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Soil Erosion

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Introduction

“Peanut butter sandwich” if we compare this with below statement peanut butter as organic matter fertile soil because peanut have a good protein content compared to bread, like wise if we lost the top fertile soil there will be impact on productivity of a crop. The process in which the topmost layer called **Fertile Soil** detached by natural or humankind source and deposited in other place is known as the soil erosion. it occurs by natural and artificial/anthropogenic activities. O horizon is present in uppermost layer of the soil and its fertile, organic matter is responsible to retain soil fertility, Soil erosion is lead to less fertile.

Water erosion: The top layer of the land is removed by water erosion, which can be caused by irrigation, rainfall, snowmelt, runoff, and ineffective irrigation management. In the end, rainwater is major reason in this situation. Organic and inorganic soil particles are carried along the surface of the land by flowing water, where they are

a. Splash erosion: Raindrops move the ground's particles and demolish the top layer's structure by essentially "bombarding" the exposed and bare land. It eventually results in runoff formation, the development of surface crusts, and a reduction in soil infiltration capacity.

b. Sheet erosion: This type of soil degradation by water happens when the amount of rainfall exceeds the capacity of the soil to absorb water, and it causes the loss of the tiniest soil particles that are rich in organic matter and nutrients. It typically occurs after crusting, which is brought on by the water damage to the soil that occurred earlier. The development of rills is one of the most detrimental consequences of sheet erosion if it is not stopped in time.

c. Rill erosion: When the water concentrates deeper in the soil and begins to build faster-flowing channels, rill erosion occurs. These channels, which can be up to 30 cm deep, result in the separation and movement of soil

particles. Eventually, gully erosion can develop from rill erosion When the rills are at least 0.3 metres deep.

d. Gully erosion: The erosion will proceed if rills are not maintained. The several rills will eventually be swept apart, leaving only a single, more pronounced scar. Another new level of erosion has emerged. Gullies are deep channels that cannot be removed using standard tillage techniques.

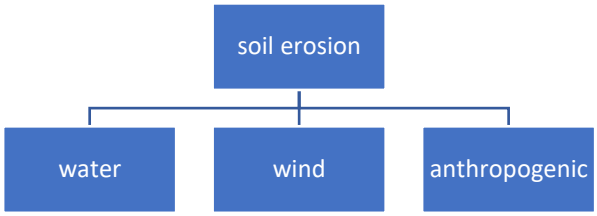
e. **Tunnel erosion:** This is the so-called "hidden" sort of land degradation by water, which can cause significant disruption even before any symptoms become visually obvious. The first sign of it is when a significant amount of water begins to move through the soil. A network of tunnels beneath the soil's surface would be tunnelling's visible results.

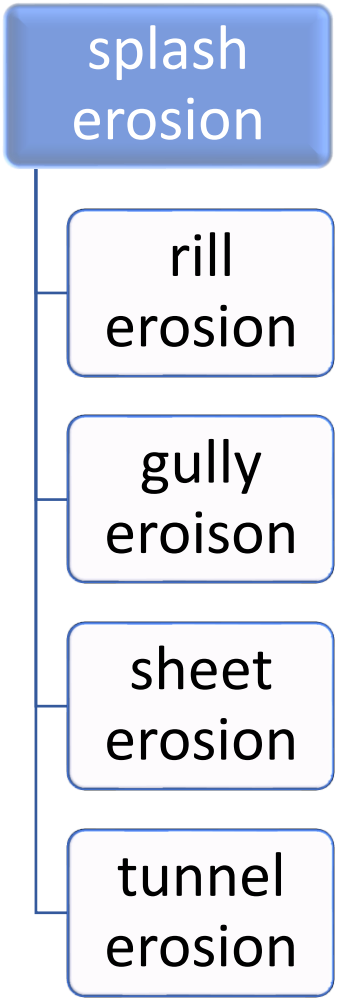
Wind Erosion: The natural process of soil movement and deposition by the wind is called wind erosion. It is a typical occurrence that is most prevalent in loose, dry soils with fine granules, such as sandy soils. By shifting dirt from one location and depositing it in another, wind erosion harms the land and native flora. The primary cause of wind erosion is wind-driven sand and dirt, which erodes.

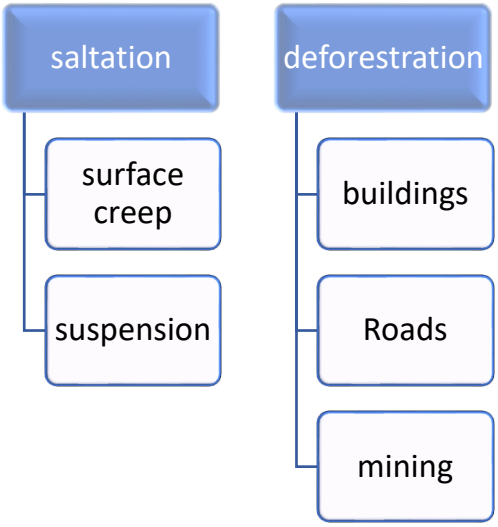
a. Saltation: - Medium-sized soil particles (0.10-0.15 mm in diameter) are carried by the wind during saltation in a series of brief bounces. The direct wind pressure on soil particles is what causes these bounces.

b. Soil creep: Additionally, saltation promotes soil creep (rolling or sliding) over the big particle surfaces (0.5-1.0 mm diameter). Large aggregates are hit by the bouncing particles carried by saltation, which speeds up their travel.

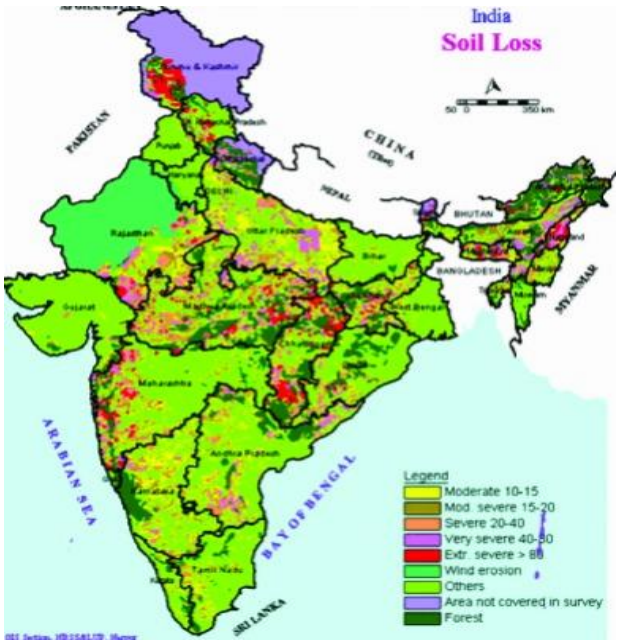
c. Suspension: Large distances are covered by soil particles that are very tiny (less than 0.1 mm). Smaller suspended particles are transported upward and parallel to the ground.







Soil drinks water and eat food! Yes, you heard it right soil drinks water, it takes all the water from rains and polluted water, purify with their structure and store in underground for us. Soil eats all the dead and decaying plant and animals digest them with the help of microbes and provide fertile environment for us to grow crops. Soil is important for life and main component for agriculture. Soil is world's largest natural water filter. It also helps in carbon sequestration; soil contains three times more amount of carbon than in atmosphere and four times more carbon in all plants and animals. Carbon sequestration helps to mitigate in climate change. Soil is doing everything for the life on earth, we don't have do anything just don't disturb the



process which the soil is doing.

Everyone knows about the productivity of the crop is reduced because of environmental deterioration and the loss of ecosystem components. Unsustainable irrigation and production methods can promote soil salinization, deplete of soil nutrients. Along with this soil erosion is one of the factors for reduction of yields. Soil erosion has a direct

impact on the productivity of the crops. Study shown that regions suffering from high soil erosion has seen a reduced crop yields and failing farms. According to some research reports on soil erosion for every 10cm loss of soil can reduce the yield up to **4-30%.** The national bureau of soil survey and land use planning (NBSS and LUP) estimated the soil erosion in India occurs in **119.2**-million-hectare area.

In Africa to prevent the desertification by Sahara Desert the African union doing a project called "**GREAT GREEN WALL"** along the length of Africa by planting a wall of trees. It also helps the local communities to get food and source of income from that and enhance their lifestyle. In China there is **"GRAIN FOR GREEN PROJECT"** along the river basin to conserve the soil erosion.

Some impacts by soil erosion

- Decreased capacity of soil to hold water and minerals.
- Subsoil exposure, which is frequently characterised by poor physical and chemical qualities.
- Increased runoff rates that waste nutrients and water that would otherwise be utilised for agricultural growth.
- Crop loss from newly planted fields.
- Low-lying locations with silt deposits.

Major cause of the soil erosion by water and wind. Water erosion mostly occurs in regions of hilly areas and where there are heavy rainfalls. Whereas wind erosion is more prevalent in arid and semi-arid regions. In high rainfall areas, due to runoff water the erosion may occur. If the crop land is slope there will be a sheet erosion which cause huge damage and get unnoticed as it occurs, it removes soil like a sheet.

Recently **IIT-Delhi** says major reason for soil erosion in India by rainfall**. 68%** soil erosion in India caused by rainfall. The East Khasi Hills in Meghalaya, one of the wettest places on earth, and its Laitknsew and Cherrapunji regions were among the areas the researchers discovered to be the most susceptible to rainfall erosivity in India. The chilly, dry Shahi Kangri mountain in Ladakh was the area least susceptible to rainfall erosivity.

Soil erosion causes low productivity of natural ecosystem as well as agricultural, forest and pasture ecosystem. The loss of soil from agricultural areas is **10-40** times faster than the rate of soil formation.

Soil structure also favours the soil erosion if the soil is,

- Medium to fine texture
- With low organic content.

These types of soils get easily eroded by water and wind.

It is estimated that worldwide approximately **75** billion tons of fertile soil is lost from agricultural systems each year. It is reported

that in India the loss of soil by erosion is **16.4** tons per hectare annually. It means annual total loss of **5.334** billion tons.

Soil erosion influences climate change: -

Erosion leads to degradation of the agricultural land. It means it supports lesser number of plants, that can take in climate change, global warming. If we effectively manage the soil. The soil itself sequester enough greenhouse gases.

Within 60 years, the United Nations expected catastrophic loss of soil and declared soil to be finite. The main source of soil degradation is soil erosion, which is one of many causes. By 2050, the cost of soil degradation might reach **$23** trillion. It is estimated that by the year 2050 the crop yield may reduce by **10%**.

To prevent soil erosion and ecosystem biodiversity, it is crucial to run awareness campaigns regarding soil and ecosystems. There are some foundations and organisations that run awareness campaigns, such as: An organisation called ecosystem restoration camp runs camps all over the world to rehabilitate damaged environments. Recently, the Isha Foundation launched the "Save Soil" campaign to raise awareness of the value of soil.

Strategies to prevent soil erosion:

Agronomical measures: like no tillage, crop rotations, growing cover and diverse crops, land use based on its capability, correction of acidity, alkalinity and drainage, contour cultivation, mulching, dense growing crops, strip cropping etc. **No tillage** in this no disturbance made to soil. So, that erosion does not occur. **Crop rotations** growing different crops in each season without any fallow period. Hence soil having crop cover all the time. **Mulching** is a **multipurpose practice** helps in prevention of soil erosion, killing of weeds and spores of harmful microbes, maintains soil temperature in winters and summers, prevents growing of weeds etc.

Mechanical measures like basin listing, contour bunding, graded bunding, channel terraces, broad bed furrow systems etc, are used to conserve soil from erosion. **Basin Listing** in this we made a basin in the plot where erosion occur along the slope here, we provide more time for water to infiltrate in soil. **Contour Bunding** construction of bunds along the slopes of the crop land to prevent the runoff erosion. making of **Broad Bed Furrows** in field by which water gets time to get infiltration in furrows.

We can stop the soil erosion by using the measures mentioned above. To provide good quality and sufficient food to meet the demands of future generations.

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