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Soil types and soil conservation

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Abstract: -

A heterogeneous mixture of small rock particles and organic materials/humus forms layers known as horizons, each with distinct properties is called soil. Factors like parent material, climate, topography, biological activity, and time influence soil formation. Soil is a fundamental natural resource comprising various types—mainly Alluvial, Black, Red, Laterite, Arid, and Mountain soils—that support agriculture and ecosystems. Effective soil conservation techniques include physical (terracing, contour plowing), biological (cover crops, afforestation), and chemical methods to prevent erosion, maintain fertility, and manage degradation.

1. Major Soil Types and Characteristics

- **Alluvial Soil:** Most widespread and fertile, found in river plains; ideal for rice, wheat, and sugarcane.
- **Black Soil (Regur):** Highly retentive of moisture, rich in clay, and ideal for cotton farming; common in the Deccan region.
- **Red and Yellow Soil:** Develops on crystalline igneous rocks, poor in nitrogen/humus but productive with fertilizers.
- **Laterite Soil:** Formed in high-temperature, high-rainfall areas; rich in iron, suitable for cashew/tea with fertilizers.
- **Arid/Desert Soil:** Sandy, saline, and low in organic matter; requires irrigation for cultivation.
- **Forest/Mountain Soil:** Varies by altitude, often acidic with low humus content.

In India, the major classification of soil has been outlined in the table below (**Table: 1**).

1. Soil Erosion

Definition: Soil erosion, described as the destruction of soil cover, results from an

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imbalance between soil-forming and erosion processes, intensified by natural or human factors. Soil erosion takes place when particles of soil are detached and then transported to a different place. The agents for this detachment and transportation are wind and water.

Detachment: This is when the topsoil is actually "detached" from the rest of the ground.

Movement: This is when the topsoil is relocated to another area.

Deposition: Where the topsoil ends up after this process.

In India, the major classification of soil		
Types	**Characteristics**	**Found In**
Alluvial Soils	Khadar and Bhangar types, enriched annually by floods, heavily cultivated, rich in potash and lime.	Found in Punjab, Haryana, UP, Bihar, West Bengal, Gujarat, Rajasthan, and deltas of major rivers.
Black Soil	Clayey, impermeable, known as 'Regur Soil', rich in lime, iron, and alumina.	Covers Deccan Plateau, parts of Maharashtra, Madhya Pradesh, Gujarat, Andhra Pradesh, and Tamil Nadu.
Red and Yellow Soil	Fertile, well-drained, red or yellow due to iron diffusion, generally deficient in nitrogen and phosphorus.	Found in Deccan Plateau, Odisha, Chattisgarh, and Middle Ganga Plain.
Laterite Soil	Formed in high temperature and rainfall areas, low humus, highly acidic, suitable for brick making.	Peninsular plateau, Karnataka, Kerala, Tamil Nadu, Madhya Pradesh, Odisha, Ranchi, and Assam.
Arid Soil	Sandy, saline, low humus, red to yellow in color.	Mainly in western Rajasthan.
Saline Soils	Salty, sandy to loamy, deficient in nitrogen, high in sodium and potassium	Arid, semi-arid, and waterlogged regions, deltas, and Sundarbans.
Peaty Soils	Heavy, black, high in humus and organic content.	Regions with heavy rainfall and high humidity, northern Bihar, southern Uttarakhand, coastal stretches of West Bengal, Odisha, and Tamil Nadu.
Forest Soils	Varying texture, acidic in snow-clad regions, fertile in lower valleys.	Found in forested areas with sufficient rainfall, Himalayan region, Western and Eastern Ghats, some parts of the Peninsular plateau.

The process of soil erosion is made up of three parts:

1.1.Types of Soil erosion

- **Splash Erosion**: First stage of erosion process that occurs when raindrops hit bare soil;
- **Sheet Erosion**: Uniform removal of a thin layer of finer and fertile top soil on **level lands** devoid of vegetative cover after a **heavy shower** and soil removal is not easily noticeable.
- **Rill Erosion**: occurs when sheet flows begin to concentrate on the land surface; leaves visible scouring on the landscape;
- **Gully Erosion**: Rill erosion evolves into gully erosion. Gullies resemble small valleys and are common on **steep slopes**.

2. Soil Conservation Methods

Soil conservation is the practice of protecting soil from erosion and maintaining its fertility to ensure sustainable land use.

- **Mulching:** The bare ground between plants is covered with a layer of organic matter like straw. It helps to retain soil moisture.
- **Contour Bunds/Barriers:** Stones, grass, soil are used to build barriers along contours. Trenches are made in front of the barriers to collect water.
- **Rock Dam:** Rocks are piled up to slow down the flow of water. This prevents gullies and further soil loss.
- **Terrace Farming:** Broad flat steps or terraces are made on steep slopes so that flat surfaces are available to grow crops and surface runoff and soil erosion could be reduced.

Examples: Western and central Himalayas have well-developed terrace farming.

- **Intercropping:** Different crops are grown in alternate rows and are sown at different times to protect the soil from rain wash.
- **Contour Ploughing:** Ploughing parallel to the contours of a hill slope to form a natural barrier for water to flow down the slope.
- **Strip Cropping:** Large fields can be divided into strips. Strips of grass are left to grow between the crops. This breaks up the force of the wind. This method is known as strip cropping.
- **Shelterbelts:** Planting lines of trees to create shelter are called shelter belts; used for stabilizing the desert in western India.

3. Conclusion

- Understanding soil is important for farming and protecting the environment. Soil erosion, caused by natural processes or human activities, poses a significant threat to agriculture and the environment.

- Soil conservation methods are essential for preserving fertile land and preventing erosion.
- Through techniques like mulching, contour bunds, and terrace farming, we can protect soil from degradation and ensure sustainable agriculture.
- By appreciating the significance of soil and implementing conservation practices, we can safeguard our environment for future generations.