



*Dr. Bbosa Science*

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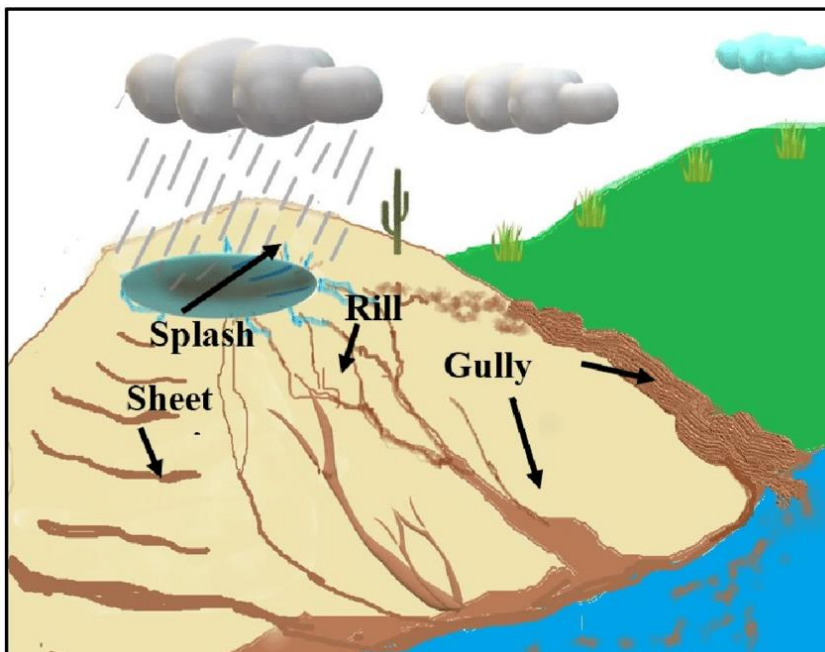
Nurture your dreams

**Theme: soil**

**S2 New Curriculum Biology-Chapter 2 – Soil erosion and conservation**

**Soil Erosion**

is the washing away of top soil



**Types of soil erosion**

- **Sheet erosion:** the surface of the soil is removed evenly over the whole surface of a slope
- **Rill erosion:** top soil is removed to an extent that small channels in which the run-off is concentrated appear
- **Gully erosion:** top soil is removed to an extent that deep valleys are formed by water run-off.

**Agents of soil erosion**

- Wind
- Water
- Animals

Man's activities that cause soil erosion include

- Overgrazing
- Clearing land for agriculture
- Deforestation
- Road construction

Methods to reduce soils erosion are

- Afforestation
- Planting grass cover
- Mulching
- Strip cropping
- Terracing
- Contour cropping

### **What is soil conservation?**

Soil conservation is the practice of protecting and preserving soil from degradation, erosion, and depletion. Proper soil conservation prevents erosion, enhances water retention, and supports biodiversity—helping ecosystems thrive

It involves methods that maintain soil health and fertility, ensuring it remains productive for agriculture, environmental balance, and sustainability.

### **Techniques of soil conservation**

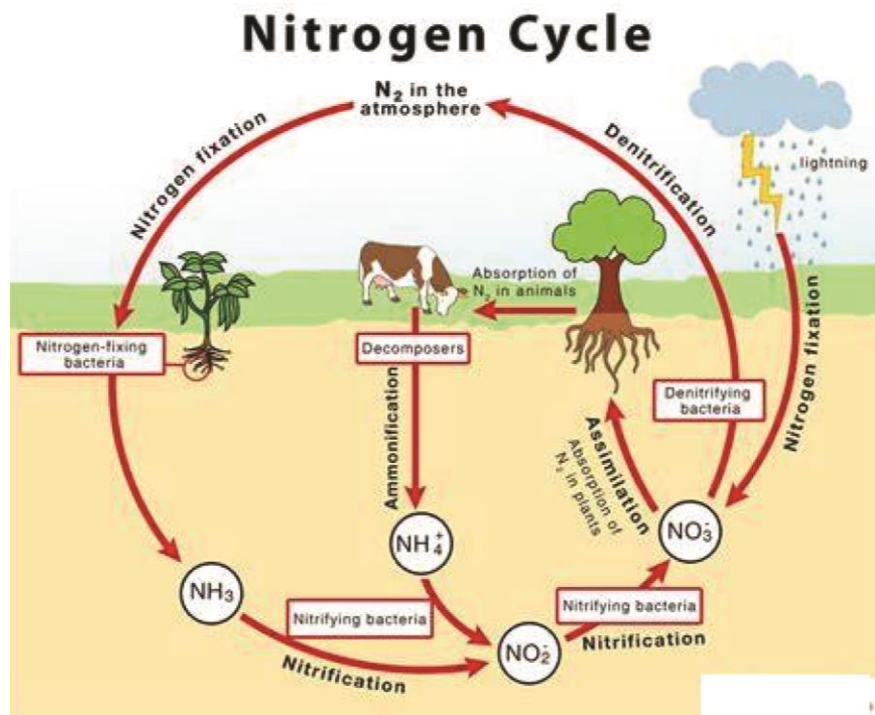
- crop rotation,
- cover cropping,
- contour plowing, terracing,
- the use of organic matter to improve soil structure.

### **Importance of microorganisms in the soil**

Microorganisms in the soil play a vital role in maintaining soil health and fertility. Their importance includes:

- **Nutrient Cycling:** Microorganisms break down organic matter, releasing essential nutrients like nitrogen, phosphorus, and potassium that plants need to grow.
- **Soil Structure Improvement:** Fungi and bacteria produce substances that help bind soil particles together, enhancing water retention and aeration.
- **Disease Suppression:** Beneficial microbes outcompete harmful pathogens, protecting plants from diseases and reducing the need for chemical pesticides.
- **Nitrogen Fixation:** Certain bacteria, like rhizobia, form symbiotic relationships with legumes, converting atmospheric nitrogen into a form plants can use.
- **Organic Matter Decomposition:** Microbes break down dead plant material, returning nutrients to the soil and promoting a healthy ecosystem.

- **Carbon Sequestration:** Some microorganisms help capture carbon dioxide from the atmosphere, aiding in climate regulation.



## Nitrogen fixation

Nitrogen fixation is the process of converting atmospheric nitrogen ( $N_2$ ) into forms that plants can absorb and use, like ammonia ( $NH_3$ ), nitrate ( $NO_3^-$ ), and nitrite ( $NO_2^-$ ). This happens through three main pathways:

- (i) **Biological Nitrogen Fixation:** Certain bacteria, including **rhizobia** (associated with legumes like beans and peas) and **cyanobacteria**, have specialized enzymes (nitrogenase) that enable them to capture nitrogen from the air and convert it into ammonia. In the case of rhizobia, they form symbiotic relationships with plant roots, creating nodules where nitrogen fixation occurs.
- (ii) **Industrial Fixation:** Through the **Haber-Bosch process**, nitrogen from the air is artificially converted into ammonia for fertilizers. Farmers apply these fertilizers to fields to boost crop growth.
- (iii) **Natural Fixation via Lightning:** Lightning discharges produce enough energy to break nitrogen molecules in the atmosphere, allowing them to combine with oxygen to form nitrogen oxides. These dissolve in rainwater and enter the soil, providing a small but meaningful natural nitrogen source.

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Thanks

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