



Variation in the availability of different resources influence the lifestyle of people at a certain place. Differences in the quality of land, soil, water, natural vegetation, animals and the usage of technology leads to differences in the quality of lives at different places. Land, soil and water are the abiotic natural resources.

Land

About thirty per cent of the total area of the Earth's surface is land. However, all the land area is not usable or habitable by the humans. A dense population means that humans are using the land for agriculture, construction of buildings and roads, grazing of animals, etc. The proportion of land put to different uses is known as **land use pattern**.

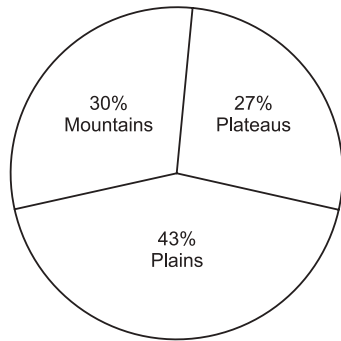
Plains and valleys offer suitable land for agriculture. Hence, these are the densely populated areas of the world. Areas having rough and uneven surface, steep slopes of the mountains, low lying areas at risk of water logging, desert areas, thick forests are sparsely populated or uninhabited. Thus, varied characteristics of land and climate are responsible for the uneven distribution of the population in different parts of the world.

Land Use

Land is used for different purposes such as agriculture, pastures, forestry, mining, building houses, roads and setting up of industries. Both natural factors and human needs for land for various purposes determine the land use pattern (type and degree of land use). **The use of land is determined by physical factors such as** topography (shape and slope of the land), soil, climate, minerals and availability of water. **Human factors** are economic well-being, technology for overcoming climate barriers, transport and communication facilities, etc. Nature of rocks like sedimentary, igneous and metamorphic rocks determine the quality of soils, minerals, etc. in the area. **Soil** is produced from weathering of rocks. Steep slopes are not favourable for agriculture



or construction of houses as such. Climate and availability of water affect the growth of the crops and habitation by animals and humans. Very few people lived on extremely cold climates of Tundra region or extremely hot and arid climates of deserts. However, the advanced technology has helped people to start living in great numbers in the snow bound cold areas of Siberia or deep inside deserts like Kuwait.



India-Land Distribution



FACT FILE

Only thirty per cent of total land area on Earth is occupied by ninety per cent of the total world population. The remaining land is either sparsely populated or uninhabited.

Countries	Percentage of area in			
	Cropland	Pasture	Forest	Other Use
Australia	6	56	14	24
Brazil	9	20	66	5
Canada	5	4	39	52
China	10	34	14	42
France	35	21	27	17
India	57	4	22	17
Japan	12	2	67	19
Russia	8	5	44	44
UK	29	46	10	16
USA	21	26	32	21
World	11	26	31	32

The **higher mountains** are populated sparsely because of extreme cold, lack of vegetation, cultivable land and transport. **Plateaus** though having a rough terrain have the fertile soil obtained from lava. The rivers contain rapids, which are used to produce hydro-electricity. Plains are rich alluvial soil brought by the rivers which is fertile. They have high density of people, easy means of transport and communication. Cheap labour is available along with raw materials and a rich consumer market.

Common land or community land or government land were called common property resources. They were used for common uses like collection of fodder or medicinal herbs. Now one has to pay to the local government institutions or forest department for such uses.

The builders have constructed housing complexes and commercial complexes in urban areas.

Today the vast changes in the land use pattern also reflect the cultural changes in our society.

Conservation of Land Resource

People and their demands are ever growing but the availability of land is limited. It has led to a large scale destruction of forest cover and now of arable land, i.e., land suitable for growing crops. Human activities for fast development without thought are leading to **land degradation**, i.e., making the land unfit for cultivation. Deforestation, overgrazing, mining and quarrying, industrial effluents, water logging and industrial dust are **main causes of land degradation**. Some of these activities lead to soil erosion and desertification and some lead to landslides also.

To check land degradation the following common methods should be adopted :

1. Afforestation (new trees should be planted, old ones protected).
2. Check on overgrazing.
3. Land reclamation (to make an area of desert, wet land etc. suitable for farming).
4. Regulated (controlled) use of chemical pesticides and fertilisers.
5. Treatment of industrial effluents and industrial dust.

Landslides

All of a sudden mass movement of rock, debris or earth down a slope is called a **landslide**. Pieces of something after it has been destroyed in an explosion, earthquake, etc. is called **debris**. While blasting for the constructions of dams or mining, the debris fall without control. Mass of soil or mud is called here **earth**. Natural landslides often take place with earthquakes, floods and volcanoes. Floods caused by heavy rainfall for long time causes heavy landslide often in the hilly terrains. Intense blasting for mining or quarrying makes the situation worst, as it weakens the zone. Heavy landslide may block the flow of a river which can wipe out the settlements down stream when the block suddenly bursts up and the mass of water flows at high speed. Landslides destroy people and property at high level.



A Landslide

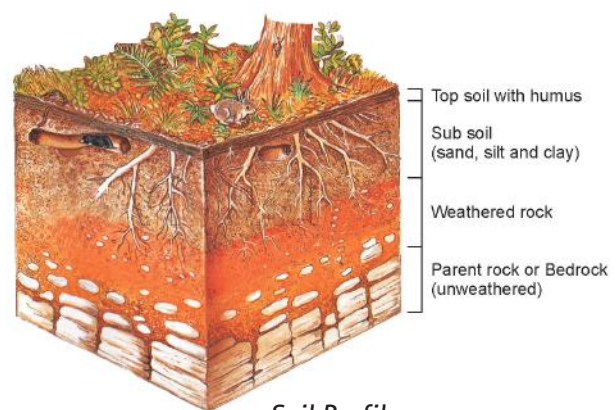
Mitigation Mechanism : Controlling a situation or making the effects of an event less unpleasant, less harmful or less serious is called mitigation mechanism or technique. Some mitigation techniques for landslides are as follows :

1. To check the intense blasting especially in the weak zone prone to landslide.
2. To avoid weak zone for building settlements.
3. To increase the vegetation cover.
4. To implement surface drainage control works.
5. Construction of retention wall to stop land from slipping.



Soil

Weathering of rocks break them into stones, gravels, sand and ultimately into clay. Sand and clay mixed in different proportions together along with organic matter form different kinds of soil. The breaking up and decay of rocks exposed to temperature changes, rain, frost, plants, animals and men is called **weathering**. The process is very very slow. It takes hundreds of years to make just one centimetre thick layer of soil.



Soil Profile

The right mix of minerals in the clay and humus (organic matter) makes the soil fertile for a certain crop. Here right mix means that the soil has the suitable elements to support the growth of a certain crop or crops.

Soil has four main layers. **Top soil** is made up of humus and finer rock particles. It has porous layers and is fertile. **Sub soil** is made up of sand, silt and clay. Rain water collects here. The third layer is composed of small pieces of **weathered rocks**. And the fourth layer, **bedrock** is composed of solid unweathered rock.

Factors of Soil Formation

1. **Parent rock** determines the colour, texture, chemical properties, mineral content and permeability of the soil.
2. **Climate** factors like temperature and rainfall affect rate of weathering, decomposition of organic material to form humus.
3. **Biomass** (flora, fauna, micro-organisms) and their remains affect the rate of humus formation. The decayed matter also increases chemical action and affects the colour and texture of the soil.
4. **Time** determines the thickness of the soil profile. Porous parent rock like sedimentary rock promotes rapid soil formation.
5. **Altitude and slope of the relief** as well as its direction with respect to sunshine and winds determine accumulation of soil. Gentle slopes favour soil accumulation while steep slopes favour soil erosion.

Types of Soil in India


Type of Soil	Area	Features	Crops grown
1. Alluvial soil	Northern plains, coastal strips and the deltas of Peninsular India. It covers 40% of the cropped area.	Light grey to ash in colour, made of sand, silt and clay. Old alluvium (bangar) in higher parts of river valley is not very fertile. New alluvium (Khadar) in lower parts of river valley is sandy, light and fertile.	Paddy (rice), wheat, sugarcane, pulses, oilseeds, etc.
1. Alluvial soil	Deccan plateau covering large parts of Gujarat, Maharashtra, Madhya Pradesh and Chhattisgarh, Andhra Pradesh and Tamil Nadu.	Moisture retentive, sticky (due to presence of clay) when wet and deep cracks dry. This aerates the soil.	Ideal for growing cotton, other crops like millets, grams, pulses, sugarcane, tobacco, groundnuts grow well, irrigation.

3. Red Soil	Eastern part of the Peninsular Plateau, Orissa, Chhota Nagpur, Chhattisgarh, Andhra Pradesh, Tamil Nadu.	Coarse, porous, does not retain moisture, not very fertile but favourable to fertilisers. It is red because it contains iron oxide.	Cowpea, red gram, black gram grow well in this soil. Wheat, rice, sugarcane, cotton grown with fertilisers and irrigation.
4. Laterite soil	Found in patches in those areas where heavy rainfall occurs, i.e., along the Western Ghats and Meghalaya.	The nutrients in the upper layer of soil are washed away by heavy rainfall. So, the soil is infertile and hard.	Coffee, rubber, cashew, tapioca.
5. Sandy soil	In deserts and on beaches.	It consists of sand grains, loosely packed. Water can easily pass through this soil, holds lot of air. So, it is coarse, loose, porous. It has little humus.	Dates, coconut, cashew nut, ground nut, watermelon, millets, maize and wheat grown with irrigation of dry farming.
6. Mountain soil	Hilly areas, particularly in depressions and valley basins or on gently inclined slopes, Jammu and Kashmir, Sikkim, Assam and Arunachal Pradesh.	Composed of sandstone, clay, shale and limestone. Lower part of the soil is calcareous and the upper part is sandy and clayey. It contains the maximum amount of humus.	Tea, coffee and medicinal plants, Many kinds of trees are found here, a variety of fruits like apples, peaches, cherries grown here.

Degradation of Soil

Soil erosion and soil depletion are the major threats to soil as a resource. The removal of the top layers of the soil on a larger scale by rain water, wind or humans is called soil erosion. Soils are also depleted at many places by deforestation, overgrazing, overfertilisation and overuse of insecticides. Soil is damaged by salinisation and water logging if it is overwatered. Landslides and running water of floods also deplete or degrade the soil. Thus, both natural and human factors lead to soil degradation. Degree of soil erosion depends on the composition and texture (coarse sandy or fine clay) of the soil, slope of the land, climate and methods of cultivation.

Water-logging : When low lying fields are overfilled with water, water



logging occurs. This brings dissolved salts to the soil surface where they collect at the roots of the plants or as a thin crust. Rapid evaporation of this water also leaves the dissolved salts in the soil. Thus, air does not reach the roots and the saline water harms the plants.

Activity : Take two boxes and fill both of them with soil. Label them as (I) and (II). Leave the soil in the box (I) bare while sow some mustard seeds in (II). Water them daily till the mustard plants grow to few centimetres height. Now place both the boxes in such a way that they are on a slope. Pour one mug of water from the same height on both of them, collect the muddy water that drains out of the two boxes in separate containers marked (I) and (II). Compare how much soil is washed out of each box. We find that amount of soil washed out in container (II) is much less compared to the amount of soil in container (I). It proves that plant roots prevent soil erosion.

Conservation of Soil

Soil conservation is an effort made by humans to prevent soil erosion and depletion and there by retain the fertility of the soil. Though it is not possible to stop soil erosion completely we can reduce the rate of soil erosion.



Terrace Farming

Besides avoiding deforestation, overgrazing, overuse of chemical fertilisers, soil conservation can be done by the following methods :

Contour Barriers : Stone, grass, soil are used to build barriers along contours (outer edges of a plot). Trenches are made in front of the barriers to collect water.

Rock Dam : Rocks are piled up to slow down the flow of water.

Mulching : Covering the bare ground between plants with a layer of organic matter like straw. It helps to retain soil moisture.

Intercropping : Growing different crops in alternate rows and sowing at different times to protect the soil from rain wash.

Terrace Farming : Slopes (terraces) are cut on the steep slopes of the hills so that flat surfaces are available to grow crops. The edges of the steps are made a little higher to keep the soil at its place. Thus, surface run-off and soil erosion is checked or reduced.

Contour Ploughing : Ploughing parallel to the contours of a hill slope to form a natural barrier for flowing water and keeping soil at its place.

Shelter Belts : In the coastal and dry regions, rows of trees are planted to check wind speed and thus reduce erosion of the soil by winds.



Contour Ploughing



Fact File

It was in the primitive oceans that life began almost 3.5 billion years back.

Water

Three-fourths of the Earth's surface is covered with water. It is therefore, called the 'watery planet'. The oceans cover two-thirds of the Earth's surface and support a rich variety of plant and animal life by water cycle. Water can neither be added nor subtracted from the Earth. Its total volume remains constant. Its quantity at places seems

to vary because it is in constant motion—cycling through the oceans, the air, the land and back again, through the processes of evaporation, precipitation and run-off. Thus, water is a vital natural resource renewable through water cycle.

Shortage in Fresh Water Supply

The ocean water is about 97.3% of the total water on Earth but it is saline and not fit for human consumption. 2.7% is fresh water. Out of which 1.9% occurs as ice sheets and glaciers in Antarctica, Greenland and mountain regions which are inaccessible for the major population because of their location. The rest about 0.8% is available and fit for human use. It is found as groundwater, as surface water in rivers and lakes and as water vapour in the atmosphere. Fresh water is, therefore, the most precious substance on Earth.

The water cycle helps us to get a regular annual supply of fresh water. Although it is a renewable source, many parts of the world are facing water scarcity.

Consumption of fresh water has increased greatly because of the increase in population. Consumption patterns have also changed. Humans use huge amount of water for drinking, cooking, washing, agriculture, industries, generating electricity (hydro, thermal or nuclear means), etc. Rising demands for food and cash crops, industrial products because of rising standards of living are the major factors leading to shortage in supply of fresh water. Because of over exploitation of ground water and lakes they are drying up (water table going down) or water pollution have caused a scarcity of water.

People consume much more water individually today than they did earlier. It is estimated that the total world consumption has almost doubled in the past thirty years.

How much water does a person need ? This varies with climate, life style, culture, tradition, diet, technology and wealth.

Table 2.2 : Water used by an average

urban Indian per day

Use	Litres per person
Drinking	3
Cooking	4
Bathing	20
Flushing	40
Washing clothes	40
Washing utensils	20
Gardening	23
Besides one dripping tap wastes many litres per day.	



Fact File

Amreli city in Saurashtra region of Gujarat was purchasing water for whole of the population (1.25 Lakhs) from the nearby talukas until water from Narmada Project reached there.

Table 2.3

World water use

Agriculture	73%
Industry	18%
Domestic	9%

Areas of Surplus Water : In the equatorial region and the tropics between 20°N and 20°S latitudes, rainfall exceeds evaporation and transpiration. This results in availability of surplus water.

Areas Deficient in Water : In both hemispheres, the subtropical regions between 20°N to 40°N and 20°S to 40°S, evaporation exceeds rainfall. So, there is scarcity of water in these regions.

Besides the above factors, rainfall is not evenly distributed over the regions and over the year. Therefore scarcity of water prevails at many places due to this factor and other factors as well. Most of Africa, West Asia, South Asia, parts of Western USA, north-west Mexico, Parts of South America and entire Australia are facing shortages in fresh water supply.

Conservation of Water Resources

Even though water is a renewable resource, its overuse and pollution have caused a scarcity of water fit for use. Discharges of untreated or partially treated sewage, agricultural chemicals and industrial effluents in water bodies are major contaminants. They pollute water with nitrate, metals and pesticides. Most of these chemicals are non-biodegradable and reach human bodies through water. They cause health hazards.



A polluted river due to sewage, industrial effluents and garbage



A Water Sprinkler

Measures for conservation of water resources are :

- 1. Save Rain Water :** (i) Plant trees and other vegetation to slow the surface run off and thus let rainwater seep down the ground.
(ii) Restore traditional ponds, tanks and lakes to store rain water.
(iii) Construct dams to store surplus flowing water of the rivers.
(iv) Store rainwater as it falls, i.e., water harvesting.
- 2. Save Irrigation Water:** (i) Line the bed of irrigation canal with bricks or concrete to check loss of water by seepage.
(ii) Use water sprinklers for irrigation to check water losses through seepage and evaporation.
(iii) Use drip or trickle irrigation through holes in a network of underground pipes in dry region with high rates of evaporation.
- 3. Save Water in Industries :** (i) Re-use water once used for cooling of pipes, for example, in power plants.
(ii) Treat the effluents suitably before releasing them in water bodies.
- 4. Save Water in Homes :** (i) Repair leaking pipes at once.

- (ii) Do not take a shower to bathe instead use a bucket of water.
- (iii) Instal water-saving taps.
- (iv) Do not wash under the running tap, instead use a mug of water.
- (v) Close the tap immediately after using.

River Valley Project : Water is stored by making dams on rivers, so that it is available in the dry seasons. An extensive network of canals is laid in the river valley. Such projects are multi-purpose as they give several benefits : irrigation to drought prone areas, control of floods, generation of electricity, providing water for domestic use, etc. However, it has been realised now that construction of large dams is an environmental threat. Smaller dams are a lesser environmental threat and they get completed faster. Minor irrigation projects like making ponds and tanks have been found more suitable for remote villages to be self-sufficient in water resources.



Key Words

- » Arable land : cultivable land.
- » Deforestation : cutting of trees in a forest on large scale.
- » Desertification : depletion of top soil to result in an empty area of land with little or no vegetation.
- » Landslide : all of a sudden mass movement of rocks, debris or earth down a slope.
- » Overgrazing : removal of grass by domestic animals on a large scale.
- » Afforestation : planting of trees on a large scale.
- » Soil : mixture of finer rock particles (sand and clay) and humus (decayed organic matter) and living organisms.
- » Soil Erosion : carrying away of the top soil by wind, water or human action.
- » Land Degradation : making the land unfit for cultivation.
- » Soil Conservation : protecting soil from erosion and depletion and efficient use of soil.
- » Water Cycle : water made available by the process of evaporation, condensation and precipitation.
- » Effluent : waste water from industries.
- » Water table : the level at and below which water is found in the ground.
- » Contour : outer edges of a plot of land.

SUMMARY

- ▶ All the land area is not usable or habitable by the humans.
- ▶ Land is used for agriculture, pastures, forestry, mining, building houses, roads and setting up of industries.
- ▶ Vast changes in the land use pattern reflect the cultural changes in a society.
- ▶ Deforestation, overgrazing, mining and quarrying, industrial effluents, water logging and industrial dust are main causes of land degradation
- ▶ Landslides take place because of earthquakes, volcanoes, flood, blasting for construction of dams or mining.
- ▶ Sand and clay mixed in different proportions together along with organic matter form different kinds of soil.
- ▶ Soil has four main layers — top soil, subsoil, weathered rock, bedrock.
- ▶ Factors of soil formation are parent rock, climate, biomass, time, altitude and slope of the relief.
- ▶ Types of soil in India are alluvial, black, red, laterite, sandy and mountainous.

- ▶ Soil degradation is caused by deforestation, overgrazing, over fertilisation, overuse of insecticides, water-logging, landslide, etc.
- ▶ Soil can be conserved by making contour barriers, shelter belts, rock dams, terrace farming, contour ploughing, etc.
- ▶ Only about 0.8% of the total water on Earth is the fresh water available and fit for human use.
- ▶ Even though water is a renewable resource, its overuse and pollution have caused a scarcity of water fit for use.
- ▶ Measures for conservation of water include afforestation, water harvesting, construction of dams, restoring ponds, tanks and lakes, using water sprinklers or drip irrigation, treating effluents and using a mug or bucket of water instead of running tap or shower.

Exercise Time

A. Tick (✓) the only correct choice amongst the following :

1. This soil is ideal for growing cotton
 a. Red b. Sandy c. Mountainous d. Black
2. Which one is most appropriate to check soil erosion on steep slopes?
 a. Mulching b. Shelter belts c. Terrace farming d. Intercropping
3. Maximum fresh water is used for
 a. domestic b. industries c. agriculture d. drinking
4. 1.9% of the total water of Earth is contained in
 a. ice sheets and glaciers b. rivers, ponds and lakes
 c. forests d. deserts
5. Which one of the following is not in favour of the conservation of natural resources?
 a. close the tap immediately after using b. switch off the bulb when not in use
 c. line the bed of canals with bricks d. dispose polypacks after shopping

B. Fill in the blanks :

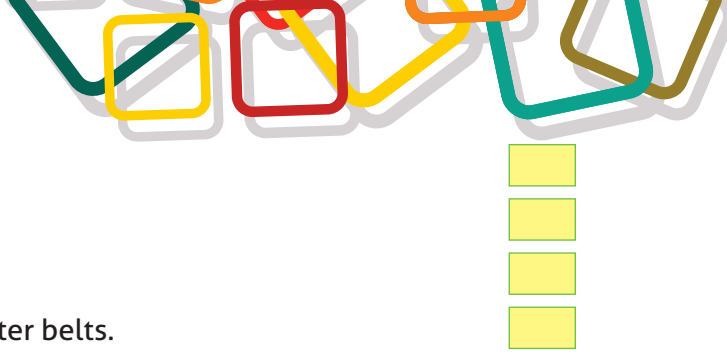
1. River valley are densely populated because they are suitable for _____.
2. Land is used for different purposes like _____ and _____.
3. Overirrigation leads to _____ and _____.
4. _____ per cent of water on the Earth is found in oceans and only _____ is fresh water.
5. _____ is produced from weathering of rocks.

C. Match the Following :

- | | |
|---------------------|--|
| 1. Arable land | a. prevent soil erosion |
| 2. Rock dams | b. rich alluvial soils brought by rivers |
| 3. Humus | c. land suitable for agriculture |
| 4. Plains | d. making the land unfit for cultivation |
| 5. Land degradation | e. organic matter in the top soil |

D. Write true (T) or False (F) against the following statements in given brackets :

1. River valleys are densely populated regions. □

- 
2. Afforestation is a technique of soil erosion.
 3. Water availability per person in India is declining.
 4. Black soil is ideal for growing wheat.
 5. Rows of trees to check the wind speed are called shelter belts.

E. Define the following terms :

1. Soil
2. Land degradation
3. Mitigation
4. Mulching
5. Soil conservation
6. Water conservation

F. Answer in one word or one phrase :

1. Name the sources of the Earth's fresh water.
2. What from the soil is formed ?
3. What is called cutting of forests on a large scale ?
4. Which dams have lesser environmental threat ?
5. What is the layer of the soil with humus called ?

G. Answer these question briefly :

1. Why is land considered an important resource? Why do we call it a limited resource ?
2. What are the main factors that determine the land use pattern and its change ?
3. What are the five main factors that control soil formation ?
4. What is soil erosion ? What are its factors ?
5. What are the causes of land degradation ?

H. Answer these questions in detail :

1. Describe the causes of land degradation. How can we prevent it ?
2. What is a landslide ? How is it caused ? How can its effect be made less serious ?
3. Describe the features of different kinds of soil.
4. What does soil consist of ? Describe its various layers.
5. What are the four major ways in which soil resource can be conserved ?

PROJECT WORK

1. Observe the land, type of soil and availability of water in your region. Make a table to show how it has influenced the life of people there.
2. Make clay models to show terrace farming.
3. Assess how much water you use in a day individually and as a family. Compare this monthly consumption of your family with the monthly water bill.
4. Make a project on the various types of soil in India.