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3. The Nature and the Soil

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Abstract:

This paper is mainly focused on the study of the significance of the important natural source i.e., SOIL- It is not a formal letter or a word, it's a life of the natural cycle of all living organisms. The soil itself creates a mountain, destroys sand, clay, and various sedimentary sources. Without soil, we can't imagine where the world will move. Soil is the elixir of nature.

Keywords: *Soil, Afforestation, Deforestation, Soil Erosion, Wetland soil and the ecosystem.*

Figure 3.1: SOIL- It's more Essential than you think:

In our day-to-day life, we have been going through so many communities of plants, animals and microbes, etc. but the question is do we think about how it all started and what is the root of all those living things?

There are so many natural resources which are helpful and essential to lead our day-to-day life. Despite all those resources Soil plays the role of heart of those all-natural resources.

Plants and animals rely on soils for food, shelter, and more. Soil is also home to fungi, algae, and unicellular and multicellular organisms that are invisible to the naked eye, such as bacteria and protozoa. As they move through the soil, microorganisms help improve drainage and soil structure, making soil more fertile and productive.

3.1 What is Soil?

Soils are complex mixtures of minerals, water, air, organic matter, and countless organisms that are the decaying remains of once-living things. It forms at the surface of land – known as the ***skin of the earth.*** Soil is proficient in supporting plant life and is vital to life on earth.

Soil is not only just a loose surface material that covers most lands but also it is home to more than 25 percent of our planet's biodiversity, it supports plant life, agriculture, and food security. Soil structure plays an indispensable role in plant growth helping in the movement of water, air, and nutrients to plants.

3.2 Plays a Prominent Role in our Health:

Soils are important for human health in plenty of ways. Soil biodiversity helps us to breathe, they can help control air quality and greenhouse gas emissions through carbon sequestration, which cleans the air for us to breathe. Most of the human nutrients are gain from the soil and the four major elements, H, O, C, and N, make up approximately 99% of the human body, and seven minor elements, Na, K, Ca, Mg, P, S, and Cl, make up another 0.9% of the body. Out of the approximately 29 elements considered essential for human life, 18 are either essential or beneficial to plants and are obtained from soil, and most of the other elements can be taken up from the soil by plants. Therefore, soils that provide a healthy, nutrient-rich growth medium for plants will result in plant tissues that contain most of the elements required for human life when the plants are consumed.(National Research Council, 2005)[1].

3.3 Afforestation- Plantation of Trees:

Afforestation is the process of introducing trees and tree seedlings to an area that has presently not been forested. Afforestation can be done through tree planting and seeding, naturally or artificially. The life cycle of forests is very long, and it is difficult to change them once afforested. Forest sites are mainly affected by environmental and human activities.To facilitate afforestation, it is necessary to evaluate and classify the forest site factors and achieve a suitable species planted on the right site. Site preparation is also based on on-site classification. It is usually carried out after determining the type of afforestation land, divided into mechanical land preparation and chemical methods. An essential task of site preparation is to maintain soil moisture and promote seedlings survival and growth.

Afforestation of agricultural soils can result in important changes in physical characteristics of soil and soil structure formation in a relatively short time.

The pattern of changes and soil conditions in each phase depends on location, where microclimatic, geological, and biological factors and their interactions can play decisive roles. Based on our observations, the creation of a stable soil structure was related to the quality of soil organic matter, determined by the characteristics as well as the quantity of the litter.

Forest restoration is the method of improving the health, productivity, and arrangement of life of a forest is a complex endeavor that can never fully bring back the original forest.

That's why it's far better to conserve existing healthy forests and prevent them from being degraded or destroyed in the first place.

3.4 Deforestation- Devastation of Soil:

Deforestation can have destructive effects on soils. Soil is tied to the ground via the roots of plants. The huge roots of trees provide adequate facilities to prevent the topsoil from blowing away with the wind or washing away with the rain. When deforestation removes these trees and their roots the topsoil becomes vulnerable to the elements. Deforestation, as defined by the United Nations, is the permanent removal of trees until there is less than 10% of the forested land remaining.

Since the beginning of the Industrial Revolution, humans have removed more than half of the original forest cover on Earth. The effects of tree loss on soil are significant. Trees and shrubs shield the ground from the force of raindrops and provide shade that reduces surface soil temperature, which in turn reduces evaporation. Logging and small-scale removal of trees exposes soil to rain splash which loosens and dislodges soil particles, eroding soil and creating a more impermeable bare surface, which increases flow.

3.5 Soil Erosion and its Depravity:

Soil erosion is the most widespread form of soil degradation. It influences the productivity of natural and managed ecosystems. The natural wearing away of the soil surface by wind and water is worsened by poor soil management, especially in farmed lands. The slow replacement of eroded soil by the weathering of bedrock cannot keep up with rates of erosion caused by human action. Each year millions of hectares of farmland are lost to soil erosion, reducing the land available for agriculture.

The erosion, transport and deposition of eroded soils driven by cultivation and overgrazing cause a loss of nutrients and carbon in particulate forms. In turn, soil erosion leads to the pollution and sedimentation of waterways, and acts as a source of the greenhouse gases that contribute to climate change. The effects of soil erosion go beyond the loss of fertile land.

It has led to increased pollution and sedimentation in streams and rivers, clogging these waterways and causing declines in fish and other species. And degraded lands are also often less able to hold onto water, which can worsen flooding. Sustainable land use can help to reduce the impacts of agriculture and livestock, preventing soil degradation and erosion and the loss of valuable land to desertification.

A record from the (IPCC)[2] found that when cultivated without conservation practices, soil is currently eroding up to 100 times quicker than it's forming. The risk of erosion will become even higher in the future due to emissions-driven temperature changes, with resulting decreases in agricultural production, land value and human health.

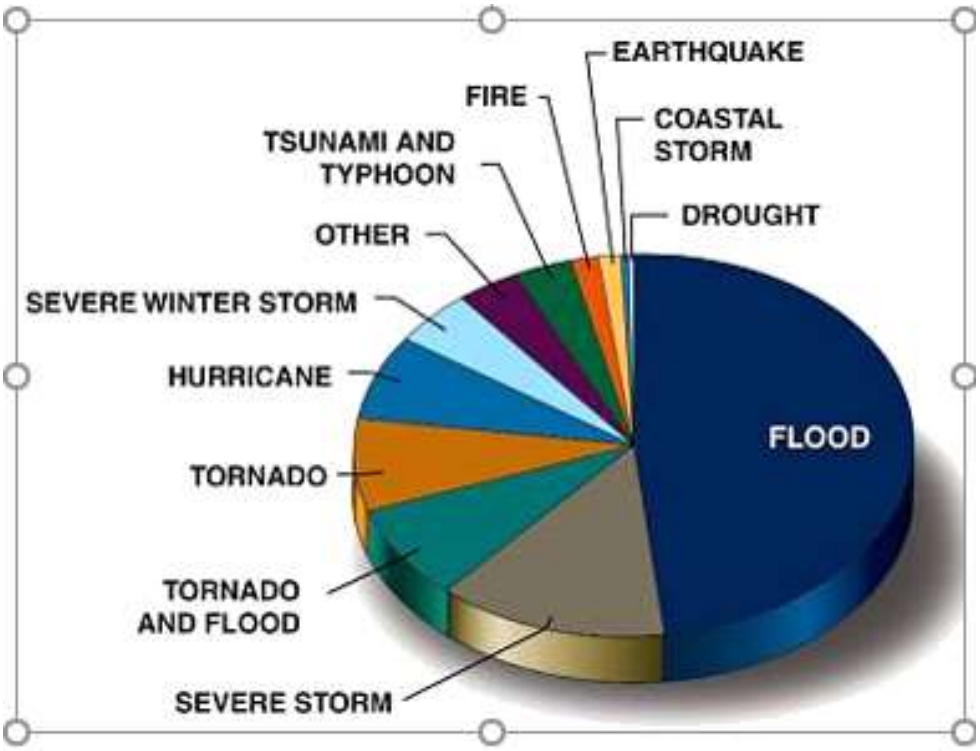


Figure 3.2: The pie chart bestows the factors which also cause soil degradation.

3.6 Wetland Soil and the Ecosystem:

Wetland soils differ from terrestrial soils in that they are anaerobic. The absence of oxygen produces characteristics, especially differences in soil color and texture that are uniquely different from aerobic, terrestrial soils. In anaerobic soils, a shift in microbial metabolism occurs, from one of aerobic, oxygen-driven metabolism to one driven by other energy-producing compounds. Wetlands are important features in the landscape that provide numerous beneficial services for people and fish and wildlife. Some of these services, or functions, include protecting and improving water quality, providing fish and wildlife habitats, storing floodwaters and maintaining surface water flow during dry periods. These valuable functions are the result of the unique natural characteristics of wetlands.

3.7 Wetland Soils:

Soils host the zone of biogeochemical activity where plants, animals, and microorganisms interact with the hydrologic cycle and other elemental cycles. A typical soil contains both mineral and organic materials as well as the adjacent water-filled and air-filled pore space.

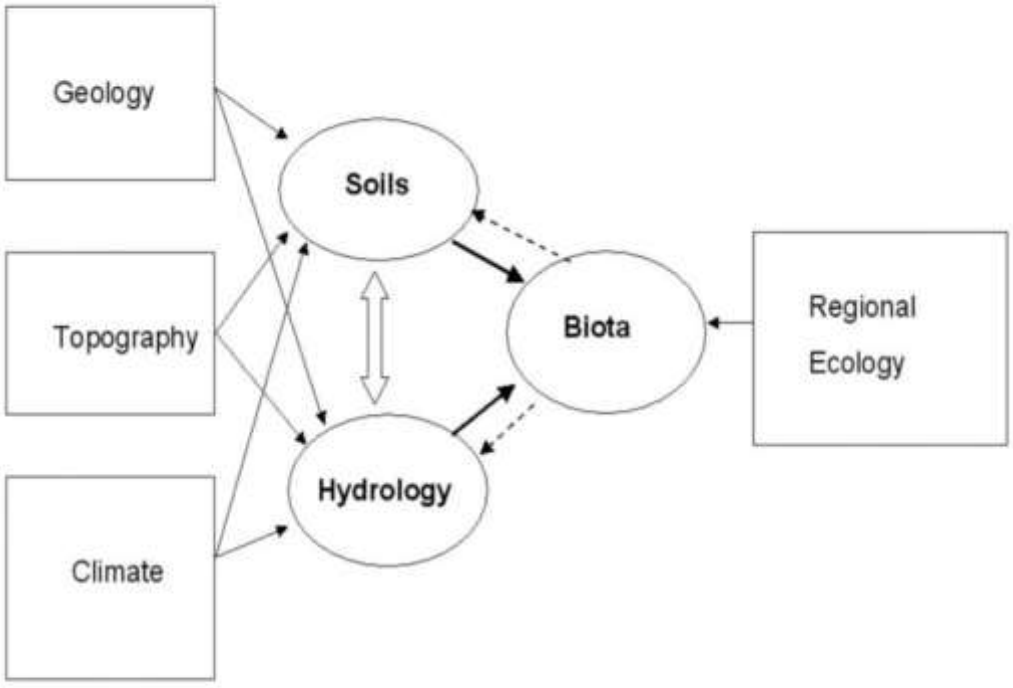
The physical and chemical properties of a soil may influence the processes that lead to wetland formation and function. Furthermore, wetland formation and function may influence some of the physical and chemical properties of soils. Bio-Geochemical processes in seasonally saturated soils can lead to the accumulation of organic matter and trans-formations of iron-based minerals, which may influence nutrient cycling, soil acidity, and soil color.

3.8 Generally, Wetland Soils can be Classified into three Categories:

a. Soils permanently inundated with water above the soil surface
b. Saturated soils with the water table at or just below the soil surface
c. Soils where the water table depth is always below the surface

3.9 Wetland Ecology:

Wetlands, which are fluctuating ecosystems inherently difficult to categorize, are often found at the intersection of terrestrial habitat and aquatic habitat and usually include elements of both systems. Biotic[3] and Abiotic[4] factors that are determined by hydrology in a wetland could include soil texture, water quality, or topography, whereas biotic factors influenced by hydrology in a wetland would be plant and animal types, diversity, or quantity.



Abiotic and biotic impacts upon and interactions within wetlands

3.10 Soil is Life, Conserve it:

Soil is the basis for sustenance for 7.9 billion people. Soil conservation is important for sustainability. It preserves clean water and helps regulate the climate. Soil loss translates into widespread poverty and slower economic development. Environmental and economic benefits, coupled with mandatory regulations, are strong incentives for producers to take every practical measure possible to protect the soil. Without soil conservation, soil erosion would increase. The effects of soil erosion go beyond the loss of fertile land impacts and m down the markets worldwide and also includes water usage.

Wendell Berry[3], the American novelist said that the soil is the great connector of lives, the source and destination of all. It is the healer and restorer and resurrect or, by which disease passes into health, age into youth, death into life. Without proper care for it we can have no community, because without proper care for it we can have no life. ***'Though researchers preach the importance of soil, most of us don't bother about it. We need to pay additional attention to conserve soil for our sake'.***

3.11 References:

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