

# **MAN AND HIS ENVIRONMENT**

- Human beings impact on the environment in two main ways namely, land use and pollution.

## **LAND USE**

### ***Deforestation***

- It is one of the main land use practices that adversely impacts on the environment.
- Deforestation is the permanent destruction of forests in order to extract timber or use the land for other purposes.

## Effects of deforestation on the environment

- ↳ Deforestation contributes to increased atmospheric CO<sub>2</sub>, leading to global warming.
- ↳ Deforested areas experience soil erosion frequently because they become exposed to rain and wind.
- ↳ Soils lost during erosion may end up in rivers, filling up river beds and causing flooding.
- ↳ It leads to a reduction in the amount of rainfall and changes rainfall patterns.
- ↳ Deforestation causes biodiversity loss because it leads to species death, species extinction and habitat loss.

## Logging

- ↳ Logging is the felling of trees for timber.
- ↳ Logging can be selective or indiscriminate (clear-cutting).

### Effects of logging on the environment

- ↳ Forests serve as a buffer zone to filter water and hold soil in place. They sustain water and soil resources through recycling of nutrients.
- ↳ In watersheds where forests are destroyed, the buffer zone function is lost. This causes reduction in water movement into rivers during the dry season (leading to drought), while flooding and soil erosion increase during the wet season.

- ↳ Logging can exacerbate forest fires.
- ↳ Logging also affects rainfall patterns and amount; rainfall becomes more erratic and dry periods become prolonged.
- ↳ Unsustainable logging mobilises debris that finds its way into the marine environment, where it damages mangroves and coral reefs, and habitats crucial for aquatic life.
- ↳ It also causes biodiversity loss as a result of species death, species extinction and habitat loss.

## **Monoculture (forest plantation)**

- ↳ This is the planting of only one species of tree on a piece of land.

### **Effects of monoculture on the environment**

- ↳ Increase in pest diversity and abundance due to continuous supply of food.
- ↳ The same species draws particular soil nutrients from the soil for a long time and so the soil becomes deficient in particular soil nutrients.

## POLLUTION

- ↓ Pollution is the release of substances or energy into the environment in such quantities and for such duration that they can have detrimental effects on the environment and organisms living in it.
- ↓ The substances which cause pollution are known as pollutants.
- ↓ There are four main forms of pollution: land, air, water and noise.

# LAND POLLUTION

## Sources

- ↳ Domestic wastes
- ↳ Agricultural wastes
- ↳ Industrial wastes

## **Domestic wastes**

- ↓ Solid wastes such as paper, food, metals, glass, wood, plastics, clothes, rags are generated in homes.
- ↓ These are disposed off in the open, landfills, or are burnt. The organic part of domestic waste can be composted.

## **Environmental effects**

- ↓ Gives off bad smell and attracts pests.
- ↓ Plastics and metals cannot degrade and therefore require a lot of space for land filling.
- ↓ Open dump burning contributes to air pollution.

## Agricultural wastes

- They include fertilisers, pesticides, animal manure.

## Environmental effects

- Residues of fertilisers and pesticides remain in the soil and crops. This can cause biological magnification when animals feed on the plants.
- Fertilisers usually contain nitrates, phosphates, potassium compounds etc. Animals can take in these components which can be toxic to them.

## Industrial wastes

- ↳ These are wastes generated from manufacturing processes of industries. Some of these wastes find their way directly into the soil.
- ↳ Mining is a major source of industrial wastes. E.g. Petroleum extraction and manufacturing contaminate the soil with bitumen, gasoline, kerosene and mining brine solutions. Open cast mining contaminates soil with toxic metals (Hg, Pb, As) and chemicals (Cyanide).
- ↳ Other industries also contaminate land with chemicals, paints, foundry wastes etc.

## **Environmental effects**

- ↳ Chemicals released into soils end up in the food chain, causing biological magnification.
- ↳ The chemicals cause pollution in the soil which destroys vegetation.
- ↳ People who come into contact with such polluted soils may have health related problems.

# AIR POLLUTION

## 1) Smoke and exhaust fumes

### a) *Carbon monoxide*

#### Environmental effects

- Carbon monoxide combines with haemoglobin to form *carboxyhaemoglobin* which reduces oxygen carrying capacity of the blood.
- This condition causes weakness, fainting and death.

## b) Carbon dioxide

- ↓ It is the primary greenhouse gas produced from human activities.
- ↓ As a greenhouse gas, it contributes to greenhouse effect leading to global warming, increase in sea level due to melting of polar ice, and subsequently flooding.

# Greenhouse effect

## ATMOSPHERE

### GREENHOUSE GASES

Solar radiation  
passes through the  
clear atmosphere

Some solar radiation is reflected  
by clouds and particles in  
the atmosphere and is sent back to space.

Some of the infrared  
radiation passes through  
the atmosphere and is sent  
back to space.

Some of the infrared radiation is absorbed  
and re-emitted by the greenhouse gas  
molecules. The direct effect is the warming of  
the earth's surface.

Surface gains more heat  
and infrared radiation is  
emitted again.

### c) Carbon particles

#### Environmental effects

- They block stomata of plants, making it impossible for them to undergo gaseous exchange and photosynthesis.
- Carbon particles cause respiratory diseases in man.

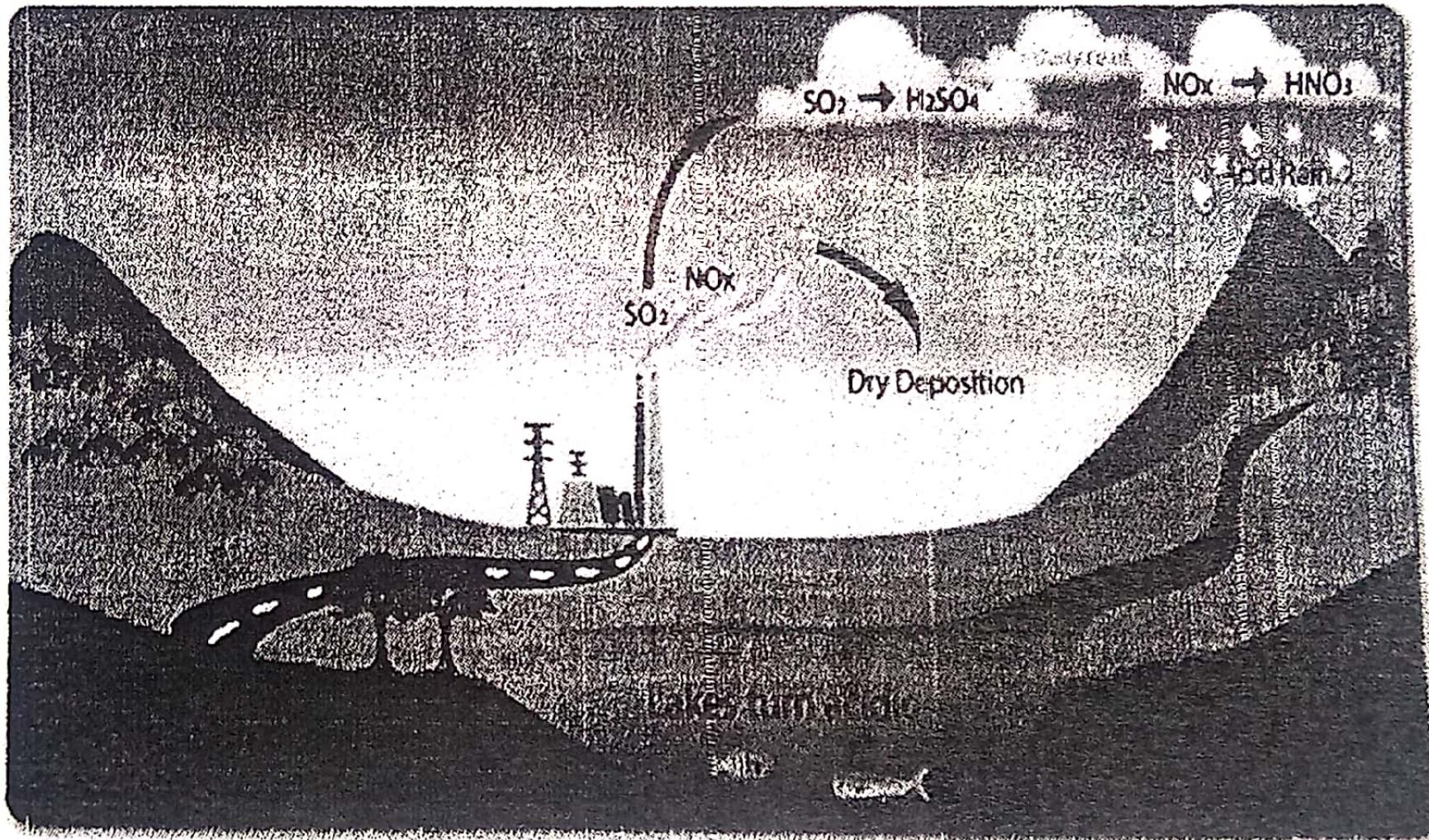
*d) Lead*

**Environmental effects**

- Affects mental development of children.
- Causes headache, fatigue, depression and irritability.

## 2) Sulphur dioxide & nitrogen dioxide

- They cause acid rain.



## Environmental effects

- Acid rain is corrosive to buildings and metals.
- Acid rain causes leaf blotching and wilting of plants.
- Deposition of SO<sub>2</sub>, NO<sub>2</sub> and acid rain in water bodies kills aquatic life.
- They also find their way in soils, making them acidic. This phenomenon:
  - (a) reduces plant growth and can ultimately kill forests.
  - (b) reduces soil microbial diversity and activity.

### 3) Chlorofluorocarbons (CFCs)

2

CFCs are broken down by the sun's ultraviolet rays, and chlorine atoms are released into the ozone layer, thus causing a chain reaction of the ozone layer.

(Case of CFC-11)



1

CFCs are emitted, and reach the ozone layer.

sunbeams

3

Harmful ultraviolet rays reaching the Earth increase.

the ozone Layer

the stratosphere

the troposphere

CFCs

harmful  
uv  
rays

- ↳ CFCs emanate from refrigerators, aerosol sprays, foam industries etc.

## Environmental effects

- ↳ They cause the breakdown of the ozone layer which protects the earth from UV radiation of the sun.
- ↳ This phenomenon increases the amount of UV radiation that reaches the earth.

# WATER POLLUTION

## Hot water (Thermal pollution)

- ↳ This is the release of hot water produced from industrial processes into water bodies.

### Environmental effects

- ↳ It decreases solubility of oxygen in water thereby reducing dissolved oxygen concentration of water bodies.
- ↳ Consequently, organisms living in affected water bodies become suffocated.
- ↳ High temperature can hamper digestion and reproduction of organisms.

## Crude oil from spillage

### Environmental effects

- The oil covers the surface of the ocean and reduces sunlight penetration and dissolved oxygen concentration.
- The oil can stick to the feathers of birds and prevent them from flying.

## Sewage

- ↳ Wastewater from drains and sewers such as soaps, detergents etc. are often released into water bodies.

### Environmental effects

- ↳ It causes high nutrient enrichment in water bodies which can eventually lead to eutrophication.
- ↳ It increases BOD of water thereby reducing the amount of dissolved oxygen of water bodies.
- ↳ The release of wastewater into water bodies introduces disease causing organisms in them.

## Sediment

- ↳ Soil erosion from agricultural lands, forest soils exposed by logging and deforestation, degraded stream banks, overgrazed rangelands, strip mines, and construction sites can release large amount of sediments into water bodies.

### Environmental effects

- ↳ It decreases water transparency and hence reduces light penetration.
- ↳ Sediments can cover aquatic organisms and impede their growth and affect their survival.
- ↳ Sediments can carry insoluble toxins into river bodies.

## Agricultural wastes

- ↳ Agricultural wastes including manure, animal and plant residues, pesticide and fertiliser residues can be washed into streams, rivers, lakes etc.

## Environmental effects

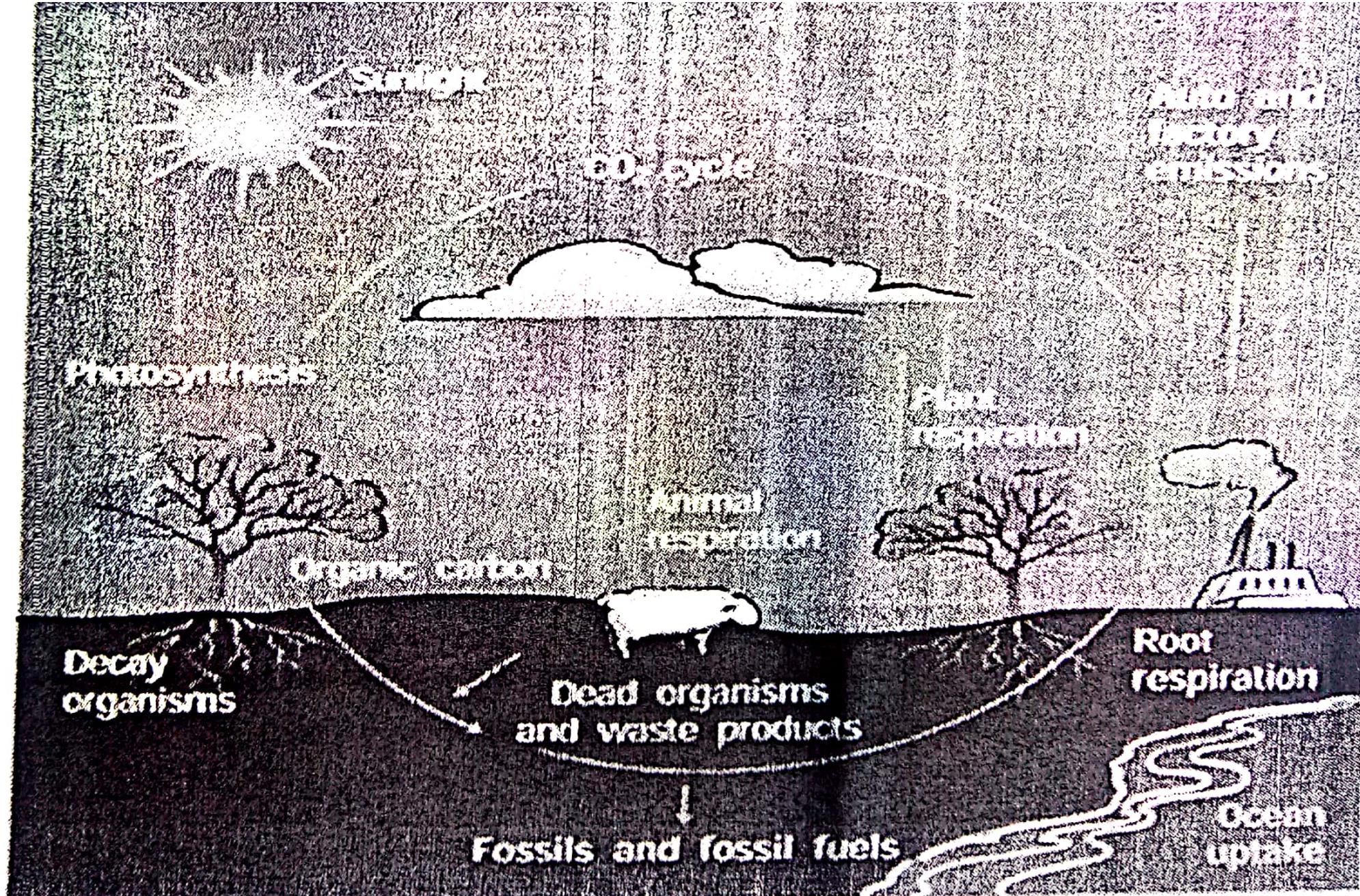
- ↳ Eutrophication may occur.
- ↳ These residues may become toxic to aquatic organisms.
- ↳ They can enter food chains and cause biological magnification.

## BIOGEOCHEMICAL CYCLES

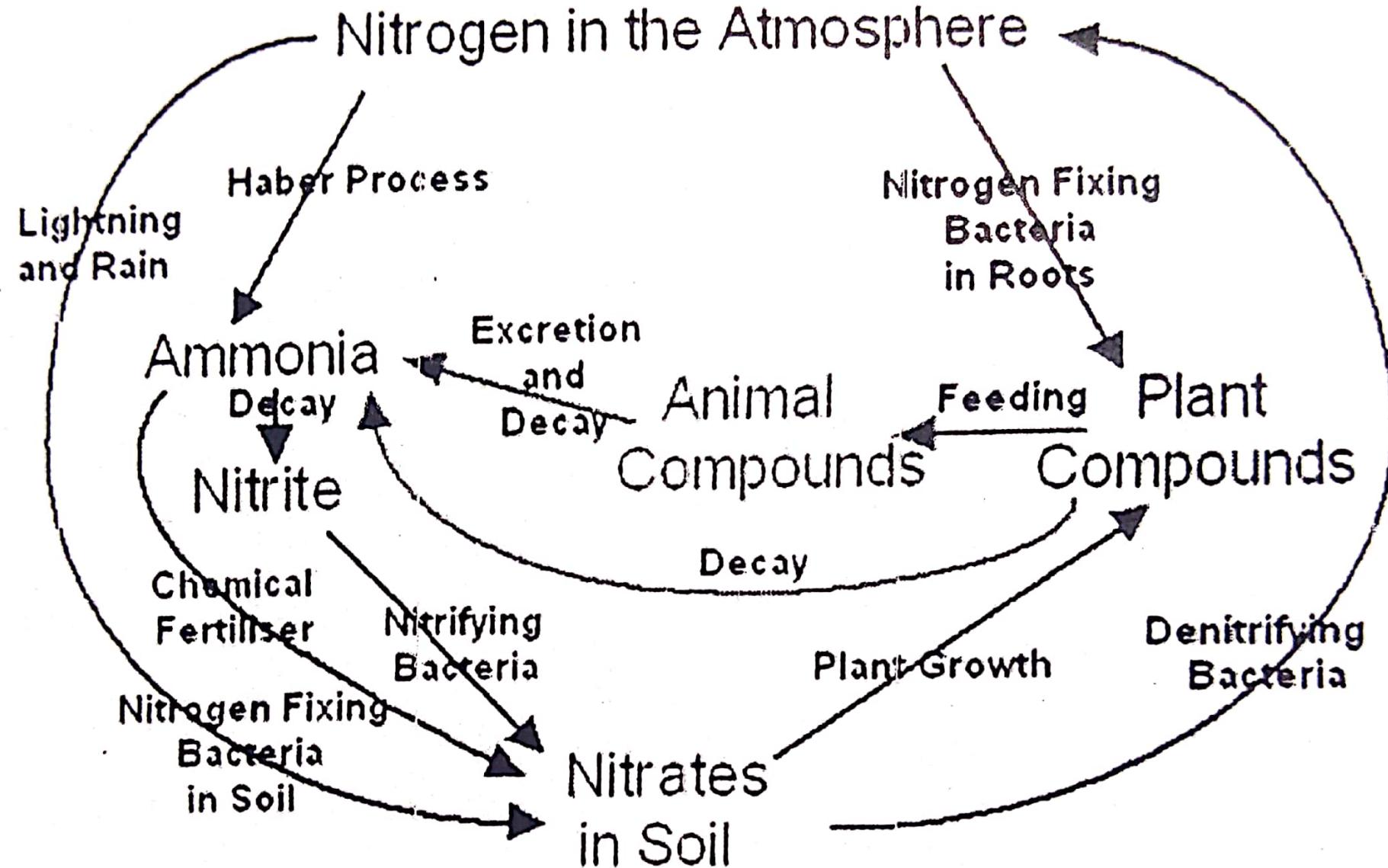
- ↳ A biogeochemical cycle is a pathway by which a chemical substance moves through biotic and abiotic components of the earth.
- ↳ Every biogeochemical cycles is made up of an active or cycling pool and a reservoir pool.

## **Types of biogeochemical cycles**

- The major types of elements involved in biogeochemical cycles include carbon, nitrogen, sulphur, phosphorus, water.



# Nitrogen cycle



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