5/April/24

Geography Foundation

Biogeography

12:00 - 2:20 | Lec-1

Topics -

- Soil profile
- Soil horizon
- Soil formation process
- Factors responsible for soil formation
- Soil classification
- Soils in India
- Problems & solutions for soil Degradation

#Reference book - Envi. Geography by Savindra Singh
- Rupa Made Simple

Soils -

- Soil is not only dust, it is a complex Ecosystem of both biotic & abiotic factors / components
- Soil forming process takes 100 years to form 1 cm of soil
- Soil depth ranges from few cm to 4-5 m.
- 1st work in soil was initiated by a Russian - V.V Dokuchaev & further work was carried forward by an American - G.F. Naubut

- Study of Process related to soil - Pedogenesis & study of soil - Peddogy
- Soil consist of 25% air, 25% water, 45% mineral & 5% organic component/ humus
- The vertical cross section of soil is called as **SOIL PROFILE**. This soil profile is

divided into few layers called as HORI
& these horizons are out come of interaction
b/w climate, living organism, earth surface
over a period of time

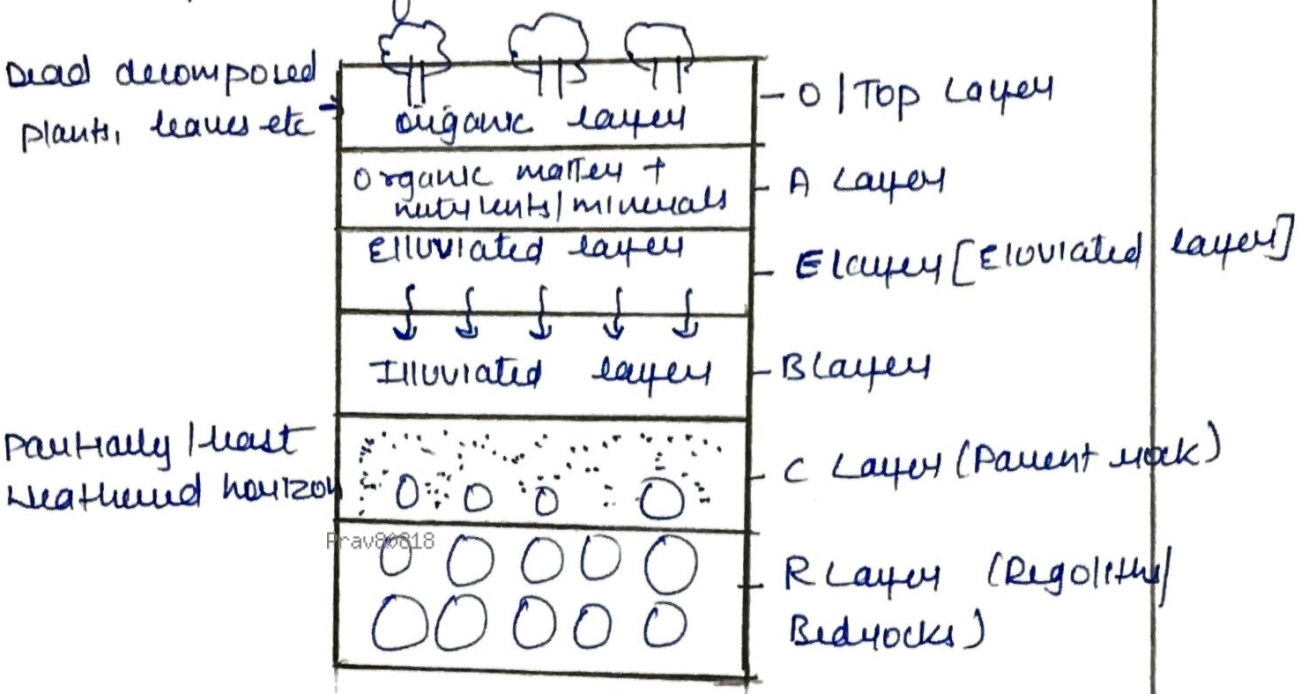


Fig - Soil Profile

- Elluviation - losing its mineral
- Illuviation - Minerals leaching from Elluviated layer, accumulated in Illuviated layer

- O Layer - This layer is dominated by organic layer, formed by partial decomposition of plants

leaves, twigs, lichens, mosses.

[O + A + E layer = SOLUM]
[Bedrock layer - saprolite]

- E layer - Elluviated layer
- A layer - Top part of soil / Top layer of soil. It consist of minerals and organic matter. Nutrients like Iron, Aluminium, Clay & organic matter is dissolved and carried out in this layer

- Elluviated layer - It is a light colour elluviated layer eroded of its nutrients. Minerals like clay, iron, aluminium move downward leaving behind minerals like Quartz
- B layer [Subsoil] - Layer of Illuviation. This layer accumulates all the leached minerals from E Horizon.

- **C layer/ parent rock** - least weathered horizon. It is unconsolidated & accumulates more soluble inorganic compounds. This is parent rock.

- **Bedrock layer**- It denotes neither of unweathered ~~layer~~ material at base of soil profile & it consist of continuous mass of hard rock. This layer is generally found below 50 feet of soil profile.

Soil Formation Processes - Prav80818

- **Weathering** - Mainly disintegration of rocks by agents like water, winds, glaciers

- **Leaching** - Removal of mineral due to percolation of water

  - Warm & Humid region
    - Silica is more mobile, it will move downward & Iron & Aluminium will accumulate in top layer
    - This is called as **Laterisation** & Laterite soil is formed (in India)
  - Cold & Humid region
    - Silica will be ~~more~~ less mobile. Iron & Aluminium will move downward & Silica will be accumulated in Top layer
    - This is called as **Podzolisation** & Podzol soil is formed (in Canada, Russia)

- **Gleyfication** - soil formation in swamps & marshes. because of decomposition of anaerobic bacteria that releases a compound called as potassium Gluconate. This compound imp-arts blue-green colour to the soil which is called as Gley patches

Ex Sundarbans

- **Chelviation** - It is the process of moving minerals downward under influence of acids (& not water) created by plants. These acids that helps in downward movement of minerals are called as Chelviating agents / Chelates.

Factors Controlling Soil Formation -

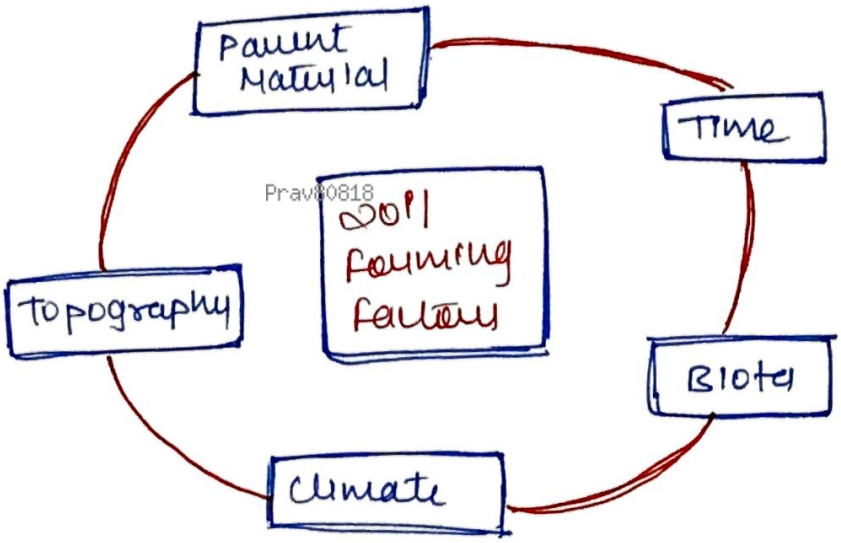
a] Climate

b] Parent rock

c] Topography / Relief

d] Biota

e] Time



a] Climate - an imp factor that determine soil. It is influenced by precipitat^n that controls downward movement. If precipitation is high → nutrients will be out of reach of roots & If precipitat^n is slow-starch

builds up in soil & restrict the fertility.

- Temperature - Controls the chemical composition of soil. Below 10°C, bacterial activity will be slowed down ∴ conducive for the formation of organic matter/humus. At 0°C bacterial activity will be almost stopped. If the temp is high - bacterial rapidly decomposes the material which is unsuitable for yielding good soil

- Climate also controls weathering. Hot & dry region experience physical weathering giving coarse textured soil (Dry Regions). while in warm & Humid region - chemical weathering is dominant which give rise to a fine texture soil

- ~~Soil chem~~

b] Parent Rock –

o Soil chemistry is influenced by Parent rock –

a] Impact colour of soil

Ex Basalt rock gives black colour

Granite rock gives Red colour

b] Texture

- Hard rocks give coarse texture while soft rocks gives fine texture
- Granite rocks give coarse textured soil. Limestone give rise to fine textured soil

c] Porosity – ability of soil to retain the water/ moisture) while Permeability. refers to ability of soil allowing water to pass through it.

- Soft rocks – fine soil, are more porous ∴ holds moisture

Ex Black cotton soil in India

- Hard rocks - coarse soil are more permeable

c] Topography - The configuration of slope on ground surface., also known as Relief. influence soil formation if soil is exposed to the solar insolation.

- Temp. will be high, moisture will be reduced while soil facing away from the sun - remains with the moisture in the cooler condition. If slope is steep on surface there will be more erosion leading to format" of thin soil profile & If slopes are gentle - soil profile is thicker.

- Topography determines climate which intern determine type of soil.

d] Biota - refers to plants, micro organism, rabbits.

- plants roots are providing organic material

to upper soil horizons

- Organism, ranging from microorganism to burrowing mammals plays a vital role in enhancing fertility of soil. Earthworms are not only burrowing soil but also by passing soil to intestinal tract, making soil more fertile

e] Time - Soil requires time for developing their horizons. The matured soil takes 100 of years to acquire the structure and characteristics of good soil.

- Time determines thickness of soil.
- Time doesnot have correlation with soil It is not true that mature soil with horizon development will have fertile soil
- Soil formed out of ~~bedrock~~ sediment develops faster in comparison to soil formed out of bedrock.