



CHAPTER

18

NATURAL RESOURCES

We human beings depend upon a number of things and services provided by the nature, which are known as Natural resources. Examples of the natural resources are water, air, soil, minerals, coal, petroleum, forests, crops, wild life etc.

18.1. Kinds of Natural Resources

(i) Renewable natural resources and (ii) Non-renewable natural resources.

18.1.1. Renewable Natural resources

These are inexhaustible resources and can be regenerated within a given span of time. Examples are forests, wildlife, wind energy, tidal energy, hydro power, solar energy etc.

18.1.2. Non-renewable Natural resources

These are resources which cannot be regenerated. Examples are coal, petroleum, minerals etc. Once these reserves are exhausted, the same cannot be replenished.

Sometimes the renewable resources may become non-renewable resources when we exploit them to such extent that their rate of consumption exceeds their rate of regeneration. For example, a particular species, if it is exploited too much, its population declines to a great extent that it is not be able to sustain itself. So, it gradually becomes endangered and finally extinct.

The protection and conservation of our natural resources are very important. We should use them in a judicious manner so that it does not become exhausted. We should conserve them for use by our future generations.

18.1.3. Forest resources

Forest is one of the most important resources. About 1/3 of the earth's land surface is covered by forests. The forests not only provide us innumerable

material resources but also serve to maintain several environmental conditions which are essential for life. But, it is becoming a matter of concern that everywhere the natural forest cover has declined over the years due to human activities.

Commercial uses of forests

We get a large number of commercial goods from the forests. These include timber, firewood, pulpwood, food items, resins, gums, non-edible oils, fibres, rubber, lac, bamboo, medicines, etc.

Ecological significance on importance of forests

It is said that the environmental services provided by a typical tree is worth more than three times its commercial value.

The ecological services provided by the forests include the following :

- (i) Production of oxygen : All the green plants of the forest produce oxygen through photosynthesis which is essential for respiration of all the living organisms.
- (ii) Reducing global warming : CO_2 which is the main greenhouse gas is absorbed by the forests as a raw material for photosynthesis. Thus, the forests act as an absorbant for CO_2 thereby reducing the problem of global warming caused by CO_2 .
- (iii) Habitat for wild life : Forests are the homes of millions of wild animals and plants.
- (iv) Regulation of hydrological cycle : The forest floor absorbs most of the rainwater by slowing down the surface runoff. Such water is released slowly for recharge of springs. About 50-80% of the water vapour in the air above tropical forests comes from transpiration by plants and helps in bringing rains.
- (v) Soil conservation : The trees of the forest bind the soil particles tightly in their roots thus preventing soil erosion. They also act as wind breakers.
- (vi) Pollution moderator : Forests also act as pollution moderators by absorbing many toxic gases and thus help in keeping the air pure. The forests are also reported to absorb noise. Thus reducing noise and air pollution.

18.1.4. Deforestation

Due to rapid increase in population growth, more lands for housing and agriculture are needed. To accommodate the increasing population more houses are to be constructed leading to the requirements of more construction materials like timber, bamboos etc. More and more forest products are consumed for fire wood, charcoal etc. leading to exploitation of forests. Many tribes still follow the practice of **shifting cultivation**. They burn down the forest in different areas for cultivation. With growing civilization more lands are required for establishment of industries. Use of wood for making boxes, furnitures, railway sleepers, plywood, pulp for paper industry etc. also exert tremendous pressure on forests. Construction of hydro-electric projects, roads, big dams and mining also result in deforestation.

18.1.5. Major consequences of deforestation

Deforestation leads to many far reaching consequences, as follows :

- (i) The existence of many wild life species are threatened due to the destruction of their natural habitat.
- (ii) Rainfall is affected due to changes in hydrological cycle.
- (iii) Problems of soil erosion and loss of soil fertility increase.
- (iv) In hilly areas deforestation leads to landslides.

18.1.6. Forest conservation

Since forest cover has become decreased very fast (about 14%) it needs conservation. The following situations are ways through which conservation of forest is done.

(i) Conservation of reserve forests

These include National Parks, Sanctuaries, Sacred Groves, Biosphere Reserves and all ecologically fragile areas. No exploitation of flora and fauna can be done for commercial purpose. Cutting of trees for fuel and consumption of fodder by cattles should be prevented. For this public support is needed to fulfil the real goal of eco-development. The Chipko Movement is a very good example of public support.

Chipko Movement – A case study

About 300 years ago, a ruler in Rajasthan started to fell the 'Khejri' trees in his state. Local women led by a Bishnoi woman, Amrita Devi, clung to the trees to prevent the felling of the trees that were the valuable resources on which they were dependent. The women were mercilessly massacred. Later the ruler knew his mistake. The story was remembered and revived in December 1972 when the illiterate tribal women in Tehri-Garhwal district of Uttarakhand commenced the movement against the felling of trees by timber contractors. The movement gathered momentum in 1978 when the women faced police firing. This movement was known as Chipko (means to embrace) Movement in memory of the Bishnoi women who had clung to their trees and given up their lives. These women had realized that their firewood and fodder resources had receded fast in the areas around their settlements due to excessive commercial timber extraction. This led to serious floods and the loss of precious soil. The movement was supported by the persons like as Sunderlal Bahuguna and Chandi Prasad Bhat who led the people's movement to prevent deforestation by timber contractors.

Chipko activists made long padyatras across the Himalayas protesting against deforestation. The movement was successful and supported by empowering local women's groups who were the most seriously affected population. The movement had proved to the world that the forests in the hills were the life supporting systems of local communities and of immense value in ecological services such as soil conservation and maintenance of the natural water regime of the whole region.

(ii) Forest plantations

Extensive planting of trees through afforestation programmes is needed to save the diminishing forest cover. For this, production or commercial forestry has been widely adopted in different regions of the world. This aims to fulfil the commercial demand, without causing destruction of the natural forests, through intensive plantation in all available spaces.

(iii) Social forestry and Agroforestry

In social forestry, the trees and shrubs are planted in unused areas like unused farmland, community land, sides of road and rail tracks, etc. This provides firewood, fodder etc. thereby reducing pressure on existing forests.

Agroforestry is a combination of agriculture and forestry technologies for integrated, diverse and productive land use system. This combines the plantation of trees and other woody perennial plants in association with agricultural crops, pastures on the same unit of land either at the same time or in time sequence.

18.1.7. Forest Conservation through Law

According to the National Forest Policy, 1952, one third of the geographical area of the country should be under forests. But, due to continuous deforestation in the country for various reasons, it is estimated that 4.238 million hectares of forest land was officially diverted to non-forest purposes between 1951-52 and 1979-80. Under such condition, Government of India could enact the Forest (Conservation) Act, 1980 with a view to conserve forests.

18.1.8. Forest (Conservation) Act, 1980

Forest (Conservation) Act, 1980 was enacted with a view to check indiscriminate dereservation and diversion of forest land for non-forest purposes. Under this Act, prior permission should be taken from the Central Government before any reserved forest is declared as de-reserved, or any forest land is diverted to non-forest purposes. If there is permission for diversion, compensatory afforestation should be done. Where non-forest lands are available compensatory afforestation be raised over equivalent area of non-forest lands. If non-forest lands are not available, compensatory plantations be raised over degraded forests twice in extent to the area being diverted.

The Forest (Conservation) Act, 1980 was amended in 1988. This is to incorporate stricture penal provisions against violators. Important amendments are as follows :

- (i) No state government or other authority may direct that any forest land may be assigned by way of lease or otherwise to any person, corporation, agency or organisation (not owned by the government) without prior approval of the Central Government.
- (ii) No forest land or any portion thereof may be cleared of trees which have grown naturally in that land or portion, for the purpose of using it for reforestation without prior approval of Central Government.
- (iii) Scope of existing “non-forest purposes” has been extended to other areas as cultivation of tea, coffee, spices, rubber, palms, medicinal plants, etc.

- (iv) Admissible punishment to the offender of the provision of Section 2 of the Act.

Let us answer these

1. What are renewable and non-renewable resources ?
2. How does the forest act in reducing the global warming ?
3. What are the major consequences of deforestation ?

18.2. Wildlife

All kinds of non-cultivated plants and non-domesticated animals living freely in their natural habitats far from human interference, control and dominance are known as **wildlife**. In India, a wide variety of vegetation and animals are found. It is estimated that in India there are about 350 species of mammals, 2,100 species of birds, 500 species of amphibians and reptiles and 30,000 species of invertebrates. Many of the important wildlife fauna are becoming threatened to extinction. Some of them are Indian lion (*Panthera leo persica*), Royal Bengal tiger (*Panthera Tigris*), Sangai (*Cervus eldi-eldi*) etc.

18.2.1. Why should we conserve wildlife?

Some of the important reasons for conserving wild life are as follows :

1. Ecological balance

Every animal is a link in one food chain or the other. A loss or extinction of an animal may affect the food chain. In addition to this, every animal has a specific role in an ecosystem. If the role is that of a scavenger (animal eating dead body of other animal), then in its loss, our surrounding will be filled with rotting flesh of dead animals. If it is a rat eating snake, then in the absence of the snake, the number of rats will increase so much that they may consume all our grains which may lead to famine. So, the existence of the animals are required for ecological balance.

2. Utility to man

We can get many useful materials like meat, honey, wax, silk, lac, fur, hide ornamental materials (elephant tusks, horns, mollusk shells, pearls etc.), scent (from musk-deer), timber, medicines and many other things from the animals and plants. If the wild life is conserved and propagated, we can get these materials abundantly and can be used for commercial purpose. But, killing

animals for these materials without propagating them will lead to the extinction of the animals. Their conservation and propagation is thus highly essential.

3. Helps to our survival

For the conservation of a particular animal, say tigers or lions, we are to protect or conserve the natural habitat of the animals. For their protection we should not disturb the vegetation of the area as well as the smaller animals like deer, wild boar etc. on which they eat. By doing so we will get oxygen from the plants through the process of photosynthesis and CO₂ gas also will be taken in. As a whole, the ecological balance is maintained in the area. The rainfall may not be disturbed, the climatic condition of the area will not be changed.

4. Science and Education

Animals such as frogs, rabbits, dogs, guineapigs, monkeys, etc. are used in teaching students and also by scientist to experiment in surgery and medicine.

5. Tourist attraction

Many people like to see the wild animals in their natural habitats and also at zoos. So animal lovers travel to far off countries to see the different animals. Such activity helps to increase income of the country.

6. Game value

Many people enjoy fishing and hunting (except those declared protected) as their hobby. This is also a source of income for a country. For this the government opens their forest reserves for hunters who pay and hunt a specified number of animals and birds. At times, it is closed to allow the animals to increase their number. In this way a lot of revenue can be earned.

7. Aesthetic value

Many animals by their beauty and pattern (peacock, butterflies), majestic elegance (tiger and lions), sweet voice (cuckoo) and playful behaviour (dolphins and chimpanzees) appeal to the aesthetic sense of man and often become a subject of inspiration for painting, poetry, sculptures and writing.

18.2.2. Conservation of Wildlife

It is clear that the conservation of wild life is necessary not only for the benefit of the wildlife itself but also for our survival. The number of endangered

species of flora and fauna is increasing continuously. For this, steps have been taken up to protect and manage the wildlife of the country. Non-governmental organizations (NGO) as well as government organizations at state and central levels have been set up to protect the wildlife. Recently the subject was given top priority and a separate Ministry of Environment and Forests under the central government is entrusted with the task to environmental protection. The Department of Environment, Forests and Wildlife was set up under this Ministry with a view to bring co-ordination between states and centre and speedy implementation of the steps to be taken up for the protection and conservation of Wildlife.

Wildlife conservation can be done by

- (i) protection of natural habitats through controlled, limited exploitation of species.
- (ii) establishing Biosphere Reserves for plant and animal species.
- (iii) improving the existing protected areas as sanctuaries, national parks etc.
- (iv) imposing restrictions on export of rare plant and animal species and their products.
- (v) imposing protection through legislation.
- (vi) educating public for environmental protection at all levels of education.

Some of the Wild Life Acts enacted by the State and Central Government for the conservation of Wildlife are:

1. Madras Wild Elephant Preservation Act, 1873
2. All India Elephant Preservation Act, 1879
3. The Wild Birds and Animals Protection Act, 1912
4. Bengal Rhinoceros Preservation Act, 1932
5. Assam Rhinoceros Preservation Act, 1952
6. Wild Life (Protection) Act, 1972

Some Government organizations for wildlife protection

1. Indian Board for Wildlife (IBWL) , 1952
2. Indian National Man and the Biosphere committee, 1972 for Biosphere Reserve.

Some principal Non-Government Organizations

1. Bombay Natural History Society, founded in 1883.
2. Wildlife Preservation Society of India, Dehradun, founded in 1958.
3. World Wide Fund for Nature India.

Let us answer these.

1. What is meant by wildlife ?
2. How the wildlife can be conserved ?

18.3. Conservation of Coal and Petroleum

Coal and petroleum are important conventional sources of energy. These are fossil fuels and non-renewable sources of energy.

Coal was formed 255-350 million years ago in the damp, hot regions of the earth. The ancient plants growing in swamps and river banks were buried into the soil after death. Due to heat and pressure they became gradually converted into peat and coal over millions of years. Coal is the world's most abundant fossil fuel. The coal reserves are likely to last for about 200 years at the present rate of usage. But if the usage increases by 2 % per year then it will last for another 65 years only.

Coal is a prime source of industrial energy. It provides about 60% of the industrial power requirement in our country. Many thermal and superthermal power stations are located near the coal fields where the coal is burned and converted to electric power which can be used for many purposes. Sixtytwo percent of the world's electric power is generated from the burning of coal. Being a non-renewable resource, if extracted at the present rate, it will soon become totally exhausted. So, it needs conservation for the future generations.

Petroleum is found in the sedimentary rocks, containing plants and animals remains about 100 to 200 million years old. Crude petroleum is a complex mixture of alkane hydrocarbons. It is purified and refined by the process of fractional distillation. During this process different constituents separate out at different temperatures and get a large variety of products namely petroleum gas, kerosene, petrol, diesel, fuel oil, lubricating oil, paraffin, wax, plastic, etc.

It is estimated that at the present rate of usage, the world's crude oil reserves will be exhausted in just 40 years.

Since many of the petroleum products and coal are utilized for the production of electricity, the conservation of electric energy also will lead to the conservation of coal and petroleum. The following practices can be followed for the conservation of coal and petroleum.

1. To turn off light, fans and other electric appliances when not in use.
2. To arrange for getting as much heat as possible from natural sources. If it is a sunny day, we can dry our clothes in sun instead of using a drier.
3. To use solar cooker for cooking our food on sunny days which will cut down the expenses of LPG .
4. Plantations of deciduous trees and climbers at proper places outside our house. This will cut off intense heat of summer and get a cool breeze and shade. This will lead to the reduction of electricity charges on coolers and air conditioners. The deciduous trees shed their leaves in winter so it will not obstruct sunlight during winter.
5. To drive the vehicles less, make fewer trips and to use public transportations when ever possible. If some people are to go regularly to the same place, like office going then we can share by joining a car-pool.
6. To wear adequate woolen warm clothes in winter days inside the house instead of using the heat convector.
7. To ride bicycle or just to walk down small distances instead of using car and scooter.
8. To use as far as possible renewable energy sources like solar energy, wind energy, hydro power sources etc.

18.3.1. CNG (Compressed natural gas) use as an alternative fuel for vehicles

The use of petrol and diesel as fuels of the vehicles add more and more pollutants in the environment particularly in urban areas where large number of vehicles are running. CNG , is nowadays used in place of petrol and diesel as fuel in buses and autorickshaws in the cities like Delhi. CNG use has greatly reduced the vehicular pollution.

Let us answer these.

1. About how many years more are likely to last the coal reserves of the world at the present rate of usage ?
2. What are different constituents of the petroleum separated after fractional distillation ?
3. Which fuel can be used in place of petrol and diesel to reduce pollution ?

POINTS TO REMEMBER

- The natural resources like forests, wildlife, coal, petroleum etc. need to be used in a sustainable manner.
- The environmental services provided by the forest are more than its commercial value.
- There are many far reaching consequences of deforestation.
- The fossil fuels, coal and petroleum, will ultimately be exhausted. Because of this and as their combustion pollutes our environment, we need to use these resources judiciously.

EXERCISES

1. What is meant by natural resources ?
2. What are the two kinds of natural resources ?
3. What are the ecological services provided by the forests ?
4. How the forests can be conserved ?
5. Why should we conserve wildlife ?
6. What steps can be taken up for the conservation of coal and petroleum ?

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