

## Soil Degradation

### Why in news?

In a recent conference, UNESCO warns 90% of Earth's land could be degraded by 2050.

### What is soil degradation?

- **Soil** – A material composed of minerals, living organisms, soil organic matter, gas, and water.

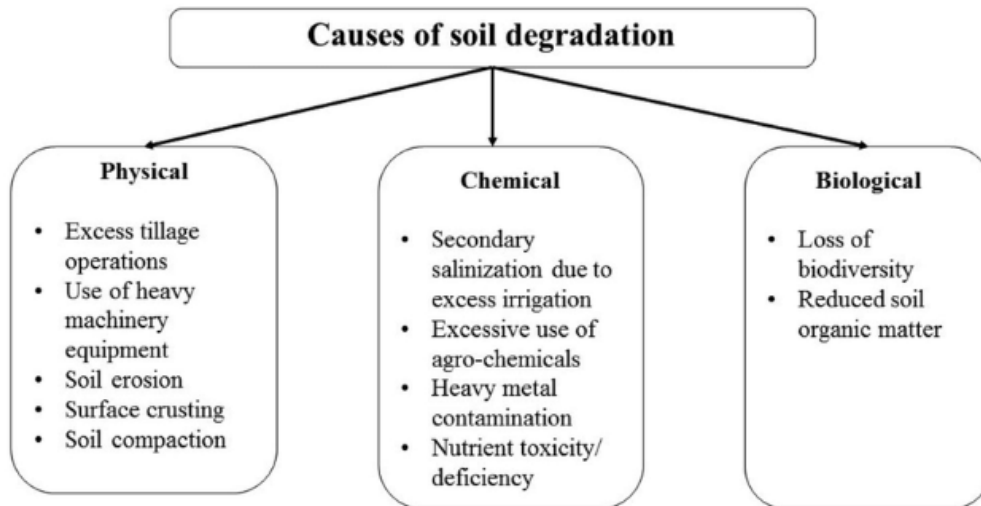
#### Importance of Soil

- It provides plants nutrition to grow and foothold for their roots.
- It filters rainwater and recharges groundwater.
- It regulates the discharge of excess rainwater.
- It prevents flooding.
- It can store large amounts of organic carbon.
- It can help regulate emissions of carbon dioxide and other greenhouse gases.

- **Soil degradation** – It is the loss of the intrinsic physical, chemical, and/or biological qualities of soil either by natural or anthropic processes, which result in the diminution or annihilation of important ecosystem functions.

*A third of the world's soils are degraded and in India, around 29.7% land is degraded.*

- **Causes of soil degradation** – The leading causes of soil deterioration are wind and water erosion, deforestation, and urbanization.
- **Soil erosion** – It is the displacement of the top layer of soil and is often caused by wind and water forces.
- Although these are naturally-occurring elements of nature, too much erosion can lead to soil depletion.
- **Deforestation and overgrazing** – Overgrazing and deforestation are the leading human activities that cause soil depletion.
- **Urbanization** – It creates mass amounts of pollution and less agricultural productivity, indirectly causing soil deterioration.



### What are impacts of soil degradation?

- **Loss of fertile soil** - Degradation reduces the soil's ability to supply essential nutrients to plants, leading to decreased agricultural productivity.
  - **World Atlas of Desertification** - 75% of soils are already degraded, directly affecting 3.2 billion people.
- **Lead to soil compaction** - Heavy machinery, overgrazing, and deforestation can compact the soil, *reducing its ability to hold water and air*.
- Compacted soils *have poor drainage and root penetration*, which negatively impacts plant growth.
- **Affects the health of living** - The use of pesticides, herbicides, and industrial pollutants can contaminate the soil, affecting its health and the health of plants, animals, and humans that rely on it.
- **Loss of soil inorganic carbon** - This depletion could hurt the health of soil and its ability to regulate nutrient levels, foster plant growth and store carbon.
  - In India, soil acidification might lead to loss of 3.3 billion tonnes of soil inorganic carbon (SIC) from the top 0.3 metres of its soil over the next 30 years.
- **Depletes productivity** - Acidic soils *affect crop growth and productivity* by reducing the availability of plant nutrients.
- Low pH levels (acidic soils) dissolves solid carbonate and removes it either as carbon dioxide gas or releases them directly into the water.
- It also predisposes plants to other biotic and abiotic stress factors.
- **Threat to food security** - Soil erosion and land degradation pose a major threat to global food security and to the achievement of the UN-mandated SDGs, compromising the well-being of at least 3.2 billion people around the world.
  - The loss of a few inches of topsoil has the potential to lower crop yields by 50%.

### Measures by UNESCO for Conserving Soil

- **World soil health index** - UNESCO has pledged to support its member states by establishing 'world soil health index'.
- The index will help to standardise measure for analysing and comparing soil quality in different regions and ecosystems.
- **Long-term soil and landscape management** - This is planned as a pilot project in ten natural sites supported by its Biosphere Reserves Programme.
- The initiative will assist in assessing the management methods used on these sites and ensuring that best practices are developed and implemented in other parts of the world.

### What lies ahead?

- **Practice conservation tillage** - Reducing the frequency and intensity of tillage helps preserve soil structure, reduces erosion, and maintains organic matter. Techniques such as no-till or minimum-till farming can be adopted.
- **Cover crops** - Planting cover crops during off-season periods helps protect the soil from erosion, improves soil structure, adds organic matter, and enhances nutrient cycling.
- **Promote Agroforestry** - Integrating trees and shrubs into agricultural landscapes provides multiple benefits, including improved soil structure, increased organic matter, reduced erosion, and enhanced biodiversity.
- **Follow terracing and contour Farming** - On sloped land, terracing and contour farming can reduce soil erosion by slowing down water runoff and promoting water infiltration.
- **Enhance soil testing** - Regular soil testing helps determine nutrient needs and prevent over-application of fertilizers.
- **Control usage of fertilizers** - Using balanced fertilization practices maintains soil fertility without causing pollution.
- **Create awareness** - The United Nations Food and Agricultural Organization (FAO) declared ***December 5 as 'World Soil Day'***.

### References

1. [Down To Earth| UNESCO Warns Accelerated Degrading of Earth's Land](#)
2. [Down To Earth| Measures to Reduce Soil Degradation](#)