

DEFINIATION, FUNCTION AND UTILIZATION OF SOIL

Abstract

A particular 5 plot or area surface soil sample collection and its profile study in lab. The study is near area or hills and forest. Because to know about the soil erosion with less moisture and its distinct variation in soil morphological, physical, chemical properties including the soil fertility status of surface soil along the toposquare. The sample text result show that available nitrogen, phosphorous and sulphur content. In topographic position observed higher moisture and higher cropping intensity. Soil also contain iron, magnesium, copper, zinc etc .positive correlation available zn, cu with soil organic content negative correlation with soil PH has been found. Various type of soil sample of study in various area found sandy, loomy, clay loam and sandy clay soil. Clay percentage in the medium land and low land found to be higher land. Soil acidity was found major crop production constrain of study area. Soil testing fertilizer and manures will help in for crop productivity as sustaining soil health.

Keywords: Soil Salinity, Soil Erosion, Desertification, Hydrophobic, Groundwater Regeneration

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I. INTRODUCTION

The study of soil is fundamental to understanding the intricate relationships that sustain life on Earth. Soil, often referred to as the "skin of the Earth," is a complex and dynamic mixture of mineral particles, organic matter, water, air, and countless microorganisms. Its significance reaches far beyond its role as a mere substrate; it forms the basis of ecosystems, supporting plant growth, regulating water flow, recycling nutrients, and providing habitats for diverse organisms. This review paper delves into the essential aspects of soil: its definition, functions, and utilization. By exploring the composition and formation of soil, we gain insights into the intricate processes that shape its properties. Understanding its multifaceted functions, from fostering agricultural productivity to influencing climate patterns, highlights its vital role in maintaining ecological balance. As human activities continue to impact the environment, the responsible utilization of soil becomes increasingly crucial. This paper examines the challenges posed by urbanization, agriculture, and industrial practices, all of which can degrade soil quality and compromise its ability to perform its critical functions. By investigating sustainable soil management strategies and emphasizing the importance of soil conservation, this paper aims to underscore the urgency of preserving this invaluable resource for current and future generations.

II. ECOLOGICAL ASPECT OF PROTECTION OF SOIL

Weakly interconnected with the other environmental compartments (water and air), soils are complex ecosystems. Due to these connections, soils have extensive interactions with other environmental compartments. play a crucial ecological mediation role. Soils can act as both sources and sinks in processes that move materials. Humans have owned soil from ancient times, in stark contrast to the other environmental compartments (air and water systems). This reality is emphasised by the idea of "owned land," which denotes "possession of soil." Dirt (Boden) and land (Land) are frequently used interchangeably in some languages, including German. Soil is the most important resource for human survival in terms of both the material and cultural elements. Considering that dirt is a type of property the use of soil to preserve the environment or as a reservoir for groundwater used to make drinking water when an aqueous solution passes through.

Water usage may be limited. In terms of its usage and exploitation, the soil serves as a memory and archive of these actions. Older-use pollutions, often known as "contaminated sites," are essential to soil conservation in this regard. Due to historical soil exploitation, the use of some or all soil functions is usually restricted today.

- 1. Function of Soil:** Minerals, water, air, and organisms, along with the consequences of their transformation and destruction, make up the complex multiphase mixture. Widely varying forms of soil can form depending on the climate and the underlying rocks, and the rate of creation depends on how quickly the rocks weather in the bottom layers and how quickly biomass degrades in the upper layers.
- 2. Ecological Function of Soil:** For the soil to fulfill its regulatory function, the natural mineral and energy cycles must be under control.

It encompasses all inputs to the soil, both material and immaterial, as well as the processes those introductions start.

3. **For Filter Purpose:** Mechanical retention of particles larger than 100 nm is what is meant by filtration [6]. When an aqueous suspension passes through pore systems, filtering takes place.

Gravitational potential (z) (downward) and matrix potential (y) (upward) influence how soil water behaves (hydraulic potential f). When these two potentials are in equilibrium, they are equal, or $f = \frac{1}{4} (y) (z) \frac{1}{4}$. The displacement of equilibrium occurs when water is added (by precipitation, for example), which raises the matrix potential. This infiltration is one of the most significant factors preventing erosion.

Pore blockage caused, for instance, by mud clogging or compaction might result in decreased filter effectiveness. The functions of the transformation and habitat (stagnant water, inadequate air) can also be negatively impacted by pore blockage.

4. Buffer Solution

The following principal areas are included in the buffer function:

- The water balance is buffered
- Acid input buffering
- Pollutant and nutrient buffering

The water balance is buffered in part by the capacity of soils to hold water in pore spaces via capillary forces.

A liquid rises in a capillary when its pressure (tension) is lower than ambient pressure until hydrostatic equilibrium is reached. With a reduction in capillary diameter, the liquid rises higher as a result of an increase in capillary pressure.

The majority of biological soil processes are impacted by the buffering of nutrients and contaminants. The following adsorption process is made feasible by the existence of organic and inorganic exchangers.

There can be phenomena:

- **Van der Waals Forces:** Important for humus and organic pollutants
- **Hydrogen Bonds:** important for mineral surfaces and organic contaminants
- **Complexes of Electron Donors and Acceptors:** important for humus and organic pollutants
- **Hydrophobic Bonding:** important for humus and organic contaminants
- Ion bonding is important for humus, clay minerals, organic contaminants, and inorganic pollutants and nutrients.

Regarding both organic and inorganic contaminants, covalent bonding is important.

- **Transformation Function:** Chemical substances behave differently in the pedosphere depending on their characteristics, their environment, and occasionally manmade activities. The transformational capability allows for the soil to self-clean. Both abiotic (such as reactions on mineral surfaces and photochemical reactions) and biotic processes can degrade and change materials in soil.

The ability of soils to self-clean is influenced by a number of factors, one of which is the presence of microbes, which supply the enzymes required for biotic transformation processes.

- **Productive Activity:** The ability of a soil to provide a substrate for cultivated plants (food and feed plants, renewable resources) is what defines its productive function. impact on the

Since agriculture, forestry, and horticulture are all intended to make a profit; hence, the productive function is often assessed in terms of economics rather than ecological ones. Nevertheless, farming has an impact on a number of ecological soil functions.

III. UTILISATION OF SOIL

The most biggest ecological problem of the world is the of consumption & destruction of the soils or the top soil. ie. the destruction of the soil's ie. the destruct of the surface. The soil is basically for food production. However in the highly developed and industrialized countries

- Problems of sites of acidification & of Contaminated sites
- Damage and Soil Pollution
- Soil salination

1. **Land Utilisation:** The use of land for various purposes is known as land utilization.

Land supports natural vegetation, wild life, human life, economic activities, transport and communication systems. thus land is an ultimate resource. in india 43% of land is plain area which supports vegetation, wild life, human life, etc., 30% is mountains that supports rivers, tourism, etc. and 27% is of plateaus that supports forest, minerals etc.

2. **Destruction of Soil:** The degradation of soil by erosion, salination, desertification, and forest destruction are all occurring on a larger scale than the sealing of land discussed above.

Industrial farming practises hasten the loss of the priceless topsoil in the frequently very labile ecosystems of the non-industrialized nations, where 80% of the world's population growth takes place. After a brief phase of meagre yields, this quickly causes the growth of dry zones and desertification in the subtropics and tropics due to erosion.

Erosion. The main factor in soil deterioration is wind or water erosion. Water erosion removes 25 000 106 t of soil worldwide each year.

- 3. Chemical Degradation:** After some time of use by salination the agricultural land renders usable by agricultural irrigation are threatened

Acidification of soils and contamination are two additional elements of chemical deterioration that are intimately linked to anthropogenic industrial pollution.

Despite having a smaller overall footprint than the areas affected by the other chemical degradation processes, there are several "hot spots" with serious issues in the intensively industrialised areas.

Nutrient loss is the most significant chemical degradation process in terms of area. Losses of nutrients are caused by the current or past overuse of soils by unsustainable farming practises.

IV. DESERTIFICATION

Every sixth person on earth is impacted by the spread of deserts, which cover around 25% of the planet's area . Approximately 6×10^6 hectares of pastureland turn into desert each year. In this way, the deserts have grown by 120×10^6 ha since 1970.

V. FOREST

When trees are cut down in forests, soil is indirectly destroyed. When trees are cut down, the soil is frequently left vulnerable to erosion by water or the wind.

Each year, more than 5×10^6 acres of tropical rain forest are destroyed to make way for agriculture. More than 20×10^6 hectares of moist tropical forests have been transformed into cattle pasture in South America by farmers and ranchers since 1970.

In South America (especially Brazil), Central Africa, Southeast Asia and the Pacific Region, as well as Russia, forest land is reportedly drastically decreasing. In the impacted areas, loss rates range from 100,000 to several million hectares.

VI. CONCLUSION

In conclusion, soil serves as the foundation of terrestrial ecosystems, playing a crucial role in supporting plant growth, nutrient cycling, water regulation, and providing habitats for diverse organisms. Its composition and formation are complex processes influenced by geological, biological, and environmental factors. The multifaceted functions of soil underscore its significance in sustaining life and maintaining ecosystem services. Recognizing soil as a finite and valuable resource, responsible utilization is paramount. Practices such as sustainable agriculture, proper waste disposal, and urban planning can contribute to soil health and prevent degradation. As we navigate the challenges of a growing global population and changing climate, it is imperative to prioritize soil conservation and

management strategies to ensure its productivity and longevity for current and future generations.

VII. ACKNOWLEDGEMENT

I acknowledge the authors who provided all the information for helping us to write this Definition, Function and Utilization of Soil.

Conflict of Interest: The author declared, no conflict of interest.

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