

Natural Resources – Land and Soil

In the course of your exploration of the Earth's physical features and its environment in the previous two years, you have already learnt that the Earth has the basic qualities to support life. It provides us, the humans, the means of our survival and opportunities for our development. The introduction to the concept of resources has made you aware about the presence and importance of the various **natural resources** on the Earth's surface. You already know that among the Earth's major domains, the **hydrosphere covers 71%** of the Earth's surface while the **lithosphere covers 29%**. All parts of this small percentage are not habitable. The lithosphere comprises the solid upper crust of the Earth along with the soil. This part of nature is termed as **land**.

LAND

Land is a natural resource of utmost importance to man and most living beings. It serves as a **base for natural vegetation**. It serves as a **habitat for wildlife**.

Land supports economic activities like **agriculture and pastoral farming** which provide us **food and materials for our clothing**. **Mining and industries** are connected with land. We mine minerals from land and build industries with products from the land. We build our **shelter** and houses on land with materials we obtain from it. Thus, we should utilise land with care and **proper planning**.

VARIOUS LANDFORMS AND THEIR UTILISATION

The utilisation of land is determined by **physical factors** like **relief, soil** and supporting **climate**. **Human factors** like **population pressure, its density and quality, i.e.,** their cultural and technical ability also determines the land utilisation.

The Earth's surface comprises three main landforms - **mountains, plateaus and plains**. These **relief features** influence the life and economic activities of man.

Remote mountains with difficult terrain, uneven plateau surfaces, deserts and swampy land make livelihood difficult. Their land use is limited and hence they are sparsely populated regions. On the other hand, broad low-lying plains drained by rivers, e.g., Indo-Gangetic Plain, provide opportunities for agriculture and settlement. Thus, plains are densely populated regions of the world.

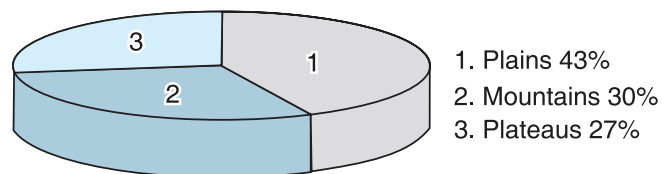


Fig. 2.2 : India : Pie Chart showing percentage of land under different relief features



(a) Mountains – Scenic Beauty



(b) Plateaus – Forested Tableland



(c) Plains – Food Bowl

Fig. 2.1 : Different Landforms

LAND USES

Different patterns of land use develop in different parts of the world. The total land area of any country may be put to different uses, depending upon the relief.

Depending on the quality, the land may be **productive** and **involved in different economic activities** while a part of the land may be **unproductive** and may lie as **waste land** or **barren land**. The **pattern of land utilisation** is termed as **land use**.

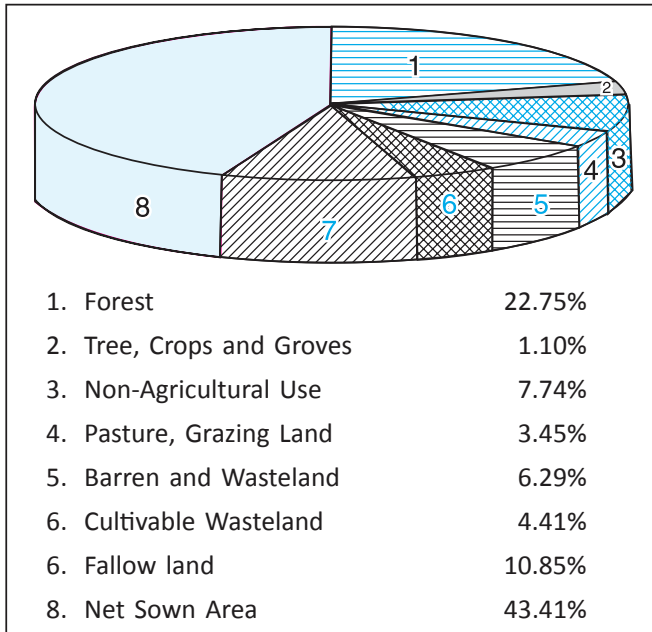


Fig. 2.3 : India: Pie chart showing land use

Land use in any area is determined by:

- location and accessibility of the area.
- relief, nature of rocks and slope of the land.
- the type of soil.
- availability of water.
- cultural and technical development and need of the people.
- infrastructure of the area.

LAND UTILISATION IN INDIA

As compared to India, countries like Japan (67% forest) and Brazil (66% forest) have much larger percentage of areas under forest cover. India has the largest percentage of its land under agricultural use followed by France, U.K. and USA. While only 3.45% of India's land is under pastures for rearing livestock, Australia has 56% of the land under pastures, accounting for the flourishing pastoral trade. In

advanced countries like Canada, nearly 52% of the land is put to non-agricultural uses. A comparison of the land use of different countries reflects the level of their economic development as well as the economic activities undertaken in those countries.

Land owned by individuals is known as 'private land'. Whereas, land used by community for common uses like collection of fodder, fruits, nuts and medicinal herbs etc. is known as 'community land'. It is also called 'common property resources.'

Vast changes in land use pattern reflect the cultural changes in society.

Because of the expansion of agricultural and constructional activities, major threats to the environment are :

- Land degradation
- Landslides
- Soil erosion
- Desertification.

CONSERVATION OF LAND RESOURCES

The total **land area** of any country is **fixed**. The increasing population increases demand for everything and puts pressure upon land. Man cleared forests to acquire land for agriculture. Gradually, with cultural and social changes the land use pattern underwent further changes. Man encroached every possible scrap of land in variable areas. The urban areas became crowded with sprawling housing complexes, commercial spaces, industries and changing infrastructures. The natural landscape changed rapidly. The tremendous pressures on the available land resources degraded its quality.

Deforestation led to desertification, soil erosion and landslides.

We have to, therefore, adopt **scientific methods** to get **maximum benefit** from land. At the same time we should **conserve** this valuable resource to maintain its quality for present and future generations.

Resources are essential for sustenance as well as for development. But overexploitation and unplanned consumption of resources are leading to its depletion.

Conservation of resources means using resources efficiently, that are needed now, and without harming future prospects. Conservation emphasises judicious and planned use of natural resources by :

- Afforestation
- Land reclamation
- Regulated use of chemical pesticides and fertilisers
- Checks on overgrazing by animals etc.

SOIL

Soil is one of the most valuable resources. It is an **abiotic** resource that is **renewable**. It determines the quality of the land. It forms the **basis of agriculture**. It provides support and nourishment to the plants. In turn, animals and humans get food from the plants.

The thin topmost layer of the Earth's crust, made up of fine rock particles and organic matter, is termed as **soil**. Soil is a layer of unconsolidated materials at the Earth's surface. It is formed by breaking down of rock particles due to weathering and erosion. It contains humus or decayed plant and animal remnants as well as living organisms, water and air.

Layers of Soil

For a farmer, the term soil refers to the cultivated top layer only, that has a depth of upto 15 to 20 cm.

O-horizon or the topmost layer of soil is **humus**. It is composed of decayed organic matter. It is, however, lacking in dry and arid areas.

A-horizon or the **topsoil** is rich in humus and minerals. It contains most of the nutrients for plant growth. It consists of fine silt, clay and sand.

B-horizon or the **subsoil** is poor in humus, but contains minerals washed downwards by water from the upper layer. It contains gravel, clay and sand.

C-horizon is composed of weathered **parent rock**. It is dark in colour. Big fragments of the weathered

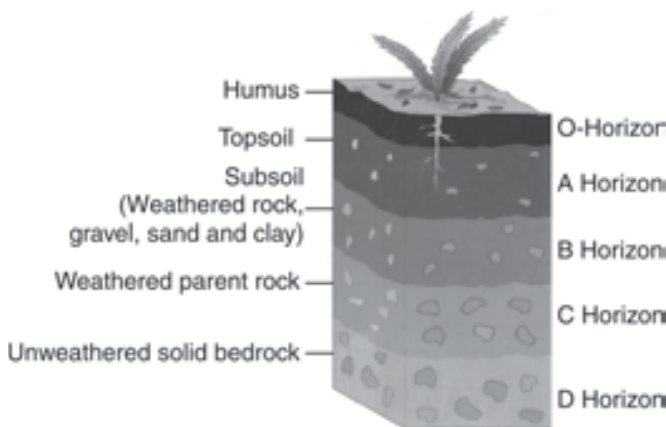


Fig. 2.4 : Soil Profile — Layers of Soil

WORDOLOGY

Weathering is the process of breaking down of exposed rocks due to changes in weather phenomenon as well as due to actions of plants, animals and humans.

rock lie in this layer. It has little or no plant and animal life.

D-horizon is composed of unweathered solid **bedrock**.

Formation of soil depends on five major factors.

- Nature of parent rock - It influences the colour and texture of the soil. It also determines chemical properties, mineral content and permeability of soil.
- Relief of the area - Altitude and slope of the land determine accumulation of soil.
- Climate - Temperature and rainfall influence rate of weathering and erosion.
- Vegetation - It determines the quantity of humus and micro-organisms in the soil. It includes flora, fauna and micro organisms found in the soil.
- Time - Usually 1000 years may pass in forming 2.5 cm of soil. Time determines thickness of soil.

The quality of soil determines the cultivation of land for crop production. Areas with rich, thick fertile soil give good agricultural production. Such soils are found in river valleys. The soil type is mostly alluvium. It is very rich in nutrients because it is renewed every year during the annual floods. The vast stretches of fertile soil make the river valleys of the Nile in Egypt, Yangtze Kiang and Hwang Ho in China, Mississippi in USA and the Indus-Ganga-Brahmaputra in India, some of the leading agricultural regions of the world.

Regions with thin **unfertile** soil are **unproductive**. Irrigation is required in such areas.

Soil is vital for the **agricultural development** of any country. In our country, where agriculture is the mainstay of the economy, quality and distribution of soil resource is of great importance. Main types of soils found in India are: alluvial soil, black soil, red soil, laterite soil and desert soil.

SOIL TYPES IN INDIA

Type	Formation	Quality	Areas	Also known as
Alluvial Soil	Riverine deposit	Most fertile	The northern plain, the Eastern coastal plains	Khadar – new alluvium Bangar – old alluvium
Black soil	Weathering of basalt rock formed from Deccan lava	Fine clayey material with good capacity to hold moisture.	North-western part of Deccan Plateau mainly Maharashtra, Madhya Pradesh, Chhattisgarh and parts of Gujarat	Regur and black cotton soil.
Red Soil	Weathering of old igneous rocks in areas of low rainfall	High iron content, needs fertilizer and irrigation to grow crops	Eastern and Southern parts of Deccan Plateau	
Laterite Soil	Leaching or seeping down of soil nutrients from upper layers in regions of high temperature and heavy rainfall	Poor quality	Fringes of the Western Ghats, Chhotanagpur Plateau and highlands of Assam and Meghalya.	
Desert Soil	Formed in arid areas	Coarse grained, dry and sandy	Arid region of Rajasthan adjoining arid areas of Gujarat, Punjab, Haryana.	
Forest and Mountain Soil	Weathering of mountain rocks	Rich in humus	Himalayan region	



Fig. 2.5 : Alluvial Soil



Fig. 2.7 : Red Soil



Fig. 2.6 : Black Soil



Fig. 2.8 : Laterite Soil



Fig. 2.9 : Desert Soil

the problem of soil erosion often plagues our land. The **destruction** and **natural removal** of the top layer of the soil is termed as **soil erosion**. The loose soil particles are blown away by wind or washed away by water. This deteriorates the quality of the soil. They lose their fertility and gradually become unfit for cultivation.

Soil erosion may be caused by natural factors like force of running water or blasts of wind.

But the main causes behind destruction of this natural resource are **faulty human activities**. Deforestation, overgrazing of pastures, overutilisation of soil, unscientific methods of cultivation, mining and construction works, all lead to severe soil erosion.

SOIL EROSION

Soil is one of the most important natural resources that helps in a country's prosperity. But

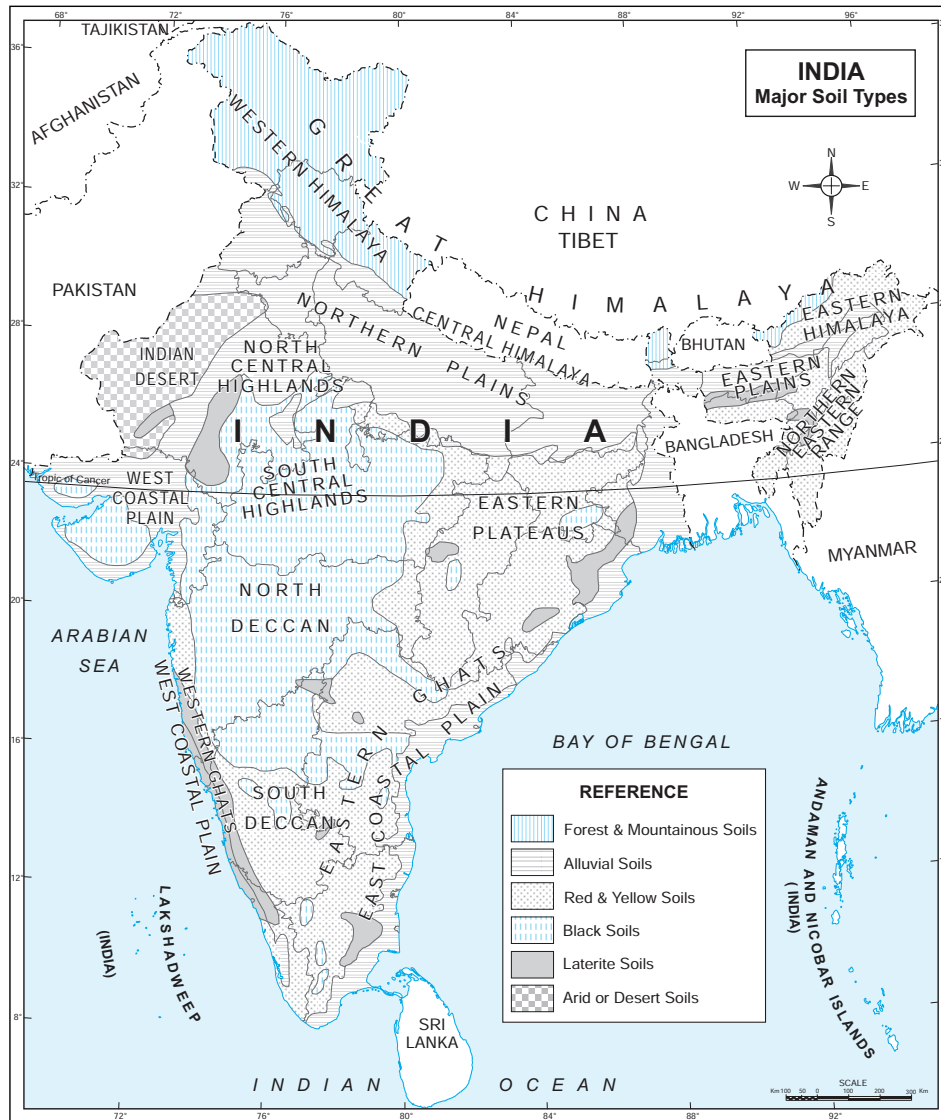


Fig. 2.10 : The distribution of soil in India

SOIL CONSERVATION

Good agricultural production is necessary for the economic prosperity of any country like India. Fertile soils help a country to attain self sufficiency in agricultural production. The wide variety of soils in India support variety of crops and provide livelihood to millions of people. It is, therefore, necessary to ensure planned management of this resource through **soil conservation**.

Soil conservation is the **protection of the soil** cover from the menace of soil erosion. Its objective is to maintain the quality of the soil by preventing its deterioration. All over the world, proper land use practices and special agricultural techniques have been adopted by the farmers as well as the government.

Some of the methods adopted for soil conservation are as follows.

1. **Afforestation** or planting of more trees can help a lot in conserving the soil. The roots of the trees bind the soil and prevent soil erosion. Increasing the existing plant cover by planting trees in a row can arrest force of the wind as well as prevent washing away of soils by water. So afforestation is possibly the best and easiest method of soil conservation.
2. **Agricultural techniques** adopted for soil conservation include.
 - (i) **Terrace cultivation** : In the hilly areas it can check soil erosion. It is a common practice in all highlands of the world. **Steps** are cut along the slope and their edges are bunded. This, apart from providing more land for cultivation, it also prevents washing away of the soil nutrients along the slope.
 - (ii) **Contour ploughing** : This involves farming along the contour lines horizontally around a hill rather than ploughing up and down the slope. This reduces the flow of water and thus checks soil erosion.
 - (iii) **Strip cropping** : This involves planting strips of grasses in between the crops to break the force of wind.
 - (iv) Planting **shelter belts** : By planting trees in a row, the force of wind can be checked. This can also prevent the spread of desert and help in disaster management in cyclone prone areas.
 - (v) **Crop Rotation** : This is done with the objective of maintaining soil fertility. Different crops are planted in rotation to successively balance soil nutrients. Planting of leguminous crops for nitrogen-fixation is common within the routine.
 - (vi) Mulching or covering the empty grounds between rows of plants with straw or other organic matter can help to retain soil moisture.
 - (vii) Creating contour barrier along slopes with rocks, stones, soil etc. checks flow of water and reduces soil erosion.

Other methods of soil conservation include:

3. **Prevention** of overgrazing.
4. **Construction of dams** to control flooding and to check soil erosion.

The most important approach to conserve soil is to make people aware of its need by distributing bulletins and training the farmers.

Points to Remember

- Land serves as a base for natural vegetation and a habitat for wildlife.
- Earth's surface comprises three main landforms, *i.e.*, mountains, plateaus and plains.
- Total land area of any country may be put to different uses, depending upon the relief.
- Conservation of resources means using resources efficiently without harming future prospects.
- Soil is an abiotic resource that is renewable.
- The destruction and natural removal of the top layer of the soil is termed as soil erosion.
- Soil conservation is the protection of the soil cover from the menace of soil erosion.

Glossary

LAND	: Solid upper crust of the Earth along with the soil.
MOUNTAINS	: Huge landmasses which rise to great heights.
PLATEAUS	: Broad elevated tablelands with height above 300 metres to 600 metres.
PLAINS	: Broad, low-lying stretches of land which have a gentle slope.
SOIL	: The thin topmost layer of the Earth's crust made up of fine rock particles and organic matter.
RIVERINE SOIL	: Soil deposited by rivers.
LAND USE	: Pattern of land utilisation.
NET SOWN AREA	: Area under cultivation in a particular year.
FALLOW LANDS	: Areas presently not under cultivation.
WASTELANDS	: Rocky, arid, desert areas and swamps which cannot be put to cultivation.

TIME TO LEARN

TASKS FOR SA

A. Multiple Choice Questions (MCQs)

- Which is the most fertile region of India?
(a) The Himalayas (b) Peninsular Plateau (c) Northern Plains (d) Desert
- Which of the following influences weathering and erosion of rocks in soil formation?
(a) Parent rock (b) Relief (c) Climate (d) Vegetation
- Total area under cultivation includes :
(a) Forest and net sown area (b) Net sown area and fallow lands
(c) Cultivable wastelands and fallow lands (d) Net sown area and permanent pastures
- Which of the following layers contains most of the plant nutrients?
(a) Humus (b) Topsoil (c) Subsoil (d) Parent rock
- Which of the following agricultural techniques can best maintain soil fertility?
(a) Terrace cultivation (b) Strip cropping (c) Crop rotation (d) Contour ploughing

B. Match the following

- | | |
|---------------------------------|--------------------------|
| 1. Wheat granaries of the world | (a) Alluvial |
| 2. Land for rearing livestock | (b) Afforestation |
| 3. Decayed organic matter | (c) Pastures |
| 4. Soil of river valleys | (d) Temperate grasslands |
| 5. Black soil | (e) Regur |
| 6. Planting of more trees | (f) Humus |

C. Fill in the blanks with the words given below :

relief features plains fixed agriculture landuse

- The _____ influence the life and economic activities of man.
- Land supports economic activities like _____.
- _____ are densely populated regions of the world.

- The pattern of land utilisation is termed as _____.
- The total land area of any country is _____.

D. Identify the following and name them :

- Abiotic, renewable resource that determines quality of land _____.
- Influences the colour and texture of the soil _____.
- Top layer of soil composed of decayed organic matter _____.
- Soils renewed every year during annual floods _____.
- Heavily leached soil _____.

E. Short answer type questions.

- How is land important as a resource?
- Why is soil an important resource of our country?
- Name the factors which determine the utilisation of land.
- Mention the characteristics of Alluvial soil and Black soil.
- What is meant by soil erosion? How is it caused?

F. Long answer type questions.

- What is soil? Describe different layers of soil.
- Explain the following :
 - Afforestation
 - Contour ploughing
- 'India has the largest percentage of its land under agricultural use.' Give reasons. **[HOTS]**
- Explain the land use pattern of India. What is the impact of the decrease of land under permanent pastures? **[Value Based Question]**
- What are the reasons for land degradation? Describe any four measures to conserve land.

TIME TO DO

TASKS FOR FA

G. Picture Study

Given below are some measures of soil conservation. Identify them and fill up the following :



(a)



(b)



(c)

Type of soil conservation :

- (a) _____
- (b) _____
- (c) _____

H. Activity

Take a large mouthed cylindrical beaker. Carefully put the following inside the beaker one by one in layers :

Layers	Material Used	Horizons of soil Profile
Bottom layer	Big pieces of rocks	
Next layer over it	Small pieces of rocks, pebbles and coarse soil	
Third layer	Smaller rocks, sand etc.	
Topmost layer	Loose soil and decomposed leaves	

By using Marker pens demarcate different layers. Fill up the column to show horizons of soil profile.

I. Survey

Observe your locality carefully and find out the following :

- (a) Major uses of the land.
- (b) Soil type of your region.
- (c) Causes of soil erosion in your locality.
- (d) Measures of soil conservation adopted.

Write a report on the above. Supplement your writing with photographs or newspaper cuttings, etc.

J. Assignment

Collect samples of soil from a river bank and a construction site in two small pots. Plant some peas or grams in each. In which soil does the plant grow better? Why?

LIFE SKILLS

In the garden of your house or around your house, create a compost pit by putting all the organic waste into it. This will gradually create one fertile patch of land.

Grow trees around it to check soil erosion by running water.