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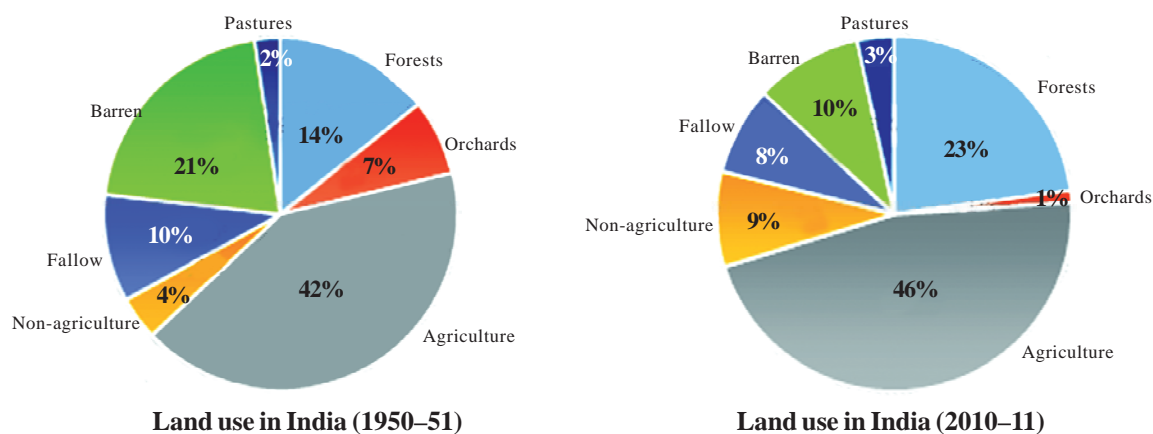
Land Resources

Among our natural resources, land is the most important resource. We use land for agriculture, livestock rearing, mining, industries, transport, habitation, etc. Who owns the land? Is it being used judiciously and sustainably? Is it being properly conserved or is it being degraded? These are questions we need to think about and understand.

2.1 Land use in India

Every country or province uses its land in different ways. Some land is farmed, some is used to build urban habitations, some is used for industries and some is covered by forests. Land use is the way the people of a country or province use their land. Land use keeps changing with time.

India's total geographic area is 32.8 lakh sq. km. Only 93 percent of this land has been surveyed for land use. The two diagrams below explain land use in the whole country and the changes in land use since independence.



Pie Diagram 2.1: Land Use in India

Forests: Land with abundant vegetation is called forests. Forests are a source of fuelwood, timber, roots and tubers, wild fruits, medicines, fodder etc. In the last 60 years, India's forest land increased from 14 percent to 23 percent. But this increase continued only up to 1970-71. Since then, the area under forests has remained more or less constant.

When we use the term 'forest land', we need to remember that the term refers to land that should be used as forest. But this does not mean that all this land has standing forests. For example, in 2010,

forest land totalled 23 percent but the land actually under forest cover totalled only 19.05 percent. The government undertakes afforestation on forest land that does not have standing forests at present.

Forests provide us with produce like timber, but the value of forests is much more than the produce they provide. Plants absorb carbon dioxide from the atmosphere and release oxygen during photosynthesis. This process helps to maintain the carbon dioxide content of the atmosphere. It also replenishes the oxygen content that is essential for human and animal respiration. A stable oxygen-carbon-di-oxide balance helps to stabilize atmospheric temperature. That is why forests are so important for our survival. Forests also help us to conserve our water sources and are a habitat for wildlife. Loss of forests endangers our air, water resources, plants, and animals.

At least 33 percent of the country should be under forest cover to ensure environmental stability. But in 1987, only 19.49 percent of India's land was under forests. After intensive efforts, the total acreage of forest land increased to 21.23 percent in 2013. Forest cover varies from state to state. Chhattisgarh is among the states with high forest cover. 41.75 percent of its area is under forests. In contrast, Uttar Pradesh has just 5.7 percent and Odisha has 31.36 percent under forests. The north-eastern states such as Nagaland, Manipur, Mizoram, Meghalaya etc. have the maximum forest cover, ranging from 70 percent to 83 percent.

Seema says that if we cut our forests there will be no timber left for our future generations to construct houses or make furniture. Julia feels that the biggest impact of cutting forests will be on the earth's climate. In your opinion, which of these two views is more correct? Give reasons.

From the environmental point of view, why is Chhattisgarh important for India?

In the previous class, you read about the Gangetic plains. What could be the reasons for Uttar Pradesh having only 5.7 percent forest cover and what is its impact?

Orchards: This category includes land covered by fruit-bearing trees. Over the last 60 years, orchards in India have been steadily cleared to make way for agricultural land. Thus, land under orchards decreased from 7 percent to 1 percent during this period.

Agricultural land: A large share of our country's land is under agriculture. The majority of India's population is employed in agriculture, which provides us with food-grain and raw material for industries. In 1950-51, 42 percent of our land was agricultural land. Today, it is 46 percent. The area under agriculture has been more or less stable since 1970. Due to the expansion of irrigation, two - and sometimes three - crops are cultivated on the same land. But only 38.75 percent of our agricultural land is irrigated and can be multi-cropped.

Non-agricultural land: This includes all land that cannot be used for agriculture or is used for non-agricultural purposes. It includes snow-capped mountains, sand dunes, houses, shops, industries, roads, railways, markets, playgrounds, rivers, dams etc. Industrialization, urbanization and the growth of transport has increased land use under this category from 4 percent in 1950-61 to 9 percent in 2010-11. Today, there is growing demand to acquire agricultural land for industrialization and urban development. What type of land should be acquired for such purposes? What is the right compensation

for such acquisition? These questions are a matter of national debate. If fertile, multi-cropped land is acquired, there is bound to be a negative impact on food-grain production and the country's food security. It is, therefore, important to acquire only less fertile land for non-agricultural uses. How much compensation should farmers be paid for land acquired from them? This question is also a matter of national debate. Changing land use makes acquired land many times more expensive. But farmers are compensated only on the basis of agricultural land prices. They, thus, do not benefit from the enhanced value of land.

Fallow land: Farmers often leave their less fertile land fallow so that the land can recoup its fertility. Fallow land can be divided into two categories - current fallow and old fallow. Current fallow is land that has been left cultivated for one year. This is usually done so that the soil can accumulate humus, which improves land fertility. Old fallow includes land that has been left uncultivated for more than a year. If old fallow is not brought under plough, it is counted as barren land. About eight percent of India's land is fallow.

Barren land: This includes two types of land. One is land with minimal possibility for agriculture. This includes rocky, hilly land, ravines etc. The other is land that can be improved through soil and moisture conservation work for forestry and agriculture. This includes land that was earlier under agriculture but is now barren. These lands can be developed to meet the needs of India's increasing population. Barren land has decreased from 21 percent to 10 percent over the last 60 years because such land is now being increasingly used for non-agricultural purposes, modern agriculture and afforestation.

What is the difference between fallow and barren land? What is their relevance in development projects?

Pasture land: This includes all land under permanent pastures and all kinds of grazing lands. These lands are for common use by the people. They are used to graze livestock and to collect fuelwood. The area under pasture in India increased between 1950-51 and 1970-71 but then decreased over the past 40 years. The decline in pasture land affects the poorest people the most because livestock rearing and agriculture are their main sources of income. The main reason for the decline in pastures is encroachment by powerful farmers and conversion of such land for alternate uses.

Have pasture lands in your area decreased? What could be the reasons for this decrease? Are urban and rural populations affected in the same way by the decrease?

Activity

Make a bar diagram to depict the different kind of land use in your village.

2.2 Land acquisition by the government

The government has the right to acquire private land or village land for public use after paying adequate compensation. The government can legally obtain land for building roads, railways, airports, mines, industrial area, hospitals, offices, dams etc. These projects often require very large tracts of land. At times, people living in a large number of villages get displaced. As we have read before, fixing the compensation for the people affected by a project is still a matter of national debate. In 2013, the Indian

Land Acquisition Act 2013

- Along with land acquisition, the act provides for rehabilitation and resettlement of the displaced people.
- The consent of at least 80 percent of the displaced people is necessary in cases where the land is meant for use by private companies or private-public partnership companies.
- The act covers the landowners among the families affected by displacement and land acquisition as well as all those who depend on the acquired land for their livelihood, such as labourers, sharecroppers, cattle grazers, adivasis, etc.
- Irrigated and multi-cropped land can be acquired for non-agricultural use only under very special circumstances.
- A social and environmental impact study of the changed land use has to be conducted before the land is acquired.
- Landowners and others will be given fair and adequate compensation.
- The land cannot be used for purposes other than that for which it is acquired. If the land is not utilized within five years of acquisition, it will be returned to the original owners.
- The ownership of the land cannot be transferred without the permission of the government.

parliament passed a legislation called the Land Acquisition Act 2013. The main points of this act are given below. Discuss them with your teacher.

as well as government officials have been complaining that the act makes it very difficult and expensive to acquire land.

A problem for discussion

Neemganj is a village with irrigated land where farmers grow three crops a year. A plan has been proposed to set up an industrial hub and a township in the village. It requires acquisition of the village land. The village has landowning farmers, many landless labourers and small traders. The project endangers their livelihoods. Some of them oppose the project. Some hope to use the new Land Acquisition Act 2013 to their advantage. Discuss the main provisions of the act and decide what the villagers should do and what approach they should adopt.

2.3 Soil

When we talk about land resources, the focus is generally on the soil and its fertility. Soil is the most important component of land resource. It is the thin top layer of earth in which vegetation grows. Soil is formed by the weathering of rocks. Temperature variations and vegetation play an important part in

this process. Over time, water and temperature fluctuations gradually break the rocks into smaller pieces. The fine particles of rock mix with the remains of plants and animals. Over a long period of time, this mix gets converted to soil.

Plants get their nutrition from the soil. Animals and other living creatures depend either directly or indirectly on plants for their food. Apart from its role in providing nutrition to living things, soil is also used for making bricks, utensils, toys, tiles etc. Most rural houses have walls and floors plastered with soil.

If you observe the foundation of a house or a well while it is being dug, you can see that the soil is spread in layers. These horizontal layers are called soil horizons. These horizons can be divided into three parts: organic layer, mineral layer and bedrock layer. Look at the picture below. The bottom layer is the bedrock layer, which is also called the R layer. Soil is formed by the weathering of rocks that form this layer. Above the bedrock layer are the C (substratum), B (subsoil), A (surface) and O (organic) layers respectively.

Organic layer: This is the topmost layer in which O and A are included. The O layer contains humus, which is the decomposed remains of plants and animals. Below this is the A layer, which is the mineral layer. The A layer is influenced by the O layer, which is why it is also rich in organic material. The thickness of the organic layer varies greatly. It is thickest in the lower areas of river valleys. Agricultural activities take place in the organic layer, which is the layer where all other forms of vegetation grow. This is why the organic layer is very important. But it is also the layer that is most affected by erosion. It is also affected by the pesticides used in agriculture and other wastes that settle in it.

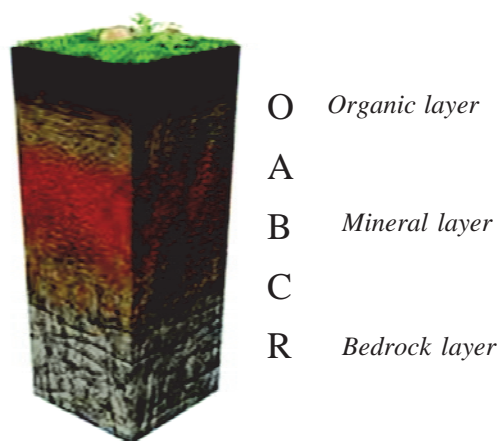


Figure 2.1: Soil horizons

Mineral layer: This middle layer consists of the B layer. It contains very little organic matter. The particles in this layer are also much larger than the soil particles in the organic layer. The roots of only those plants reach this layer that go deep. For example, the roots of a tomato plant remain in the organic layer, but those of a mango tree reach the mineral layer.

Bedrock layer: This is the lowest layer and includes the C and R layers. R is the lowest layer consisting of unweathered rock, which break up to form the C layer that consists of broken rocks.

Soil distribution in India

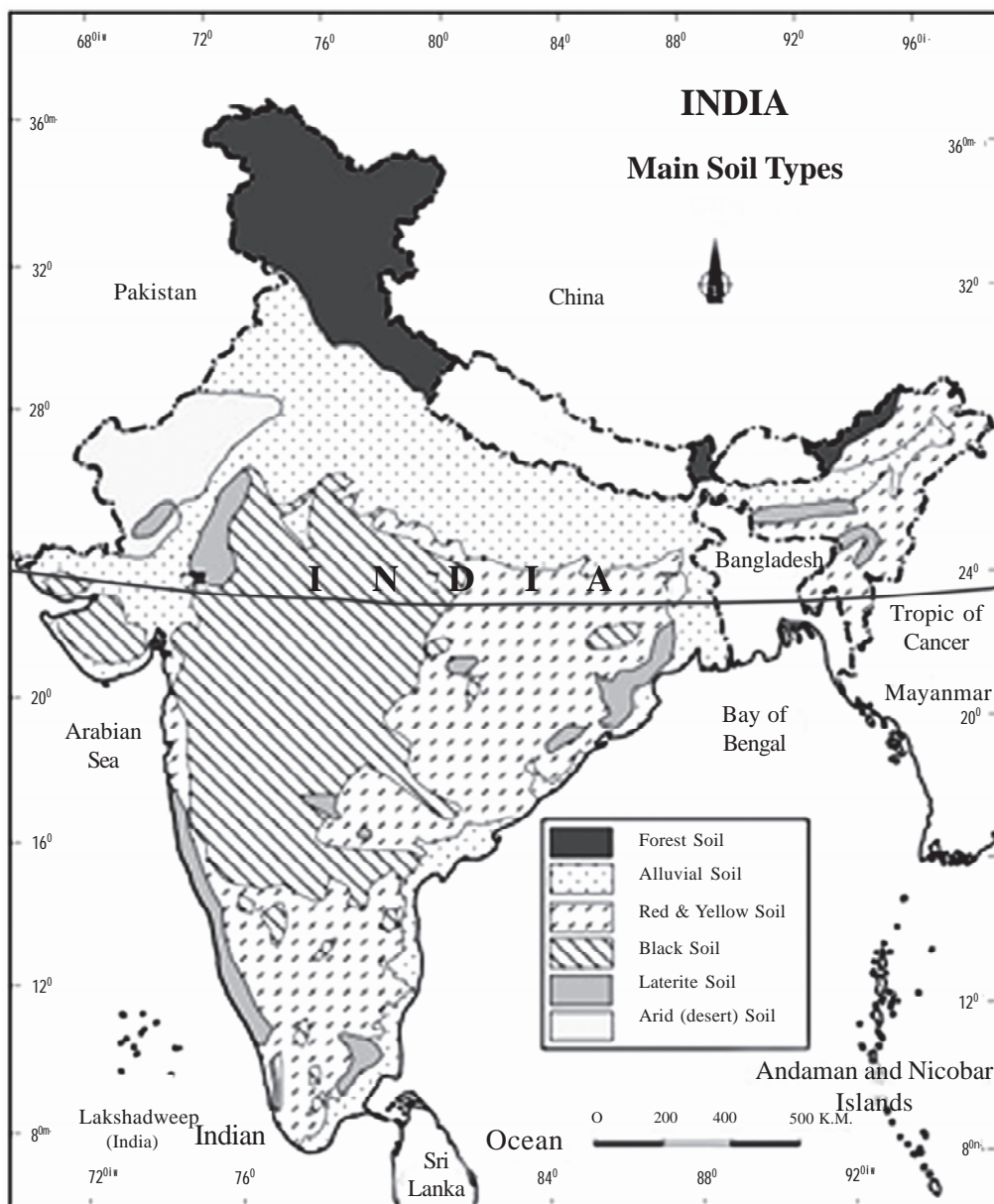
Six types of soil are commonly found in India. The main soil type is the alluvial soil that spreads across the river plains. This soil is very fertile and most suitable for agriculture.

Most of Chhattisgarh's land area is covered by red and yellow soil. Red soil is formed by the weathering of ancient metamorphic rocks in the Deccan Plateau. It gets its red colour from its high iron oxide content. The yellow colour comes from the hydration of soil chemicals.

Black soil is found in India's western states. This soil is suitable for cultivating cotton, wheat etc. Black soil is made of very fine particles that have a very high moisture retention capacity.

Laterite soil is found in the states where the monsoon rains are heavy. This soil develops in areas that experience high temperatures and high rainfall. The heavy rains leach (wash away) the fertile elements from the soil. The humus content of this soil is also low, which is why large quantities of fertilizers are needed to grow crops.

Other soils include the dry or desert soil found in the Thar Desert and the forest soil of the Himalayan ranges.



Map 2.1: Distribution of soil types in India.

Study the map and answer the following questions:

1. What are the main soil types found in India?
2. In which states of India do we find forest soil? What are the main geographical features of the states with forest soil?
3. Where in India do we find desert soil? What is the other name for desert soil?
4. Which type of soil covers most parts of Chhattisgarh?
5. Which type of soil covers the least area in India?
6. Read the chapter on human resources and find out the soil types of the state with the highest population density.

2.4 Land degradation and conservation

We have inherited our land from our ancestors. We need to hand over this land to the next generation in good condition. Humans can improve or degrade land through their activities. How do we assess the quality of land? One measure could be how much vegetation or animals the land can support sustainably. This capacity will vary from place to place. It cannot be same for a desert and an evergreen forest. When this capacity of the land to support life decreases, we say the land is degraded. For example, if the land is covered by sand after a flood, no vegetation grows. This land is degraded because plants and animals cannot get their nutrition from it like they got earlier before the flood.

Human activities can lead to land degradation in many ways. When we plough dry land or land with a high gradient (steep slope), the wind, and water erodes the loosened soil, leaving behind only large-sized particles and pebbles. The land then becomes unfit for pasture or agriculture.

You read the example of the Rajasthan canal in the previous lesson. Desert sub-soil has a high salt content. Canal irrigation in a desert area causes the salts to dissolve in the water and rise to the top to form a hard crust over the soil. Plants cannot grow on this crust. This is also an example of land degradation. In Punjab, Haryana and western Uttar Pradesh large tracts of agriculture land are irrigated. Flood irrigation causes water-logging, which leads to salinization of the soil.

In the dry areas of Gujarat, Madhya Pradesh and Maharashtra, excessive grazing is the main cause of land degradation. Grazing more livestock than the land can support destroys not just the grass and other vegetation, but also exposes the soil, which gets degraded because of wind erosion.

In open-cast mining, the top soil is removed and a large pit is dug to extract minerals. After the mining operations end, the land has large pits with debris strewn all over. It is unfit for agriculture or any other use. This is another example of land degradation. Mining is one of the main causes of degradation of forest land in Jharkhand, Chhattisgarh, Madhya Pradesh and Odisha.

Another way in which land is degraded is by grinding limestone for the cement industry and talc for the clay pottery industry. Huge amounts of fine dust particles are carried by the winds and settle on nearby land. This particle layer prevents the soil from absorbing water.

In the last few years, the discharge of contaminated water by industries has also caused water and land pollution in various parts of India.

It is estimated that about 13-19 crore hectares of land in India are currently degraded. Of this, around 28 percent is degraded forests, 56 percent is water eroded, and the rest is wind eroded or saline. About 4.8 lakh hectares of land is degraded in Chhattisgarh. This is 35 percent of the state's total land area. The cause of degradation is mostly water erosion and acidification of soil, which affects crops. Acidification can be controlled by adding lime to the soil. In Durg, Janjgir, Korba and Raipur districts, mining has caused land degradation.

There are many ways of tackling land degradation. Afforestation and pastures can address the problem to some extent, especially on land that is no longer suitable for agriculture. Similarly, ensuring proper irrigation according to the water-holding capacity of the land can help prevent waterlogging and salinization.

2.4.1 Land degradation and poverty

The poorest people in the country depend on degraded land. They either rear livestock on the land or are marginal farmers and tribes who practice subsistence agriculture. They have no other livelihood options, so they continue to farm poor quality, infertile land. This causes the land to degrade even further. But because of their poverty, these farmers cannot take up measures to improve their land. They find themselves trapped in a vicious cycle of poverty and land degradation. That is why it is important for the government to take up the responsibility to improve and conserve degraded land.

Are the poor responsible for land degradation or are they the victims of degradation?

What role can land conservation play in poverty reduction?

2.4.2 Land management

Land is a fixed resource while population keeps growing. Our needs also keep increasing as our lifestyle evolves. More and more people from the villages are migrating to urban areas. This affects our land resources. Migration leads to the rapid expansion of urban areas. Colonies and factories are built on fertile, cultivable land while forests are cleared for agriculture and mining. All these lead to stress on our land use. It is important that land is properly managed and put to proper use. The following methods can be adopted to ensure good land management:

1. Planned development of towns and villages: Our villages and towns are growing and encroaching upon agricultural land. Unused land is also available within urban areas so if there is proper planning to develop towns and villages, this problem can be handled better.

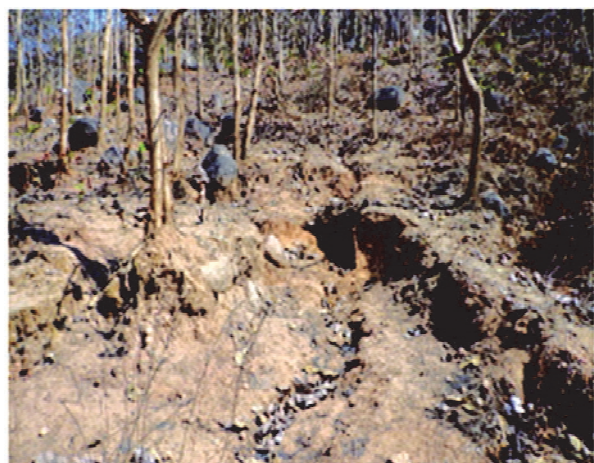


Figure 2.2: Soil erosion

2. Use of barren land: Barren land can be used in two ways. First it can be used for non-agricultural activities. The second option is to improve the land for agriculture or pasture development. This will help to expand the acreage under agriculture while reducing the extent of wastelands.

3. Use of fallow land: Fallow land, especially old fallow, can be used for agriculture or horticulture. This will help improve productivity.

4. Forest conservation and afforestation: Forests are a resource that take many years to regenerate. So forests should be used in a planned and systematic manner. Fully grown trees should be harvested only to the extent that they can be replaced. 23 percent of India's land is forested. The area under forests needs to be expanded to maintain the environmental balance.

5. Controlling soil erosion: Erosion, waste deposition and the use of chemical fertilizers and pesticides are leading to soil depletion. This reduces the fertility of the soil and decreases the productivity of agricultural land. Hence, controlling soil erosion, etc. will help increase in productivity.

6. Using land around our homes: Quite a lot of land lies unused outside homes in villages and urban neighbourhoods. This land can be put to productive use. For example, it can be used for cultivation of seasonal plants and vegetables.

EXERCISES

Choose the correct alternative in the following:

1. We eat food daily. On what kind of land is most of this food grown?
 - (a) Agricultural land
 - (b) Forest land
 - (c) Barren land
 - (d) Fallow land
2. Which layer of soil is most important for agriculture?
 - (a) C and R
 - (b) C and B
 - (c) O and A
 - (d) A and B
3. Which layer of soil is the first to be damaged by erosion and pesticide use?
 - (a) Organic layer
 - (b) Mineral layer
 - (c) Bedrock layer
 - (d) All the above layers
4. Which type of land is most suitable for industries?
 - (a) Forest land
 - (b) Agricultural land
 - (c) Orchards
 - (d) Barren land
5. Is land management:
 - (a) essential
 - (b) not essential
 - (c) sometimes essential

Answer the following questions:

6. How will the absence of soil impact our lives?
7. What will happen if agricultural land decreases?
8. What is the difference between current fallow and old fallow?
9. What are the human factors in land degradation?
10. The table below lists the names of some professions. How is soil used by these professions Fill the details in the table.

S.No.	Trade	How they use soil
1	Potter	
2	Farmer	
3	Idol maker	
4	Industrialist	
5	Rural houses	

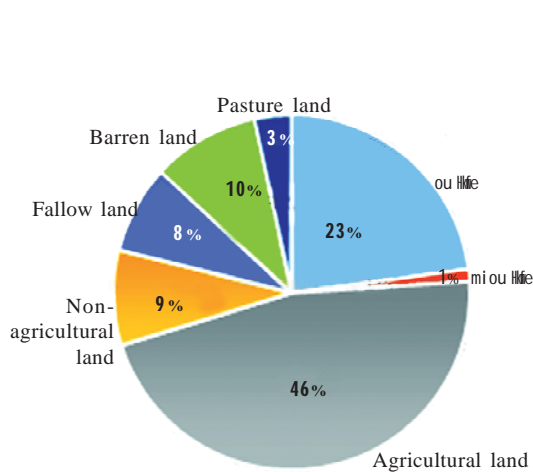
11. Study the data in the table and answer the following questions:

Land use	1950-51		1970-71		1990-91		2010-11	
	In lakh hectares	%	In lakh hectares	%	In lakh hectares	%	In lakh hectares	%
Forest land	405	14	639	22	678	22	700	23
Orchards	199	7	43	1	38	1	33	1
Agricultural land	1,187	42	1,403	48	1,430	42	1,416	46
Non-agri. land	112	4	165	6	211	7	265	9
Fallow land	281	10	199	7	234	8	246	8
Barren land	592	21	357	12	344	11	297	10
Pasture land	67	2	133	5	114	4	103	3
Total land use	2,843	100	2,938	100	3,049	100	3,060	100
Data not available	444		349		238		227	
Total area	3,287		3,287		3,287		3,287	

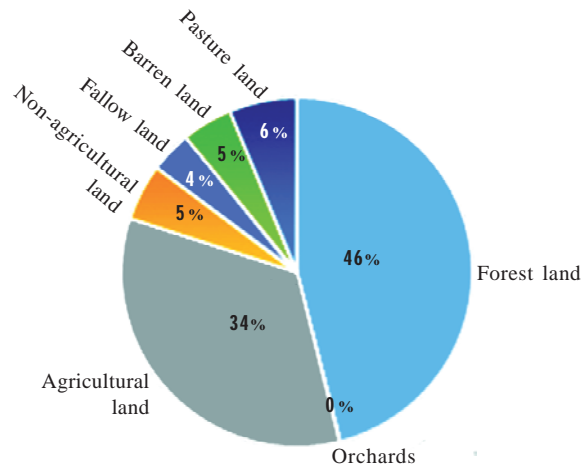
- a) Which type of land area has been steadily decreasing over the years?
- b) Which type of land area has been steadily increasing over the years?

- c) Why is the acreage of non-agricultural land increasing?
- d) Is data available for all the land in India? What have been the significant changes in land use between 1950-51 and 2010-11?

12. The pie-chart below depicts land use in India and Chhattisgarh. Study the chart and answer the following questions:



Land use in India (2010-11)



Land use in Chhattisgarh (2010-11)

- a) Which soil type has the maximum share in Chhattisgarh's total land acreage and which type has the least share?
- b) Which soil type accounts for almost half of Chhattisgarh's total land acreage?
- c) Which soil type has the maximum share of Chhattisgarh's total land acreage?