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?

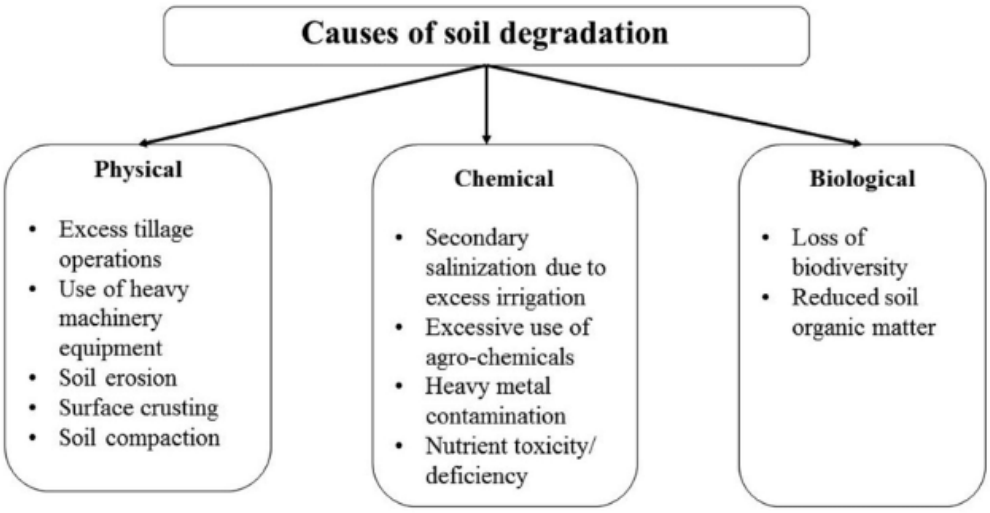
- **Soil** – A material composed of minerals, living organisms, soil organic matter, gas, and water.

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