

Soil and Agriculture in India

The soil on which we depend so much for our day-to-day needs has evolved over thousands of years. The various agents of weathering and gradation have acted upon the parent rock material to produce a thin layer of soil. The improved conservation and management of soils are among the great challenges and opportunities we face in the 21st century.

What is Soil?

Soil is a material composed of five ingredients — minerals, soil organic matter, living organisms, gas, and water. Soil minerals are divided into three size classes — **clay**, **silt**, and **sand**. The percentages of particles in these size classes are called **soil texture**. In other words, Soil is the mixture of rock debris and organic materials which develop on the earth's surface.

Factors affecting the formation of soil are:

- relief
- parent material
- climate
- vegetation and other life-forms

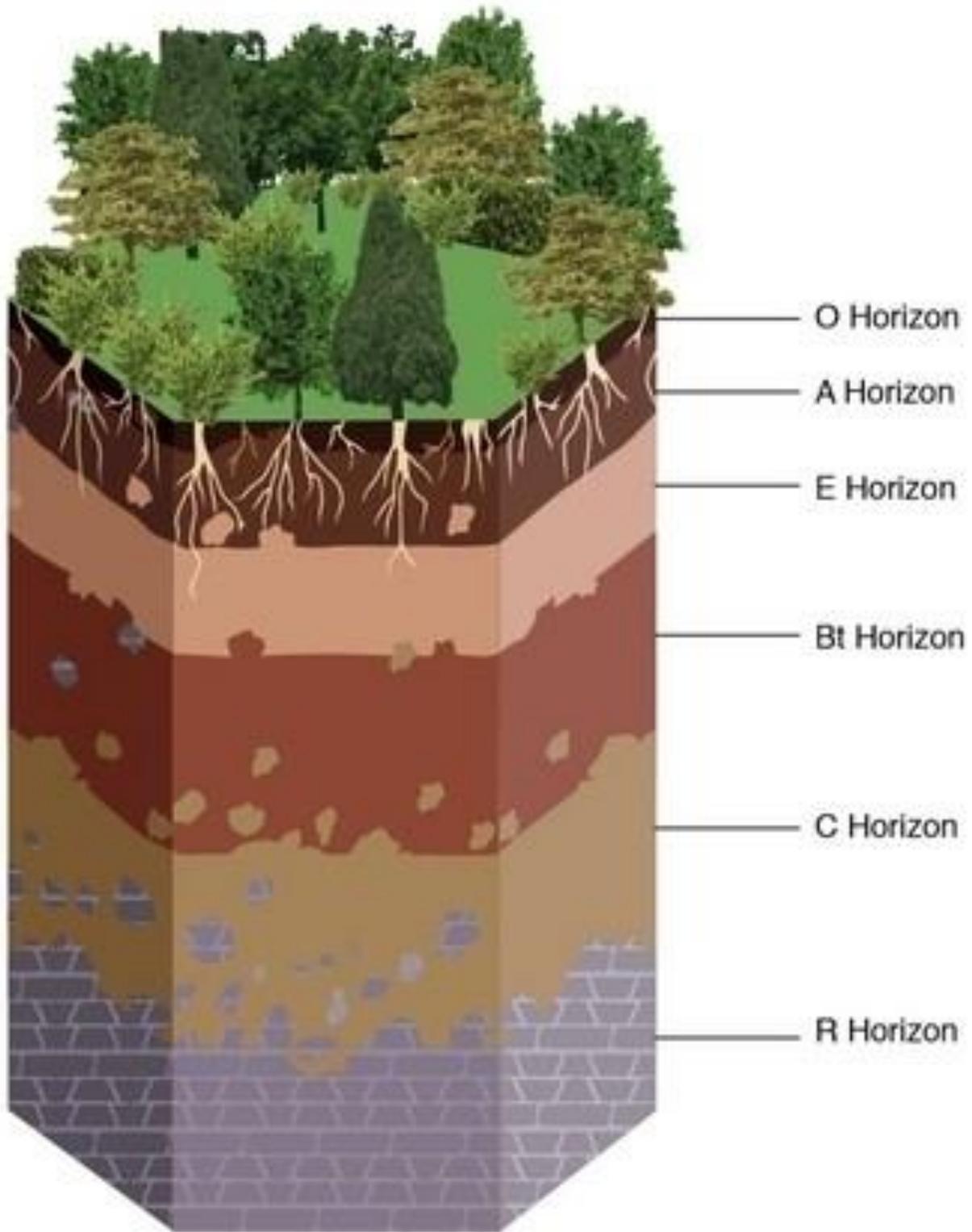
Note: Besides these, human activities also influence it to a large extent.

Components of Soil:

- Components of the soil are mineral particles, humus, water and air. Some soils are deficient in one or more of these, while there are some others that have varied combinations. The actual amount of each of these depends upon the type of soil.
- Soils are classified on the basis of their inherent characteristics and external features such as texture, colour, the slope of land and moisture content in the soil.
- Based on texture, main soil types were identified as sandy, clayey, silty and loam, etc. On the basis of colour, they were red, yellow, black, etc.

Soil Profile and Horizon of soil

A **soil horizon** makes up a distinct layer of soil. The horizon runs roughly parallel to the soil surface and has different properties and characteristics than the adjacent layers above and below. The **soil profile** is a vertical section of the soil that depicts all its horizons. The soil profile extends from the soil surface to the parent rock material.



- O - Horizon containing a high percentage of soil organic matter.
- A - Horizon darkened by the accumulation of organic matter.

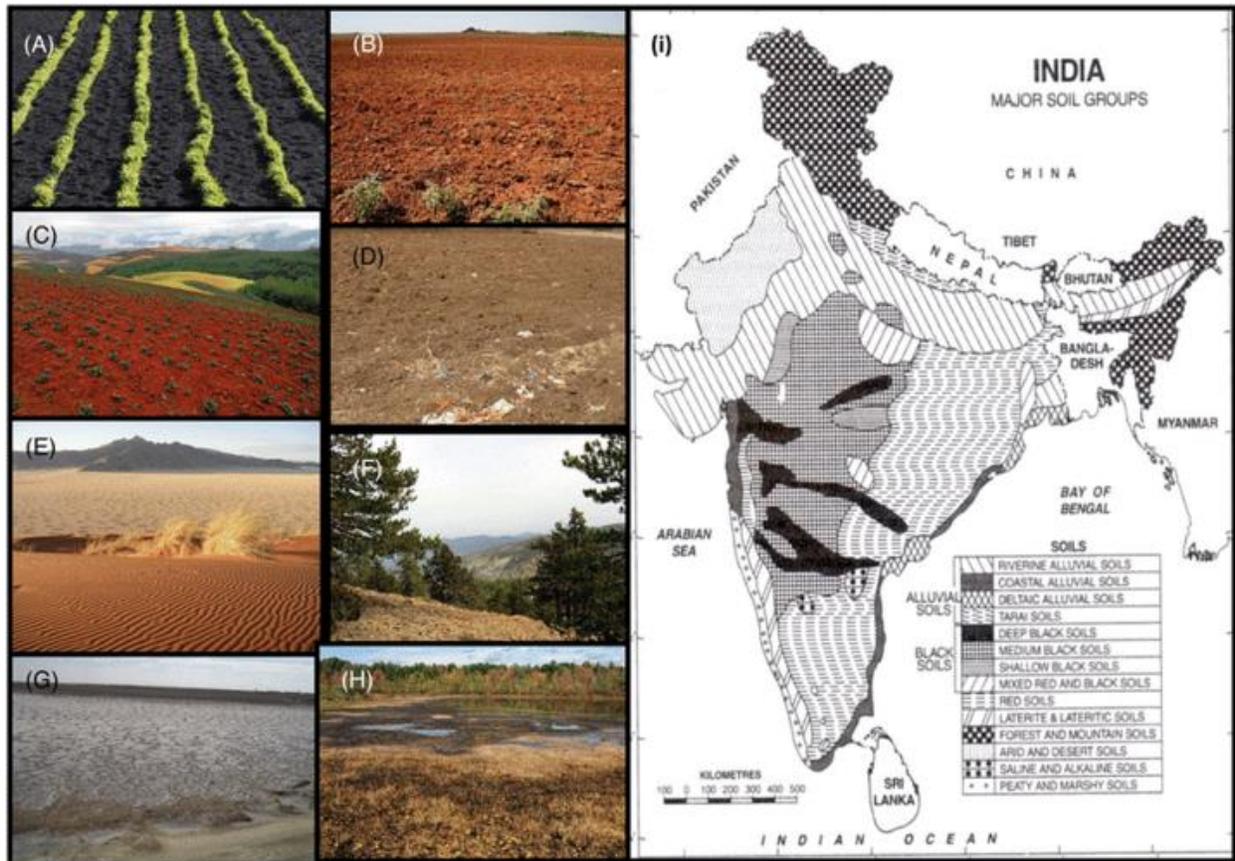
- E - Horizon formed through the removal (**eluviation**) of clays, organic matter, iron, or aluminium. Usually lightened in colour due to these removals.
- B - Broad class used for subsurface horizons that have been transformed substantially by a soil formation process such as colour and structure development; the deposition (**illuviation**) of materials such as clays, organic matter, iron, aluminium, carbonates, or gypsum; carbonate or gypsum loss; brittleness and high density; or intense weathering leading to the accumulation of weathering-resistant minerals.
- C - A horizon minimally affected or unaffected by the soil formation processes.
- R - Bedrock.

Types of Indian Soil:

India is an Agrarian country & Soil is its prime resource. It plays a vital role in the economy of India as our industries are mainly **Agro-based**. About **65 to 70%** of the total population of the country is depended on agriculture. In India, the soil study is carried out by the institutes- **National Bureau of Soil Survey** and the **Land Use Planning an Institute** under the control of the **Indian Council of Agricultural Research (ICAR)**.

On the basis of genesis, colour, composition and location, the soils of India have been classified into several soil types. Generally, there are six types of soil found in India:

- Alluvial Soil
- Regur or Black Soil
- Red Soil
- Laterite Soil
- Desert Soil
- Mountain Soil



1. Alluvial Soil

- Deposition of materials by sea and river is called **alluvium** and the soil formed due to deposition of alluvium is called as alluvial soil.
- This type of soil mainly found in the **Indo-Ganga and Brahmaputra plain** i.e. the whole northern plain and in some parts of the river basin in the south and some plateau region.
- This soil is also found in the deltas of the Mahanadi, Godavari, Cauvery and Krishna.
- Alluvial soil can be broadly categorised in two types i.e. **New alluvial soil (Khadar)** and **old alluvial soil (Bhangar)**. Both the Khadar and Bhangar soils contain calcareous concretions (Kankars).
- Old alluvial soils are found in slightly elevated areas far away from the river and are clayey and sticky.
- The new alluvial soil is found in the **floodplain** of the river and is much fertile in comparison to the old alluvial soil.
- **Crops Grown:** the Alluvial soil is suitable for the **Rabi** and **Kharif** crop like cereals, cotton, oilseeds and sugarcane.
- These are the largest soil groups covering about 15 lakh sq km or about **46 per cent** of the total area.

2. Regur or Black soil

- The regur or black soils have developed extensively upon the **Lava Plateaus** of Maharashtra, Gujarat, Madhya Pradesh mainly Malwa and are formed due to **volcanic activities**.
- These soils are very fertile and contain a high percentage of **lime, iron** and a moderate amount of **potash**.
- The type of soil is especially suited for the cultivation of cotton and hence sometimes called '**black cotton soil**.'
- **Crops Grown:** Cotton, Jowar, Wheat, Linseed, Gram, Fruit and Vegetable.
- The black soil is highly retentive of moisture.

3. Red Soil

- Red soils develop on **granite and gneisses** rocks under low rainfall condition i.e. due to weathering of the **metamorphic rocks**.
- These soils are red in colour due to the high concentration of **Iron Oxide**.
- These soils are friable and medium fertile and found mainly in almost whole of Tamil Nadu, South-eastern Karnataka, North-eastern and South-eastern Madhya Pradesh, Jharkhand the major parts of Orissa, and the Hills and Plateaus of North-east India.
- These soils are deficient in Phosphoric acid, organic matter and nitrogenous material.
- Crops Grown: Wheat, Rice, Millet's, Pulses.

4. Laterite Soil

- Laterite is a kind of clayey rock or soil formed under **high temperature** and **high rainfall** and with alternate dry and wet period.
- Laterite and lateritic soils are found in South Maharashtra, the Western Ghats in Kerala and Karnataka, at places in Odisha, small parts of Chottanagpur and in some parts of Assam, Tamil Nadu, Karnataka, and in western West Bengal (particularly in Birbhum district).
- Crops Grown: Coffee, Cashew etc.
- This type of soil is unsuitable for agriculture due to the high content of **acidity** and inability to **retain moisture**.

5. Desert soil

This type of soils found in Rajasthan, Haryana and the South Punjab, and are sandy.

- In the absence of sufficient wash by rainwater, soils have become **saline** and rather unfit for cultivation.

- In spite of that cultivation can be carried on with the help of **modern irrigation**.
- Wheat, bajra, groundnut, etc. can be grown in this soil.
- This type of soil is rich in **Phosphates** and **Calcium** but deficient in **Nitrogen and humus**.

6. Mountain Soil

- Soil found in higher altitude on the mountain is called as Mountain soil.
- The characteristics of this type of soil are changed according to the altitudes.
- This type of soil is suitable for the cultivation of potatoes, fruits, tea coffee and spices and wheat.

Type of Soils based on the size of particles

1. Sandy Soil

- Particles are larger in size.
- The particles cannot fit close together and hence there is enough space among them.
- It is not fit for vegetation as it does not retain water.
- However, millets can be grown on sandy soil.

2. Clayey Soil

- Particles are very small in size.
- Very little space among the particles.
- Water does not drain quickly through clayey soil because of less space among particles.
- So, clayey soil is not well aerated and retains more water.

3. Loamy Soil

- Particles are smaller than sand and larger than clay.
- Loamy soil is the mixture of sandy soil, clayey soil and silt.
- Silt is the deposit in river beds.
- The soil has the right water holding capacity and is well aerated.
- It is considered the best soil for the growth of plants.

Types of Agriculture in India

There are different types of farming activities performed in India which are as follows:

Subsistence Farming

- Subsistence farming is a type of farming in which nearly **all the crops or livestock raised** are used to maintain the farmer and farmer's family leaving little.
- Subsistence farms usually consist of no more than a few acres, and farm technology tends to be primitive and of low yield.

Mixed farming

- Mixed farming is an agricultural system in which a farmer conducts different agricultural practice together, such as cash crops and livestock
- The aim is to increase income through different sources and to complement land and labour demands across the year.

Shifting cultivation

- Shifting cultivation means migratory shifting agriculture.
- Under this system, a plot of land is cultivated for a few years and then, when the crop yield declines because of soil exhaustion and the effects of pests and weeds, is deserted for another area.
- Here the ground is again cleared by **slash-and-burn methods**, and the procedure is repeated.

Other Names of Shifting Cultivation

Shifting Cultivation Name	Country
Chena	Sri Lanka
Ladang	Java and Indonesia
Jhum	North-eastern India
Podu	Andhra Pradesh
Milya	Mexico and Central America
Konuko	Venezuela
Roka	Brazil
Milpa	Yucatan and Guatemala

Extensive Farming

- This is a system of farming in which the farmer uses a **limited amount** of labour and capital on a relatively large area.
- This type of agriculture is practised in countries where **population size** is small and **land** is enough.
- Per acre yield is **low** but the overall production is in surplus due to less population.
- Here machines and technology are used in farming.

Intensive Farming

- This is a system of farming in which the cultivator uses a **larger amount** of labour and capital on a relatively small area.
- This type of farming is performed in countries where the population to land ratio is **high** i.e. the population is big and the land is small.
- Annually two or three types of crops are grown over the land.
- Manual labour is used.

Plantation Agriculture

- In this type of agriculture, cash crops are mainly cultivated.
- A single crop like rubber, sugarcane, coffee, tea is grown.
- These crops are major items of export.