Soil introduction

Soil science is the study of soil as a natural resource on the surface of the earth including soil formation, classification and mapping; physical, chemical, biological, and fertility properties of soils; and these properties in relation to the use and management of soils.

Sometimes terms which refer to branches of soil science, such as pedology (formation, chemistry, morphology and classification of soil) and edaphology (influence of soil on organisms, especially plants), are used as if synonymous with soil science. The diversity of names associated with this discipline is related to the various associations concerned. Indeed, engineers, agronomists, chemists, geologists, physical geographers, ecologists, biologists, microbiologists, sylviculturists, sanitarians, archaeologists, and specialists in regional planning, all contribute to further knowledge of soils and the advancement of the soil sciences.

Soil scientists have raised concerns about how to preserve soil and arable land in a world with a growing population, possible future water crisis, increasing per capita food consumption, and land degradation.

Soil occupies the pedosphere, one of Earth's spheres that the geosciences use to organize the Earth conceptually. This is the

conceptual perspective of pedology and edaphology, the two main branches of soil science. Pedology is the study of soil in its natural setting. Edaphology is the study of soil in relation to soil-dependent uses. Both branches apply a combination of soil physics, soil chemistry, and soil biology. Due to the numerous interactions between the biosphere, atmosphere andhydrosphere that are hosted within the pedosphere, more integrated, less soil-centric concepts are also valuable. Many concepts essential to understanding soil come from individuals not identifiable strictly as soil scientists. This highlights theinterdisciplinary nature of soil concepts.

Soil Science

"The science dealing with soil as a natural resource on the surface of the earth, including Pedology (soil genesis, classification and mapping), physical, chemical, biological and fertility properties of soil and these properties in relation to their management for crop production."

Soil Science has six well defined and developed disciplines

Soil fertility : Nutrient supplying properties of soil

Soil chemistry : Chemical constituents, chemical properties and the chemical reactions

Soil physics : Involves the study of physical properties

Soil microbiology : Deals with micro organisms, its population, classification, its role in transformations

Soil conservation : Dealing with protection of soil against physical loss by erosion or against chemical deterioration i.e excessive loss of nutrients either natural or artificial means.

Soil Pedology : Dealing with the genesis, survey and classification

Views on Soil (Science)

The term SOIL was derived from the Latin Word "SOLUM" Means FLOOR

- For a Layman soil is dirt or debris
- For an Agriculturist soil is a habitat for plant growth (to grow crops)
- For a Mining Engineer soil is a debris covering the Rocks
- For a Civil Engineer soil is a material on which road bed or house bed is formed
- For a Home Owner soil is a mellow or loamy or hard material

Definitions

Generally soil refers to the loose surface of the earth as identified from

the original rocks and minerals from which it is derived through weathering process.

Whitney (1892): Soil is a nutrient bin which supplies all the nutrients required for plant growth

Hilgard (1892): Soil is more or less a loose and friable material in which plants, by means of their roots, find a foothold for nourishment as well as for other conditions of growth" **Dokuchaiev (1900):** Russian scientist - Father of soil science - Soil is a natural body composed of mineral and organic constituents, having a definite genesis and a distinct nature of its own.

Joffe (1936): "Soil is a natural body of mineral and organic constituents differentiated into horizons - usually unconsolidated - of variable depth which differs among themselves as well as from the underlying parent material in morphology, physical makeup, chemical properties and composition and biological characteristics".

Jenny (1941): Soil is a naturally occurring body that has been formed due to combined influence of climate and living organisms acting on parent material as conditioned by relief over a period of time.

Ruffin and Simonson (1968): Soil is a mixture of Earth's uppermost mantle of weathered rock and organic matter

Buckman and Brady (1969): Soil is a dynamic natural body on the surface

of the earth in which plants grow, composed of mineral and organic materials and living forms

Soil Science Society of America (1970)

(i) Soil is the unconsolidated mineral matter on the surface of the earth that has been subjected to and influenced by genetic and environmental factors of parent material, climate (including moisture and temperature effects), macro and microorganisms and topography, all affecting over a period of time and producing a product, that is "SOIL" that differs from the material from which it is derived in many, physical, chemical, biological and morphological properties and characteristics.

(ii) The unconsolidated mineral material on the immediate surface of the earth that serves as a natural medium for the growth of land plants.

Dr. W.E.H. Blum

Soils not only serve for agriculture and forestry, but also for filtering, buffering and transformation activities between the atmosphere and the ground water, protecting the food chain and drinking water against pollution and biodiversity

As soil provides nutrients, water, air and anchorage and supports life on Earth, it can be called as Soul Of Infinite Life (SOIL)

List of International Soil Scientists

1. Van Helmont (1577 – 1644)
2. Theoder De Saussure
3. John Woodward
4. Boussingault (1802 – 1882)
5. J.V. Liebig (1803 – 1873)
6. J.B.Laws & J.H. Gilbert (1855)
7. J.T.Way (1856)
8. R.Warrington (1876)
9. E.W. Hilgard (1860)
10. V.V. Dokuchaiev (1846-1903)
11. K.D.Glinga (1914)
12. C.F.Marbut (1927)
13. Hens Jenny (1941)

Indian Scientists

1. J.W.Leather (1906)
2. Madam Scholasky (1932)

3. Wadia et al. (1935)
4. Viswanath & Ukil (1943)

Soil as a three dimensional body

Soil is a three dimensional body having length, breadth and depth. They form a continuation over the land surface and differ in properties from place to place. Its upper boundary is air or water and lower boundary is the rock lithosphere.

Composition of soil on volume basis (Soil components)

Mineral matter : 45%
Organic matter : 5%
Soil water : 25%
Soil air : 25%

Soil can be compared to various systems of animals

Digestive system : Organic matter decomposition Respiratory system : Air circulation & exchange of gases Circulatory system (blood) : Water movement within the soil Excretory system : Leaching out of excess salts

Brain : Soil clay
Colour : Soil colour
Height : Soil depth

Approaches of Soil Study

Two Concepts: One treats soil as a natural body, weathered and synthesized product in nature (Pedology) while other treats soil as a medium for plant growth (Edaphology).

Pedological Approach: The origin of the soil, its classification and its description are examined in Pedology. (From Greek word *pedon*, means soil or earth). Pedology is the study of soil as a natural body and does not focus on the soil's immediate practical use. A pedologist studies, examines and classifies soil as they occur in their natural environment.

Edaphological Approach: Edophology (from Greek word *edaphos*, means soil

or ground) is the study of soil from the stand point of higher plants. Edaphologists consider the various properties of soil in relation to plant production. They are practical and have the production of food and fibre as their ultimate goal. They must determine the reasons for variation in the productivity of soils and find means for improvement.

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