☒ **Measure to control Water Pollution**

- Treatment of domestic waste and using it to irrigate crops
- Generation of biogas from sewage sludge.
- Using natural methods to kill insects and pests.

Soil

- Soil is the portion of the earth's surface consisting of disintegrated rock and decaying organic material. It provides support for many plants and animals.

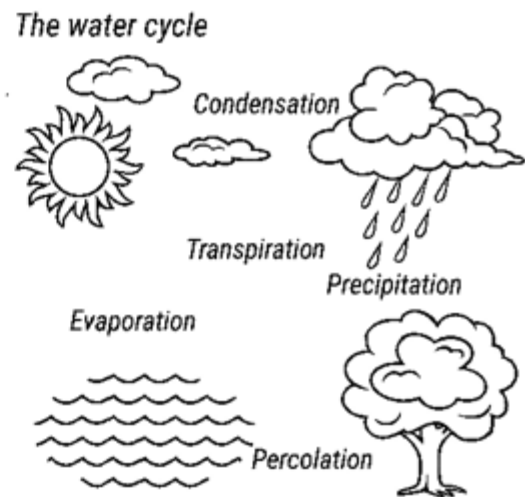
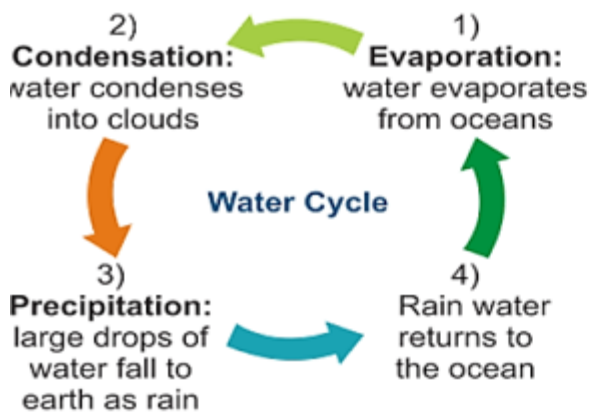
Creation of Soil: Various Factors

- **Sun:** Sun rays heat the rocks during the daytime which causes the rocks to expand. During the night, the rocks cool and contract. Due to this contraction and expansion cracks develop in the rocks and they break down.
- **Water:** Water helps in the formation of soil both by freezing as well as fast flow. Water freezes in the rock crevices and widens the crack causing the rocks to break. Fast flowing water causes the rocks to break slowly and also carries them from one place to another.
- **Wind:** Under the effect of strong winds and storms, the stone pieces further break down and are also carried from one place to another.
- **Living organisms:** Lichens grow on rock surfaces and release certain substances that convert the rocks into powdery form and make a thin soil layer. Other small plants like mosses grow on the surface of rocks that cause them to break further.

Biogeochemical Cycles

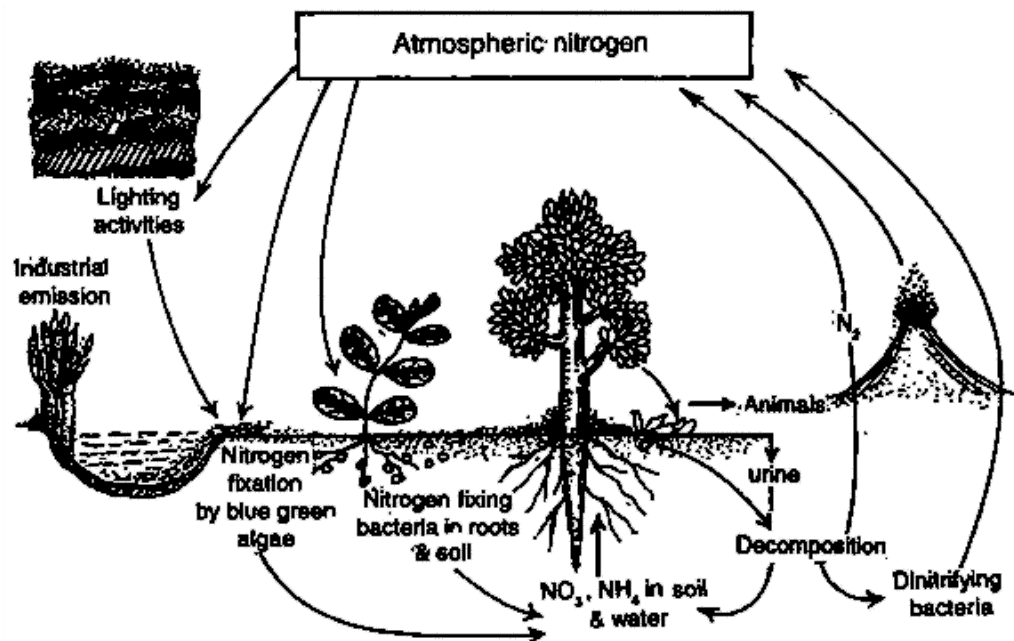
- The cycling of chemical elements like carbon, oxygen, nitrogen, phosphorus, sulphur, and water in the biosphere is called the biogeochemical cycle.
- The cyclic flow of nutrients between non-living environment and living organisms e.g. Water cycle, Carbon cycle, Nitrogen cycle, Oxygen cycle

Water Cycle



- The process in which water evaporates and falls on the land as rain and later flows back into the sea via rivers is called the water cycle.
- Water evaporates from the hydrosphere (oceans, seas, rivers, lakes, ponds) with the sun's heat and forms clouds.
- By the help of wind, clouds are blown over the land, where they are cooled enough to drop water as rain.
- Rain may fall directly into the ocean also. Some water from rain and melting snow soaks into the ground, but some flows in rivers and then to seas.
- The groundwater comes to the surface again by springs and pumps. It is used in agriculture, industry, and home. Water then evaporates into the atmosphere. It also evaporates from snow, reservoirs, and ground.
- Water vapor added by evaporation to the atmosphere again forms clouds.

Nitrogen Cycle

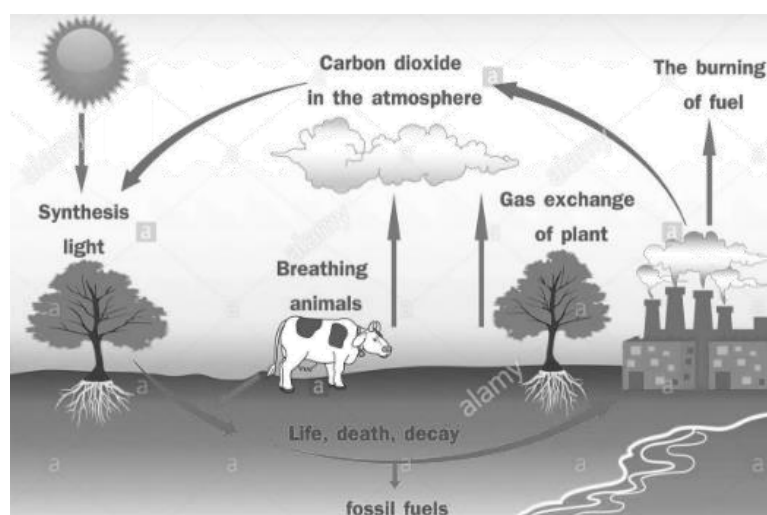


- The simpler molecular nitrogen from the atmosphere is converted into more complex molecules in the living beings and back again into the atmosphere is called the “Nitrogen Cycle”.
- **Nitrogen fixation by lightning:** During lightning, the molecular nitrogen is converted into oxides of nitrogen and dissolves in water to form nitric and nitrous acids. The acids fall on land along with the rain.
- **Nitrogen fixation by Bacteria:** The molecular nitrogen is converted into nitrates and nitrites, by free-living bacteria or the bacteria present in the root nodules of legumes.
- The conversion of molecular nitrogen into nitrates and nitrites is called as “Nitrification”.
- Plants generally convert nitrates and nitrites into amino acids. The conversion of

nitrites and nitrates into ammonia is called **“Ammonification”**.

- The conversion of Ammonia into molecular Nitrogen is called **“Denitrification”**.
Thereby nitrates and nitrites are converted into molecular or elemental nitrogen in nature.

Carbon Cycle



Carbon is the main constituent of all living organisms. It is an integral part of all major organic compounds of the protoplasm like carbohydrates, fats, proteins, and nucleic acid.

☑ Source of carbon:

1. Carbon dioxide – in air
2. Carbon dioxide or Carbonic acid or bicarbonates – in water or hydrosphere
3. Coal, petroleum, natural gas (carbon content) – in fossils fuels
4. Carbonates and graphite – in rocks
5. Limestone – oceans

☑ Carbon dioxide returns to the biosphere in five ways

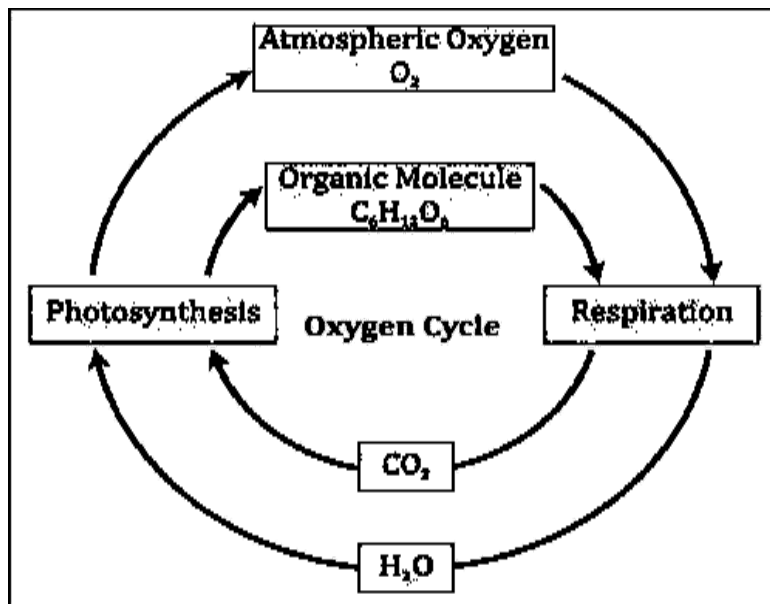
1. By plants and animals during respiration.
2. By decomposition of organic wastes and dead bodies.

3. By burning fossil fuels.
4. By volcanic eruptions.
5. By the weathering of rocks.

Greenhouse Effect

- Global warming is the increase of Earth's average surface temperature, due to the effect of greenhouse gases, such as carbon dioxide emissions from burning fossil fuels or from deforestation, which traps heat that would otherwise escape from earth.
- An increase in the percentage of such gases in the atmosphere would cause the average temperature to increase worldwide and this is called the **greenhouse effect**.

Oxygen Cycle



- The cyclic process by which an oxygen element is circulated continuously through the living and nonliving components of the biosphere constitutes the **Oxygen Cycle**.
- Oxygen required for:
 - Combustion:** the process of burning fuel in the air with the release of energy in the form of heat and light.
 - Respiration:** a form of combustion in which oxygen reacts with food to release energy.

Rusting: The corrosion of iron when exposed to air (oxygen) and moisture (water).

Ozone Layer

- Three molecules of oxygen combine to form ozone. The ozone layer is found in the **stratosphere**.
- It acts as an ozone shield and protects the earth from the harmful effect of ultraviolet radiation.
- Many man-made components like **CFCs (Chlorofluorocarbons)** react with ozone releasing molecular oxygen, causing **ozone depletion**.
- Ozone depletion has been marked in the Antarctic region where ozone layer thickness has dropped to 94 DU in 1994 from 285 DU. This depletion of the ozone layer's thickness is called an **ozone hole**.