



Land, Soil and Vegetation Resources in India Major Soil Types, Soil Erosion, Soil Conservation Part 2

Major Soil Types

The soils of India are divided into following six types:

Alluvial Soils: Alluvial soil is the most important soil type of India. It covers the vast valley areas of the Sutlej, Ganga and Brahmaputra, and the fringes of the southern peninsula. The alluvial soils occupy 64 million hectares of the most fertile land. The soils vary from sandy loam to clay in texture and are rich in potash but deficient in nitrogen and organic matter. Generally, the colour varies from grey to reddish brown. These soils are formed of deposits of silt and sand brought down by the rivers flowing from the Himalayas and the Great Indian plateau. Being young, the soils lack profile development. Being extremely productive, these soils are most important from the point of view of Indian agriculture. Based on geographical considerations, this soil can be subdivided into two divisions: newer alluvium (khadar) and older alluvium (bangar). Both are different in texture, chemical composition, drainage capacity and fertility. The newer alluvium is a light friable loam with a mixture of sand and silt. It is found in river valley, the floodplains and deltas. The older alluvium lies on the interfluves. Almost all crops are grown on these soils.

Black Soils: The black soils are found mainly on the Deccan lava region covering large parts of Maharashtra, some parts of Gujarat and Madhya Pradesh, and small parts of Karnataka, Andhra Pradesh, and Tamil Nadu. The soils are formed by disintegration of volcanic basaltic lava. The colour of the soil is generally black due to the presence of compounds of aluminium and iron. The soil is locally known as regur which extends roughly to 64 million hectares. But its depth varies from place to place. It is very thick in lowlands but very thin on highlands. The most important characteristics of this soil are its ability to retain moisture even during the dry season. The soils form wide cracks during summer due to moisture loss, and swell and become sticky when saturated. Thus, the soil is aerated and oxidised to deep levels which contribute to maintain its fertility. This continued fertility is favourable in the area of low rainfall for cotton cultivation even without irrigation. Other than cotton, this soil is favourable for the cultivation of crops like sugarcane, wheat, onion, and fruits.

Red Soils: Red soils cover large part of the Peninsular upland in Tamil Nadu, Karnataka, Goa, southeast Maharashtra, Andhra Pradesh, Orissa, Chotanagpur Plateau, and Meghalaya Plateau. They encircle the black cotton soil zone. They have developed on the crystalline rocks like granite, gneisses, and cover roughly 72 million hectares of the arable land. Iron compounds are abundant making the soil reddish in colour but they are deficient in organic matter. The red soils are generally less fertile and are not as important agriculturally as the black and alluvial soils.

But the productive capacity can be raised through irrigation and use of fertilizers. This soil is suitable for rice, millet, maize, groundnut, tobacco, and fruits.

Laterite Soils: The laterite soils are commonly found in area of high altitude and heavy rainfall in Karnataka, Tamil Nadu, Madhya Pradesh, Jharkhand, Orissa, Assam, and Meghalaya extending over 13 million hectares. They generally form under hot and humid climatic conditions. The lateritic soils are particularly found on high flat erosion surfaces in areas of high and seasonal rainfall. Loss of nutrients by accelerated leaching is the most common feature which renders the soil infertile. The pebbly crust is the important feature of laterites which is formed due to alteration of wet and dry periods. As a result of weathering, laterite becomes extremely hard. Thus, their characteristics include complete chemical decomposition of the parent rock, complete leaching of silica, a reddish-brown colour given by the oxides of aluminium and iron, and lack of humus. The crops which are generally grown are rice, millets, and sugarcane on lowland, and tropical plantations such as rubber, coffee, and tea on uplands.

Desert Soils: The desert soils occur in western Rajasthan, Saurashtra, Kachchh, western Haryana, and southern Punjab. The occurrence of these soils is related to desert and semi desertic conditions, and is defined by the absence of water availability for six months. The soil is sandy to gravelly with poor organic matter, low humus contents, infrequent rainfall, low moisture, and long drought season. The soils exhibit poorly developed horizons. The colour of the soil is either red or light brown. Generally, these soils lack the basic requirements for agriculture, but when water is available, variety of crops like cotton, rice, wheat etc. can be grown with proper application of fertilizers.

Mountain Soils: The mountain soils are complex and extremely varied. The soils vary from deep alluvium in the river basins and lower slopes to highly immature residual gravelly on higher altitudes. Because of complex topographic, geologic, vegetation and climatic conditions, no large areas of homogenous soil groups are found. Areas of steep relief are mostly devoid of soil. Various types of crops are grown in different regions like rice in valley, orchards on slopes, and potato in almost all areas.

 Image of major soil types

Image of Major Soil Types

Soil Erosion

Soil erosion is described as the carrying away of soil by natural elements like water, wind, glacier and wave. Gravity tends to move soil down slope either very slowly as in soil creep or very rapidly as in landslides. Soil erosion has become now one of the major environmental problems and a serious constraint for agricultural production. There are many physical and social factors which determine the extent and severity of soil erosion. The principal physical factors are erosivity of rainfall, erodibility of soil, severity of periodic floods, length, and steepness of the slope. The important social factors are deforestation, overgrazing, nature of land use, and methods of cultivation. Ravines, gullies, and landslides are most serious and highly visible forms of land erosion.

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Soil erosion by ravines and gullies is widespread in India. It has been estimated that 3.67 million hectares of soil surface is damaged. There are four major areas of ravines and gullies in India. They are Yumuna-Chambal ravine zone, Gujarat ravine zone, the Punjab Siwalik foothills zone, and Chotanagpur zone. There are other areas of substantial ravine erosion in the Mahanadi valley, upper Son valley, upper Narmada and Tapi valleys, Siwalik and Bhabar tract of the western Himalayan foothills, and edges of Ganga Khadar in western Uttar Pradesh. Sheet erosion is widespread over sloping deforested terrain, untterraced uplands of peninsular region, Sutlej-Ganga plains, Coastal plains, Western Ghats and North-eastern hills.

The occurrence of landslides is common in earthquake sensitive belts, particularly in the Siwaliks. Heavy rainfall and cutting of slopes for roads, buildings, and mining activities trigger landslides. In the last 50 years, the Rajasthan desert has encroached upon 13000 hectares of land in Rajasthan, Gujarat, Haryana and Uttar Pradesh. Glacial erosion is limited to high Himalayas and sea erosion is confined to coastal areas only.

Soil Conservation

Methods by which soil is prevented from being eroded constitute soil conservation. If the soil is wasted or blown away, it is not easy to replenish it. Therefore, the most important step of soil conservation is to hold the soil in place. This is possible by improved agricultural practices in different regions. Contour ploughing and terracing are generally practised on hill slopes. Rows of trees or shelter belts are planted to protect the fields in desert regions from wind erosion. Afforestation of the catchment areas and slopes in the Himalayas, the Upper Damodar valley in Jharkhand, and the Nilgiri hills in the south has been implemented. It reduces the surface runoff and binds the soil. Ravines are noted for their enormous size and depth with vertical sides.

The Central Soil Conservation Board has established 3 research stations: Kota in Rajasthan, Agra in Uttar Pradesh, and Valsad in Gujarat to suggest methods of reclamation of ravine lands. Overgrazing by sheep, goat, and other livestock has been partly responsible for soil erosion. Erosion due to these factors has been reported from Jammu and Kashmir, Himachal Pradesh, Rajasthan, and Karnataka. Soil exhaustion can be prevented by the application of manure and fertilizers.

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