

**9****DEFORESTATION**

In the previous lessons you have learnt about environment, its components and various ecological concepts. You have also acquainted yourself with natural ecosystem and man-made ecosystems. Humans have altered the ecosystems according to their own needs without thinking about the consequences. Their need combined with greed have caused much damage to the environment, which will affect the coming generations. The expansion of agriculture, urbanization and industrialization needed the land which was obtained by large scale clearing of forests. The deforestation has changed the scenario of developed and developing countries, and has brought out vast changes resulting into a various environmental problems. In this lesson you are going to study about deforestation, its causes and effect on environment.

**OBJECTIVES**

After completing this lesson, you will be able to:

- *define forest and describe the shrinking of forest cover throughout the world;*
- *explain the various causes of deforestation;*
- *give examples of exploitation of forest resources;*
- *define biodiversity, give reasons for its rapid decline, express concern about the consequences of biodiversity loss;*
- *relate the fast depletion of wildlife and explain the concept of endangered, threatened and exotic species and other forest resources due to deforestation;*
- *describe how deforestation is contributing towards soil erosion, flash floods and change in climate;*
- *describe the impact of deforestation on tribal communities;*
- *define desert and explain the causes of desertification; and give examples of desertification in India;*
- *identify the consequences of desertification.*

**Notes****9.1 FORESTS**

Forests are ecological as well as a socio-economic resource. Forests have to be managed judiciously not only because they are source of various products and industrial raw materials but also for environmental protection and various services they provide.

Approximately 1/3rd of the earth's total land area is covered by forests. The forests provide habitat for wildlife, resources such as timber, fire wood, drugs etc. and aesthetic environment. Indirectly, the forests benefit people by protecting watersheds from soil erosion, keeping rivers and reservoirs free of silt, and facilitate the recharging of groundwater. Forest plays an important role in the cycling of carbon, water, nitrogen and other elements.

What is forest? Forest is a complex ecosystem consisting mainly of trees that support a myriad forms of life. The trees are the most important component that help to create a unique environment which, in turn, supports various kinds of animals and plants. Trees are the prime producers for the forest, purify and cool the air and control the climate.

Forests may be subdivided into natural forests and plantations or man made forests. Natural forests are forests composed of mainly naturally grown indigenous (local) trees while plantations are forests established by growing trees by humans.

Climate, soil type, topography, and elevation are the main factors that determine the type of forest. Forests are classified according to their nature and composition, the type of climate in which they thrive, and its relationship with the surrounding environment. India has a many types of forests: They range from rain forest of Kerala and North-East to deciduous forests in the plains, mountain forests to alpine pastures of Ladakh and deserts of Rajasthan.

9.1.1 Types of Forests

You have already studied the details of the major types of forests in India in lesson- 6.(Recall Fig.6.2 of lesson-6)

9.1.2 Importance of Forests

Early life of humans on this planet began as forest dweller. In early days human were totally dependent on forest for food, clothing, and shelter. Even after agriculture was started humans remained dependent upon the forests for several of their needs. The source of fuel wood and provide raw materials to various wood industries. Indian forests also provide many other valuable minor products such as essential oil, medicinal plants, resins, turpentine etc. Forests are renewable resources which provide a wide variety of commodities. Forests satisfying aesthetic needs of humans and have been a source of inspiration for the development of culture and civilization. Forests are home to a very large variety of plants, animals and micro-organisms. This great richness of flora and fauna which has evolved



over the years is an important part of nature. Forests provide habitat and food as well as protection to wildlife species against extremes of climate.

Forests have great biological importance as reservoirs of genetic diversity apart from playing an important role in regulating earth's climate.

Forest carry out many important vital functions given in the following tables.

Table 9.1: Main functions of the forests

Functions	Benefits
Productive functions	Production of various types of wood, fruits and a wide range of compounds such as resins, alkaloids, essential oil, latex and pharmaceutical substances.
Protective functions	Provides habitats for various organisms conservation of soil and water, prevention of drought, shelter against wind, cold, radiation, noise, sounds, smells and sights.
Regulative functions	Absorption, storage and release of gases (most importantly carbon dioxide and oxygen), water, minerals, elements and radiant energy. All such functions improve the atmospheric and temperature conditions and enhances the economic and environmental value of the land .Forests also effectively regulate floods and drought and all the biogeochemical cycles.

• Timber

India and other tropical countries have particularly abundant timber and heartwood resources. Timber accounts for 25% of all photosynthetic materials produced on the earth and about half of the total biomass produced by a forest. A large number of trees are commercially exploited for timber in different parts of India. Timber-based industries include plywood manufacture, saw milling, paper and pulp, composite wood, matches, man-made fibres, furniture, sports goods, and particle boards.

• Medicinal plants

About 40% of all the drugs used throughout the world have active ingredients extracted from plants and animals. Drugs which are derived from natural compounds amount to at least \$40 billion worldwide sales annually. For example quinine is used to treat malaria (from the cinchona tree); *Digitalis* is used to treat chronic heart trouble (from the foxglove plant, *Cinchona officinalis*); and morphine and cocaine are used to reduce pain; drug for leukemia from *Vinca rosea*, taxol from *Taxus brevifolia* etc; and hundreds of life saving antibiotics. In recent years more than 5000 species of flowering plants have been analysed by scientists for the presence of valuable drugs.

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Asprin, which is probably the world's most widely used drug was developed according to a chemical "blueprint", from a compound extracted from the leaves of tropical willow trees.



INTEXT QUESTIONS 9.1

1. Make the list of plants used for medicinal purposes along with the botanical names and the disease for which they are used.

2. What are the main functions of forests?

3. List various timber based industries.

9.2 DEFORESTATION

Deforestation is a very broad term, which consists of cutting of trees including repeated lopping, felling, and removal of forest litter, browsing, grazing and trampling of seedlings. It can also be defined as the removal or damage of vegetation in a forest to the extent that it no longer supports its natural flora and fauna.

The rapid rate of deforestation in the tropics is a key driving force in the yearly increase of flood disasters.

Deforestation refers to the loss of tree cover; land that is permanently converted from forest to non-forest uses such as agricultural pasture, desert, and human settlement.

In the beginning of 20th century about 7.0 billion hectares of forests were present over the land of our planet and by 1950 forest covers was reduced to about 4.8 billion. If the present trend continues forests will be reduced to only 2.35 billion ha hectares in 2000 A.D. In a FAQ/UNEP study it was found that about 7.3 million hectares of rich tropical forests every year and about 14 hectare of closed forest every minute are lost.



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Table 9.2: Forest cover as per 2001 assessment

Class	Area (km ²)	Percent of geographic area
I. Forest Cover		
a) Dense	416,809	12.68
b) Open	258,729	7.87
Total Forest Cover*	675,538	20.55
II. Non-forest		
Scrub	47,318	1.44
Total Non-forest**	2,611,725	79.45
Total Geographic Area	3,287,263	100.00

*includes 4,482 km² under mangroves (0.14 percent of country's geographic area)

**includes scrub

Forest Cover Assessment 2001

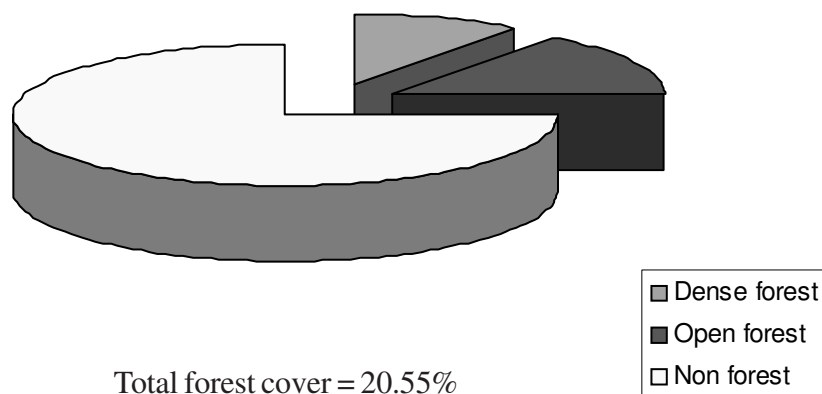


Fig. 9.1: Forest cover in India

9.2.1 Extent of forest loss in India

India is an agricultural country. The country is losing its forest cover steadily because of clearing forests of is done for agricultural purpose, cattle grazing and plantation crops such as tea, coffee etc.

Deforestation is one of the most serious and widespread environmental problems which India is facing. In India surveys conducted in early seventies and found a forest cover of about 22.7% only instead of 33% considered desirable according to “National. Forest Policy”.



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Soon after independence, rapid development and progress saw large forest tracts fragmented by roads, canals, and townships. There was an increase in the exploitation of forest wealth. In 1950 the Government of India began the annual festival of tree planting called the Vanamahotsava. Gujarat was the first state to implement it. However, it was only in the 1970s that greater impetus was given to the conservation of India's forests and wildlife. India was one of the first countries in the world to have introduced a social forestry programme to introduce trees in non-forested areas along road sides, canals, and railway lines.

9.3 CAUSES OF DEFORESTATION

The most common reason for deforestation is cutting of wood for fuel, lumber and paper. Another important cause relates to the clearing of forest land for agriculture, including conversion to crop land and pasture (Fig. 9.2).

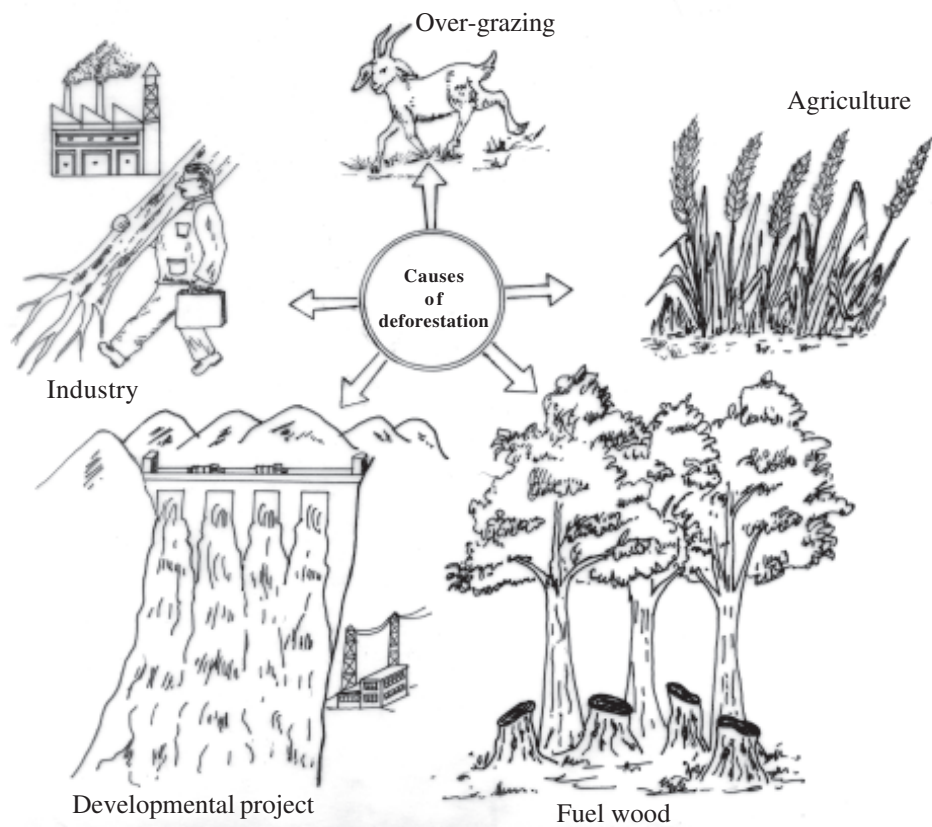


Fig. 9.2: Various causes of deforestation

The main causes of deforestation are:

- agriculture;
- shifting cultivation;



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- demand for firewood;
- demand of wood for industry and commercial purposes;
- urbanization and developmental projects;
- other causes.

(1) Agriculture

The expanding agriculture is one of the most important causes of deforestation. Man has always modified the natural ecosystems in such a way that environment becomes more favourable for crop growth whether using traditional or modern methods of agriculture. As demands for agricultural products rises, more and more land is brought under cultivation and for that more forests are cleared, grasslands and even marshes, and lands under water are reclaimed. Thus there is much more ecological destruction than gain in term of crop yield. The forest soil after clearing are unable to support farming for long periods due to exhaustion of nutrients. Once the soils become unfit for cultivation, the area suffers from to soil erosion and degradation.

(2) Shifting cultivation

Hunting and gathering has been the main form of sustenance practiced in the earlier periods of human history. Shifting cultivation or Jhoom farming is a 12000-year old practice and a step towards transition from food collection to food production. It is also known as **slash-and-burn method of farming**. Annually about 50 lakh (ha) (hectares) of forest is cleared for this type of farming. In this type of cultivation there is a limited use of tools with not very high level of mechanization. However, this method of cultivation causes extreme deforestation after 2-3 years of tillage, the land is left to the mercy of nature to recover. This type of cultivation was always meant to fulfil local needs or onsite demands to meet the requirements of the cultivating villagers. Even today, shifting cultivation is practiced in the states of Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura and Andaman and Nicobar Islands.

Region	Total wood consumption (in billion m ³)	Industrial	Firewood	Industrial	Firewood
Global	5.2	4.8	0.4	4.8	0.4
Developing countries	10.7	0.7	10.0	0.7	10.0
Developed countries	1.7	1.7	0.0	1.7	0.0

(3) Demand for firewood

Firewood has been used as a source of energy for cooking, heating etc. Almost 44% of the total global wood produced fulfils the fuel requirements of the world. Close look at the pattern of utilization of wood produced will show that the developed countries utilize 16% of their share for fuel requirements. India consumes nearly 135-170 Mt (Million tonnes) of firewood annually and 10-15 ha of forest cover is being stripped off to meet the minimum fuel needs of urban and rural poor.

Table 9.3: Use of wood

**Notes****(4) Wood for industry and commercial use**

Wood, the versatile forest produce, is used for several industrial purposes, such as making crates, packing cases, furniture, match boxes, wooden boxes, paper and pulp, plywood, etc. 1.24 lakh ha of forest have been cut for various industrial uses. Unrestricted exploitation of timber as well as other wood products for commercial purposes is the main cause of forest degradation. The paper industry accounts for about 2% of country's annual consumption of wood and 51% this requirement is met by bamboo wood. This has led to the depletion of bamboo stocks in most of the peninsular India. For example the apple industry in the Himalayan region has led to the destruction of fir and other tree species, for making wooden boxes used for transporting apples. Similarly, plywood crates were used for packing particularly tea and other produce.

(5) Urbanisation and developmental projects

Often urbanisation and developmental activities lead to deforestation. The process of deforestation begins with building of infrastructure in the form of roads, railway lines, building of dams, townships, electric supply etc. Thermal power plants, mining for coal, metal ores and minerals are also important causes of deforestation.

Nowadays you must have heard about the Tehri power project which is a 260.5m high earth and rock fill dam near the Tehri town in Garhwal Himalayas. The project site is situated a little downstream the junction of Bhagirathi and Bhilganga rivers. An estimated 4,600 ha of good forest land will be submerged under water. This has displaced an estimated 3,500 odd families.

(6) Other causes

Recent developments everywhere in world have caused large scale environmental degradation, especially in tropical forest areas. The large amounts of resources –living and nonliving (minerals, river, land) found in these forests have attracted both industry and other developmental agencies, which have severely depleted forest cover.

Forests may sometimes suffer from natural calamities such as overgrazing, floods, forest fires, diseases and termite attack.

9.4 FORESTS AND TRIBAL SOCIETY

About 4% the world's population lives in special territories. These indigenous or tribal people have claims on a particular place; they have cultural, spiritual and economic ties with the particular area and in most cases they have ability to manage the area and sustain it. In this way they protect the biodiversity of that particular area and the local culture, including knowledge and resource-management skills of the local community.



For example, the tribal people knew the agricultural practices which were ecologically sound and these were passed from generation to generation for many centuries. They knew how to grow different kinds of food and fibre crops simultaneously on the same plots and keep the land productive for several years in a row, and then plots were left to recover for several years to grow back into forests, before clearing the area again to begin the cycle afresh.

In India the tribal populations constitute about 7% of the Indian population. They live in some 450 Communities or tribal units of different sizes.



INTEXT QUESTIONS 9.2

1. List the causes for deforestation.

2. Where is Tehri power project?

3. List the names of the Indian states, where shifting cultivation is still practised.

4. Give reasons how the tribal communities were able to live in forest without harming it.

5. What percentage of total wood produced in developing countries is utilized for fuel requirement? (Refer to table 9.3).

9.5 CONSEQUENCES OF DEFORESTATION

Deforestation affects both physical and biological components of the environment.

- Soil erosion and flash flood
- Climatic change
- Loss of biodiversity

(1) Soil erosion and flash flood

A shrinking forest cover coupled with over exploitation of ground water has accelerated erosion along the slopes of the lower Himalayas and Aravali hills, making them prone to

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landslides. Destruction of the forests has altered rainfall pattern. In 1978 India suffered some of the worst flooding in its history. There was two days of heavy rainfall and 66,000 villages were inundated, 2,000 people drowned, and 40,000 cattle were swept away. In 2008 Bihar state suffered worst flood in the river kosi. Several lives were lost and a huge number of cattle were swept away. Lack of forest cover has resulted in water flowing off the ground, washing away the top soil which is finally deposited as silt in the river beds. Forests check soil-erosion, landslides and reduce intensity of flood and drought.

The loss of top soil in India, is 18.5% of the global soil loss. This is indeed very serious, considering the fact that India has only 2.4% of the land area of the world.

(2) Climatic change

Forests enhance local precipitation and improve water holding capacity of soil, regulate water cycle, maintain soil fertility by returning the nutrients to the soil through leaf fall and decomposition of litter. Forests check soil-erosion, landslides and reduce intensity of flood and droughts. Forests, being home of wildlife are important assets of aesthetic, touristic and cultural value to the society.

Forests have profound effect on the climate. Forest absorbed carbon dioxide from the atmosphere and help in balancing carbon dioxide and oxygen in the atmosphere. The forests play a vital role in maintaining oxygen supply in the air, we breathe. They also play a vital role in the regulation of water (water cycle) in the environment and act as environmental buffers regulating climate and atmospheric humidity.

Heat build-up in the atmosphere is one of the important problems of the century known as **green house effect** is the partly caused by the result from deforestation. The entire Himalayan ecosystem is threatened and is under severe imbalance as snow –line has thinned and perennial springs have dried up. Annual rainfall has declined by 3 to 4%. Chronic droughts have begun even in areas like Tamilnadu and Himanchal Pradesh where they were not known earlier.

(3) Biodiversity

“Biodiversity” include all variety of life forms. Biodiversity - (biological diversity) is a measure of variation, the number of different varieties, among living things. Biodiversity can be expressed in number of ways, which includes the number of genetic strains (differences) within species and the number of different ecosystem in an area. The most common expression of biodiversity is the number of different species, within a particular area (local biodiversity), or in a specific habitat (habitat biodiversity) or in the world (global biodiversity). Biodiversity is not static. It changes over the time during evolution new species have come up while some species become extinct.

Our knowledge is incomplete at the global level; nearly 1.4 million species have been identified. Different species inhabiting the earth have been estimated to vary between 10



and 100 million. There is lot of concern about preserving biodiversity. You will study more about biodiversity conservation in **lesson 15**. The one good reason for preserving biodiversity is that it provides wide variety of products for human use and welfare. It is a great potential resource for agriculture, medicine and industry.

There are several **causes** for biodiversity loss:-

- hunting, poaching and commercial exploitation.
- elimination and disturbance of wildlife habitats.
- selective destruction of habitat/ life forms.
- domestication.
- introduction of new alien species in new area which threaten the indigenous species.
- use of pesticides.
- pests, medical research and zoos.

All the above factors adversely affect biodiversity.

9.5.1 Extinct species

Ultimate fate of every species is extinction but after industrialization this rate has increased tremendously. The extinct species only exist in museums and photographs. The most noted example of extinct species is passenger pigeon.

• Threatened species

Several plant and animal species are threatened by the possibility of being on the verge of extinction but the seriousness of this threat varies. International Union of Conservation of Nature (IUCN) has categorized threatened species into four categories which are:

- | | |
|-----------------------|--|
| (i) Endangered | A species is considered endangered when its numbers are few and its homeland is very small, or both and if special protection is not given it may become extinct .for example the lion –tailed monkey from rain forests and Sholas of south India. |
| (ii) Rare | These are those species whose number is few or they live in such small areas or such unusual environment (endemics), that they could quickly disappear. The Great Indian Bustard (<i>Ardeotis nigriceps</i>) is an example of rare species of India. (Fig. 9.3) |
| (iii) Depleted | These are the species whose numbers are greatly reduced from those of the recent past, and they are continuing to decrease. It is the continued decrease, which is the main cause of concern. Animals/ plant in this category can quickly change to a rare or endangered category. In the past few years, the fur of the clouded leopard (<i>Neofelis nebulosa</i>) was sold illegally in Kashmir markets. |



- (iv) **Indeterminate** Those species that seem to be in danger of extinction but their true information regarding their status is not known are the indeterminate species. The snow leopard (*Leo uncia*) was classified as indeterminate species in 1968, and was declared endangered in 1970. You probably know that the snow leopard is hunted for its thick beautiful fur.



Fig. 9.3: Great Indian bustard

9.5.2 Loss of wild life

Over the past 2000 years, 600 species of animals have become extinct or are going to be extinct from the earth. Similarly, about 3000 species of plants need to be conserved. The shrinkage of green cover has adverse effects on the stability of the ecosystem. Poaching is another factor causing depletion of wildlife. The roll call of victims is endless. In Africa, in recent years, nearly 95 per cent of the black rhino population has been exterminated by poachers for their horns and over one third of Africa's elephants have been wiped out for ivory. The scarlet macaw once common throughout South America has been eliminated from most of its range in Central America. Several species of spotted cats such as the ocelot and jaguar are in danger of extinction due to demand of their fur.

9.5.3 Loss of wildlife in India

India has nearly 45,000 species of plants and 75,000 species of animals. This biological diversity ought to be preserved for maintaining stability of ecosystems. Deforestation coupled with desertification has destroyed the natural treasure of the earth to a large extent.

The population of elephant, lion and tiger is fast diminishing. 'Cheetah' is already extinct. Elephants once found all over India have now disappeared from Andhra Pradesh, Madhya Pradesh and Maharashtra. The Asiatic lion which was very common in Asia has practically vanished from Asia except for a few hundred sq km (square kilometer) of Gir forest in India.

In India four species of mammals and three species of birds have been extinct in the last 100 years. Another 40 species of mammals, 20 species of birds and 12 species of reptiles are considered highly endangered due to overexploitations, of forests.



INTEXT QUESTIONS 9.3

1. Name an endangered species in India.

2. List the main causes for the depletion of wild life.

3. Name the mammal that is already extinct from India.

4. Name the mammal that was once common in Asia is now found in few hundred kilometer at Gir forest in India?

5. Define biological diversity.

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9.6 DESERTIFICATION

What is desertification? It can be defined as **‘the diminution or destruction of the biological potential of the land which can ultimately lead to desert like conditions’**.

The arid and semi-arid areas where climate is dry, restoration is very slow, mining and overgrazing etc. adds to several other desertification pressures. Desertification is a systemic phenomenon resulting from excessive felling of trees which manifests itself in the loss of soil fertility, high wind velocity, low precipitation, increasing aridity and extremes of temperatures in the affected area.(Fig.9.4)

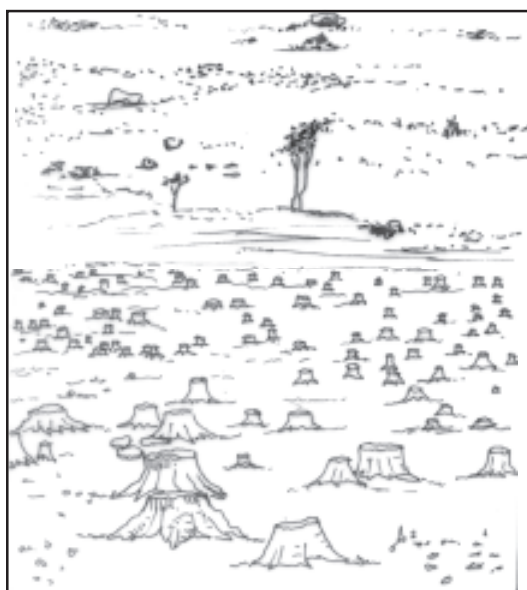


Fig. 9.4: Excessive felling of trees leads to desertification



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Desert supports very little of vegetation and animals which are especially adapted to extremely unfavorable conditions. Although desertification can develop from natural causes alone, in a majority of instances human intervention promoted arid conditions in an already dry areas. This can happen in any climatic zone or ecosystem, resulting from exploitative interaction of man with the natural ecosystem. Most of the deserts of recent origin have resulted from any one or more of the following human activities.

- (i) Uncontrolled and overexploitation of grazing land, indiscriminate cutting of trees and forest resources leading to drought, soil erosion, deterioration of soil fertility which results in stunted plant growth.
- (ii) Excessive mining in arid and semi-arid regions for extraction of minerals, coal or limestone resulting in loss of trees, and green cover, and leading to total destruction of conditions conducive to vegetation growing.
- (iii) Uneconomic land use for agriculture by cultivation on marginal lands affecting adjacent fertile lands and causing soil erosion.
- (iv) Intensive and uneconomic exploitation of water resources leading to fall in water table, seepage and problems of excessive salinisation of soil.

Table 9.4: Extent and causes of land degradation of the world

Area	Causes of land degradation
580 million ha	Deforestation -- Vast reserves of forests have been degraded by large scale logging and clearance for farm and urban use. More than 200 million ha of tropical forests were destroyed mainly for food production.
680 million ha	Overgrazing – About 20% of the world’s pasture and range lands have been damaged. Recent losses have been most severe in Africa and Asia.
137 million ha	Fuel wood consumption – About 1730 million m ³ of fuel wood are harvested annually from forests and plantations. Wood fuel is the primary source of energy in many developing regions.
550 million ha	Agricultural mismanagement – Loss of soil due to water erosion is estimated at 25,000 million tonnes annually. Soil salinization, water logging, chemical degradation and desertification affect about 40 million ha of land globally.
19.5 million ha	Industrialization and urbanization – Urban growth, road construction, mining and industry are major factors in land degradation in different regions. Valuable agricultural land is often lost.



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9.6.1 Extent of desertification

About 76.15% of the total Indian desert area has resulted from manmade desertification process. Another 19.5% of the total area is subjected to medium or slight desertification. This area is concentrated mostly along the eastern Rajasthan in the north-east to south-west zone parallel to the foothills of Aravalis.

Most of the deserts, in India are found in the states of Rajasthan and Western Gujarat, where about 23.8 mha area has been affected by desertification. About 4.34% of this area lies in the extreme West of Rajasthan in Jaisalmer district. This desert is concentrated along a belt in Ganganagar, Churu, Bikaner, Jaisalmer, Barmer, Jodhpur, Jalore, Jhunjhunu and Nagaur districts. The predominant processes of desertification in this belt are the expansion of sand cover and shifting sand dunes by wind erosion.

Natural desertification

In the Asia and Pacific region an area of about 4.361 lakhs ha has resulted from natural desertification. These areas can be classified as subtropical, cool coastal, rain shadow and interior continental deserts. Besides these, Polar regions of the world also represent a type of desert, where water is no doubt present in plenty, but being in the form of ice, it is not available for plants and animals. The Gobi desert of north western Asia is a cold desert. The Ladakh region of Jammu and Kashmir covering an area of 0.7 lakh sq. km. and located at an altitude of about 11,000 feet where extreme cold conditions prevail for about 5-6 months in a year, is also a cold desert.

9.6.2 Thar Desert—A case study

The Thar Desert exhibited spectacular biological diversity because of its evolutionary history and geographical location. This is an extensive region of sandy desert in northwestern India and eastern Pakistan. The Thar Desert is about 805 km long and about 485 km wide. Rainfall is sparse averaging from 127 to 254 mm annually and temperature rises as high as 52.8°C in July.

(i) Plants

Ecologically, vegetation of the major part of Thar Desert region falls under the category of 'thorn forest type'. However, the natural vegetation cover has become progressively transformed due to prolonged and intense human interference. Nevertheless, natural vegetation makes a substantial contribution to the productivity of trees like **Khejri** which are highly valued and conscientiously maintained. There are as many as 700 species of plants amongst which grasses alone account for 107 species. Large-scale destruction of

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natural vegetation from this part of the country is due to heavy pressure of overgrazing by livestock, making regeneration of plants process in the desert very difficult.

Human activities and - more fundamental - underlying structural factors and material processes in our society are causing species to vanish at a rate unequalled since the doomsdays of the dinosaur. There's no time to waste. We must protect biodiversity now, for our next generation.

(ii) Animals

Thar desert is fascinating. The Asiatic lion, used to inhabit the plains of Rajasthan, Punjab and Sind in the recent past. It is on record that the last lions occurring in the desert were shot during 1976. The cheetah now extinct in India was at one time found in the Kathiawad region. Similarly, leopards and caracal lynx, the wild boar, wild ass, Asiatic wolf, etc. have also met the same fate. Among other mammalian fauna, Indian gazelle, blue bull and black buck are also in the list of endangered animal species.

Predominant bird species are also very scanty, particularly in sandy habitats of western Rajasthan. The great Indian bustard, houbara, and lesser florican populations in the Thar Desert are dwindling as compared to that in the recent past. Pea-fowl, being a national bird, is well protected by people.

Among reptiles, two species of crocodiles and turtles are now restricted to Jawai-dam in Sirohi district at the foot hills of Aravali. The large terrestrial reptile, the rock python found on the foothills of Aravali is also vanishing from the desert.

Thus, looking at the past history of Thar desert, a large number of animals are at the verge of extinction and some .have vanished.

**INTEXT QUESTIONS 9.4**

1. What is 'desertification'?

2. List any three human activities that have resulted into desert formation.

3. Name the two states where most of the deserts found in India.

4. Name a mammal, a bird and a plant that were once found in large numbers in thar desert but are now in the list of endangered species.



WHAT YOU HAVE LEARNT

- Forests are the backbone of the life forms and the life on earth is sustained through them.
- There are three major functions of the forests i) productive functions .ii) protective functions iii) regulative functions.
- Timber and several models obtained from plants for medicine are still provided by forests.
- Tribal people totally depended on forests for food, shelter and clothing; in turn they also conserve the forests.
- Deforestation of forests is caused due to shifting cultivation, demand for timber, for paper and pulp, commercial wood and fire wood, and mining operations.
- Deforestation also causes soil erosion and floods, climatic changes, loss of wild life.
- Loss of biodiversity during deforestation is immense because several unknown species of biota is lost forever from our planet earth.
- Extinct species are those that were unable to survive in the changed environment and thus perished.
- Threatened species are likely to become extinct if their environment deteriorates further, endangered species are few in number and their homeland is very small and any deterioration in environment can make them extinct.
- Depleted species are those whose number have decreased in the recent years and are continuing to decrease. Indeterminate species are those species whose status is not known due to lack of information.
- Desertification is a natural phenomenon but it is often accelerated by human activities. they are uncontrolled grazing, indiscriminate cutting of forests, excessive mining, uneconomic use of agriculture land, exploitation of water resources.
- Deforestation and desertification are two interlinked problems which have arisen from the overexploitation of natural resources through human activities causing irreparable damage to earth.



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TERMINAL EXERCISE

1. Write any three functions of the forest, which function you think, is the most important and why?
2. Discuss why deforestation is one of the most important factors for wild life loss in the whole world.

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3. Match the definition of words given in column A with column B

Column A

- (a) Rare species
(b) Indeterminate species
(c) Endangered species
(d) Depleted species

Column B

- i) A species is considered endangered when its numbers are few and its homeland is very small, or both and if special protection is not given it may become extinct
ii) These are those species whose number is few or they live in such small areas or such unusual environment (endemics), that they could quickly disappear.
iii) These are the species whose numbers are greatly reduced from those of the recent past, and they are continuing to decrease.
iv) Those species that seem to be in danger.

4. Make a project on 'habitat destruction and wild life loss' by giving at least example of five animal species and five plant species, try to give photograph/drawing of the species.
5. Make a list of extinct animal and plant species from India by going through various books and magazine.
6. 'The development projects have harmed the tribal society the most' give your views on the above given statement.
7. Discuss "deforestation results in desertification".
8. Write an essay on the importance of forest in human life. Support your answer with diagram.



ANSWER TO INTEXT QUESTIONS

9.1

- | 1. | Plant | Medicinal use |
|----|-----------------------------|------------------------------------|
| a. | <i>Cinchona Officinalis</i> | Treatment of malaria |
| b. | <i>Digitalis purspusla</i> | Treatment of chronic heart disease |
| c. | <i>Vinca rosea</i> | Treatment of cancer |
| d. | <i>Taxus brevifolia</i> | Treatment of cancer |
2. Protective function, productive function and regulative function.
3. Plywood manufacture, saw milling, paper and pulp, composite wood, Matches, Man made fibres, furniture, sport goods and particle boards.



Notes

9.2

1. Agriculture, shifting cultivation, demand for fire wood and timber, development projects requiring land and raw materials.
2. Near Tehri town, at the junction of Bhagirathi and Bhilganga.
3. Manipur, Meghalaya, Mizoram, Nagaland, Andman and Nicobar Islands.
4. Tribal people used ecologically sound agricultural practices and the knowledge of such practices were passed on to the next generations for centuries.
 - they grew multiple crops simultaneously for some years and then plots were left to recover and grew back into forests
 - they have cultural and economic ties with the forest they live in and have the ability to sustain it and protect it.
5. 82%

9.3

1. Lion tailed monkey
2. Commercial exploitation
 - Introduction of exotic species
 - Habitat loss/ disturbance in habitat
 - Domestication
 - Use of pesticides
3. Cheetah
4. Asiatic Lion
5. All forms of life including plants, animals and micro organisms in nature constitute biological diversity.

9.4

1. Destruction of the *biological potential* of the land which can lead to desert like conditions.
2. Over exploitation/ uncontrolled grazing/ indiscriminate felling of trees / intensive and uneconomic exploitation of water resource leading to fall in water table/ uneconomic land use for agriculture. (Any three)
3. Rajasthan and Gujarat
4. Wild boar/wild ass – Mammal
Great Indian bustard – Bird
Kehjri – Plant