Chapter -12
Main Natural Resources

Every organism is surrounded by a variety of living organism and non living environment (Air, light, soil, water, temperature etc). These biotic and abiotic factors form the specific environment of the organism. Man has tried to maintain harmony with nature since his emergence. His existence is depended on nature's resources. Therefore, man has been respecting nature since time immemorial. Unfortunately in the last few years there is seen an increased tendency of imprudent use of nature, because of that we are facing many bad effects in the form of natural calamities such as flood, drought, landslides, epidemic, earthquakes, tsunami etc. In the ancient Indian culture know that in the vedic period our ancestors gave excessive importance to nature. They believed in the concept of Panch tatva (Sun, sky, earth, water, fire) and by worshiping these tatvas like God, they explained the significance of nature to mankind.

12.1 Meaning of natural resources

Every object that is used directly or indirectly by human is called a resource. The resources that we are receiving from nature and which we use directly without making any change in it are called natural resources.

12.2 Types of natural resources

Natural resources can be divided into three parts.

1. On the basis of development and use
2. On the basis of origin
3. On the basis of storage or distribution

On the basis of development, natural resources can be further divided into two levels -

1. **Actual resources-** Those resources or objects whose structure or quantity is known to us and which we are using in the present time are called actual resources, eg. quantity of coal in Germany, quantity of mineral oil in West Asia, quantity of black soil in Maharashtra.

2 **Possible resources-** The objects whose exact quantity or numbers cannot be guessed and which we are not currently using but can use in future, are called possible resources. The example of possible resources is wind mill which was a possible resource 20 years ago, but in modern time our country has made technical progress due to which today we are able to use mills. Uranium found in Laddak is also a possible resource which we can use in the near future.

On the basis of origin, natural resources can be divided into two levels -

1. **Biotic resources -** Living things are called as biotic resources eg. plants, animals, human etc.

2 **Abiotic resources -** Non-living objects are called as abiotic resources for eg. - air, soil, light etc.

On the basis of distribution, resources can be divided into two levels -

1. **Universal -** Those objects which are found everywhere and which are easily available are called universal resources eg.- air

2 **Local resources -** Those objects which are found at a few places only are called local resources eg- copper, iron ore etc.

Natural resources more clearly, we can further divide it into two parts-

1. Renewable resources- The things that can be manufactured and used again, meaning that the objects which can be replenished easily, these objects are called renewable resources for eg- solar energy, wind energy.

2. **Non-renewable resources-** The things whose stocks are limited and there is no hope for its creation or it takes too long to build again are called non-renewable resources eg-coal, petroleum, natural gas.

We should not use any resource in a careless manner because its continuous and excessive use will make it exhaust soon and the future generation will not be able to use it.

12.3 Management of natural resources

Man exploits natural resources for his livelihood. The primitive human being was dependent on plants and animals for his requirements. At that time the density of population was less, the requirements of humans were limited and the level of technology was low. There was no problem of conservation at that time. With time man has developed the technology of tapping the resources. In addition to the exploitation of the livelihood resources, man by scientific and technological developments also began to exploit the resources of production. Due to the continuous growth of population, the demand for resources had increased. With the development of technology man increased his capacity to use these resources. Therefore this competition has created a doubt that there will be question mark on the life of humans if the resources exhaust soon.

12.3.1 Judicious use and conservation

Natural resources can be conserved and used for long period of time if they are used judiciously and prudently. Planned, prudent and adequate use of resources is their conservation. Conservation does not mean

1. Not to use natural resources and only protect them.
2. They should be used miserly.
3. Inspite of their need they should be kept for future use.

But by conservation we mean that resources should be used sensibly to meet the requirements of more people for a longer period of time.

12.3.2 Need for conservation of Resources

Human being has been using various natural resources to fulfill his needs. He plough the land for the supply of food and for other substances, he has exploited and used forest products and minerals for the development of irrigation and power. In the last two centuries there has been a rapid growth in population and industrial production. Two hundred years ago the global population was 1.75 billion, now it has reached 5.25 billion. Our consumption for food, cloth, shelter, means of transportation, various types of equipments, industrial raw material has increased several times. Because of this we are rapidly exploiting natural resources in a destructive manner. This has resulted in worsening of the natural balance. If this equilibrium is lost then the existance of human beings will also be in danger. Thus for the existance and for the progress of human being conservation and management of natural resources is necessary.

12.3.3 Ways of conservation of resources

Natural resource is our capital. It should be used for beneficial works in a planned manner. For this firstly we must be aware of the resources of a country or a region, and should also keep in mind that various resources are mutually influential and interactive. So if one reduces or gets destroyed, then its bad effects fall on the whole economic cycle. We should use them on priority basis. Finishing indiscriminately those resources or natural resources which are limited, is a blind sight. It is essential to search for the alternative options for the limited resources like coal and petroleum. For the conservation of resources it is necessary to get support at government and non government level.

12.3.4 Forest conservation and management

Forest is the base of life on earth. This is an area where the action of the development of life has been going for ages and millions of species of animals and plants have been evolved. Forest not only control the

rain and supplies water continuously to the rivers, but also provide humidity to the atmosphere.

Fig. 12.1 Forest

Forests not only protect fertile soil from erosion due to water and rain but also are one of the important factors for the formation of fertile soil from active abiotic rocks. Forests help to keep the environment clean and maintains the natural balance. Clean environment is not possible without forest. In the last few years, the demand for timber as well as the increase in its prices had led to an increase in the timber trade that now the forests around the world have become threatened. Due to the reduced cover of the forests drought occurs at many places. In the absence of trees, the fertile soil flows away with rain water. Due to cutting of trees on the hills, soil flows down with rains and comes into the rivers, consequently the rivers become so shallow that it floods, when the water level increases a little. The question of protecting the forest has now become a question of life and death for us today.

In spite of the accelerated destruction of the forests in the last few years, there are about 15000 species of flowering plants and double the number of other remaining flora species are found in India. Only 15% of all available species of plants are of economic importance. Indian forests are spread across around 8 lakhs sq km. In India mostly the tropical forests are found. One of the specialities of evergreen tropical forests is that they are rich in biodiversity. In some parts of the country we have deciduous temperate forests. About 35 lakhs cubic meter of timber, 13 lakhs cubic meter firewood, innumerable types of products like - bamboo, medicine, gum, resins, rubber, scented oil, oil seeds and many other useful products are obtained from forests.

Protecting forests is today's priority. Figures sourced from the satellites show that in our country 1.3 million hectare of forests are declining each year. With the increase in population forest land is cleared for agricultural purpose. Forests are cut around the world for different construction works, factories and animal husbandry. Initially approximately 70% of the earth was covered with forests but now only 16-17 percent of the land is covered with forests. Jhoom farming is considered as one of the reasons for deforestation. In this type of farming the flora of a particular region is burnt to ashes, thereby increasing the fertility of the land, for two-to three years good harvest is taken. With the decrease in the fertility of the soil the same method is adopted in other areas. In our country the tribal people of Nagaland, Mijoram, Meghalaya, Arunachal Pradesh, Tripura and Assam adopt this method of farming.

The Major side effects of deforestation are depletion of natural resources, soil erosion, destruction of forest life, change in climate, desertification, increase in pollution etc. are notable.

The following measures can be adopted for the protection of the forests-

1. Forest should be cut upto the optimal limits, there should be an equal ratio between the rate of forest cutting and plantation.
2. Forest should be protected from fire, for this the observation posts and fire protection path should be made.
3. Forest should be protected by spraying insecticides to kill harmful insects and by removing diseased trees.
4. More priority should be given to diverse forest over uniform forest.
5. Destruction of forest for agriculture and habitat

purpose and jhoom method of agriculture should be stopped.

6.To prevent deforestation, alternative sources of fuel and timber should be worked out.

7.Conservation of forest resources should be kept in mind while planning for dams and other multipurpose schemes.

8. Awakening public awareness about the importance of forests. Chipko movement, silent valley area etc are the result of this awareness. Social and voluntary organization have a great role in forest conservation.

9. It is creditable to give incentive to social farming.

10. The rules and regulations of forest conservation must be followed strictly.

12.3.5 Social forestry

In our country more than one crore hectare of degraded land needs to be replanted every year so that ecological balance can be maintained. This target can be achieved through social forestry. This will not only increase the forest area but will also create employment on a large scale. The National Commission Agriculture had also suggested to adopt social forestry in order to increase the forest area, so that with the expansion of forests, the villagers could get fodder, firewood, and secondary forest produce. It is recognized as a programme of the people, for the people and by the people.

There are three main components of social forestry-

1. Agro-forestry

2. Plantation done by the forest department to meet the needs of the public at public places like canals, roadside, hospital etc.

3. Plantation on public land done by villagers.

12.4 Conservation of wild life

In general the term wild animals are used for those that live in natural habitat like, elephant, lion, rhinoceros, deer etc. But the term wild life is widely used for all the species of animals and plants found in nature. India is a country which is endowed with religious, cultural, political, climatic, land diversity and a rich biodiversity. It is remarkable that the land of our country has only 2.4 percent of the total land area of the world, where as 8.1 percent of the world's total biodiversity is found in our country. Overall in India 500 mammals, 1200 aves, 220 snakes, 150 lizards, 30 tortoise, 30 crocodile and alligator, 105 fresh water fishes and thousands of invertebrate species are found.

Fig. 12.2 Wild animals

But at present there has been such a cause created by humans that the existence of wildlife is ending. Apart from humans there are also some natural reasons due to which the wildlife is becoming endangered.

Reasons for the Extinction of wildlife-

1.Destruction of natural habitat- There are many reasons for the destruction of the animals in natural habitat. The main reasons for this destruction are natural calamities like earthquake, volcano, tsunami etc. Following are the other reasons -

(i) Due to the population growth the needs of human beings have increased. Human used forest land for housing, agriculture, industries, which resulted in a crisis on the habitat of wildlife.

(ii) Due to large scale water projects like Bhakra Nangal, Tihari, Vyas project etc the forest land was submerged in water, thereby decreasing the habitat of wildlife.

(iii) Natural habitats were also destroyed due to the mining works in forests, acid rain etc.

(iv) Oil leakage from oil tankers in the ocean is destroying the habitat of sea organisms.

(v) Because of the Green house effect the climate is getting hot around the earth, thereby destroying the biodiversity.

2. Illegal poaching of the wild animals.

3. Pollution

4. Conflict between humans and wildlife.

Apart from the above mentioned reasons for the destruction of wild life, natural, genetic and man-made reasons are also there.

In India conservation of wildlife was under the National Forest Policy during 1952-1972. For the protection of wildlife in 1972, wildlife protection act was framed which is implemented today with many amendments. An International organization IUCN (International Union for Conservation of Nature) was formed in 1948 due to the world wide awareness among people, for the conservation of nature. IUCN compiled a book on all the species which have reached the brink of extinction, this book is known as Red Data Book. IUCN has defined the following five category of species -

1. Extinct species- The species which are extincted from this world and not surviving today are kept in this category like- Dinosaur (animal), Rhynia (plant) etc.

2. Endangered species- These are the species whose conservation measure if not taken, will end in the near future like Rhinoceros, Godawan (Great Indian Bustard), Lion etc.

Fig. 12.3 Godawan

3.Vulnerable species- These are the species which are likely to become endangered unless the circumstances threatening its survival and reproduction improve like- common leopard, alligator etc.

4. Rare species- A rare species is a group of organisms that are very uncommon, scarce and can become endangered in near future, like- giant panda, snow leopard etc.

5. Inadequately known species- These are the species which exist on earth but not much is known about their distribution.

National parks, wildlife sanctuaries, Biosphere reserves, are the main protected areas set up with the view of conservation of wild life.

12.1 National Park

National parks are the natural areas where wildlife and natural habitats are preserved along with the environment. There is a complete ban on cattle grazing in national parks. Private organizations are prohibited to conduct their private activities in national parks. Some part of the national parks can be developed to promote

tourism. Their control, management and policy making is done by central government.

Table 12.1 India's Main National Parks

S.No.	Name	State
1	Kajiranga National Park	Assam
2	Gir National Park	Gujarat
3	Great Himalya National Park	Himachal Pradesh
4	Bandipur National Park	Karnataka
5	Satpura National Park	Madhya Pradesh
6	Sundarban National Park	West Bengal
7	Ranthambhor National Park	Rajasthan
8	Kevla devi National park	Rajasthan
9	Corbet National Park	Uttranchal

12.4.2 Sanctuary

These are also protected areas, they have completed restriction on wildlife hunting. These allow private organizations to enter on the condition that their activities should be creative and should not adversely affect wildlife. Following are some of the sanctuaries in India- Nagarjun sagar (Andhra Pradesh), Hazaribagh prani vihar (Bihar), Nal sarovar prani vihar (Uttar Pradesh), Kedarnath pranivihar (Uttranchal)

Table 12.2 Main wildlife sanctuaries and wild animals of Rajasthan

S. No.	Wild life Sanctuary	Wild animals
1	Sariska, Alwar	Deer, Godavan
2	Darrah, Kota	Panther
3	Mount Abu, Sirohi	Wild Cock
4	Tal Chhappar, Churu	Black deer
5	Jawahar Sagar, Kota	Alligator
6	Sitamata, Pratapgarh	Flying Squirrel
7	Kailadevi, Karauli	Bear
8	Nahargarh, Jaipur	Fox, panther

12.4.3 Biosphere Reserve

These are the natural areas which have been declared as a silent area for scientific study. These are the areas comprising terrestrial, marine and coastal ecosystems. Each reserve promotes solutions by reconciling the conservation of biodiversity with its sustainable use. Until now 669 biosphere reserves in 128 countries has been established. India has 18 biosphere reserves. In India first biosphere reserve came into existence in 1986 at Nilgiri.

Table 12.3 :- Main Biosphere Reserves of India.

S. No.	Region	Reserve
1	Andaman and Nicobar Islands	Great Nicobar
2	Assam	Kajiranga, Manas
3	Karnataka, Kerela	Nilgiri
4	Uttarpradesh	Nanda devi
5	West Bengal	Sundarban
6	Madhya Pradesh	Kanha
7	Rajasthan	Thar Desert

12.5 Water conservation and management

Water is life. Seventy percent of earth surface is submerged in water. Only 2.5 percent of this water is used by humans, 97.5 percent of total water being saline is useless for us. Increasing population and indiscriminate exploitation of natural resources has created many problems for human being. Of these water crisis has emerged as an important problem. The reasons for this are pollution of water bodies, over exploitation of ground water, industrial demand of water, uncertainity of monsoon, and neglecting the traditional sources. Problem of water deficiency has created tension at national and international levels. In India there is a situation of tension exists in neighbouring states about the water sharing of almost all the rivers. So water conservation and management is today's biggest demand. There are three important principles of water conservation and management :

1. Maintaining water availability
2. Protecting water from getting polluted.
3. Cleaning the contaminated water and recycling it.

12.4.1 Ways of water conservation and management.

Water is a cyclic resource, if it is used judiciously, it will not be depleted.

Conservation of water is the conservation of life. The following measures should be taken for the water conservation

1. Water should be declared as a national asset and proper planning should be done.
2. Water should be collected by rainwater harvesting methods.
3. Wastage of water should be minimised in domestic works.
4. Ground water should not be over exploited.
5. Water should be prevented from being polluted.
6. Water should be recycled and used again.
7. For flood control and proper use of water the rivers should be linked together.
8. Fountain method or drip method should be employed for irrigation.

First step in this direction is the scientific management of water resources through integrated water shed management and the second step is rain water harvesting

12.4.2 Integrated watershed management

In the watershed management, there is an integrated use of agricultural, forestry, techniques for land and water management of a particular region is practised. Watershed is an area whose water flows towards one point. It's a geo-morphological unit, a river basin, which can be used according to the convenience of small natural areas. Watershed management is the overall developmental thinking in which the conservation of soil and humidity, flood control, water harvesting, plantations, feeding gardens, grassland, social forestry etc programs are inclined. Watershed development program in India is run in collaboration of the ministry of agriculture and rural development and ministry of forests.

12.4.3 Rain water harvesting

Rain water harvesting is an important measure of ground water recharge. In a state like Rajasthan where most of the drought and famine continues, rain water harvesting is the primary requirement. Since ancient times, there has been tradition of rain water harvesting in the country. Water was harvested in taal-talaiya, tanks, well, johad, step wells etc. Rajasthan has the following indigenous methods of water harvesting-

1. **Khadeen-** Khadeen is a temporary pond made up of soil, which is built at the base of sloppy land. It has walls of soil on two sides and a strong stone wall on the third side. When the amount of water is high the Khadeen fills and the water moves into the next khadeen. The Khadeen is cultivated when the water dries in it.

Fig. 12.4. Khadeen

2-Pond- Pond is the main ancient technique of storage of rain water in Rajasthan. These were separate for men and women. A well was made at the bottom of the pond, commonly known as Beri. This ancient method of water harvesting still holds its significance and is a scientific basis for increasing the level of ground water.

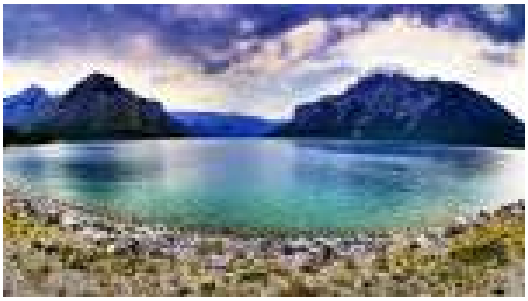

Fig. 12.5 Pond

3. **Lake-** In Rajasthan both types, natural and artificial lakes are found. Lakes have been very traditional system of water storage form ancient times. The water leaking out of the lakes is helpful in increasing the water levels of wells, step wells, kund etc which are situated below it.

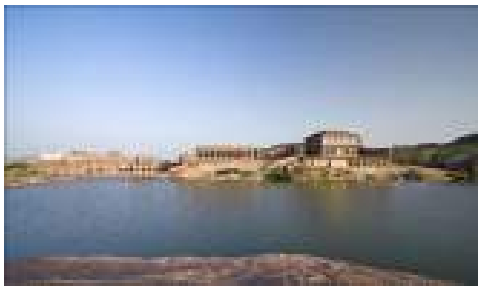

Fig. 12.6 Kaylana lake (Jodhpur)

4. **Step well -** Step well or Baori has its own importance in Rajasthan. These are one of the oldest methods of water harvesting. Stairs and Tibare were made to go down into step well. They are adorned with beautiful art work.

Fig. 12.7 Step well

5. **Toba-** Toba is the traditional source of water harvesting in Thar desert. It resembles that of a Nadi, but its depth is more than Nadi.

Fig. 12.8 Toba

12.5 Conservation of coal and petroleum

12.5.1 Coal

Coal is a solid organic substance that is used in the form of fuel. Coal is very important as a major source of energy, 35-40 percent of the total energy used is obtained from coal. Various forms of coal contain different amount of carbon. Other inflammable and useful products are also obtained from coal. Years ago, due to subdued vegetation, coal was produced. Nearly 30 crore years ago earth was covered with dense forests, kutch fields and water bodies. Vegetation groups fell into the water, died and buried under the layers of soil. Due to the high heat and pressure under earth these remains of organisms get converted in to coal. Coal mainly contains carbon and its compounds. In addition to carbon and hydrogen, nitrogen, oxygen and sulphur is also present. Apart from this phosphorus and some inorganic matter are also found. Based on the quantity of carbon, coal is divided into the following four types-

1. Anthracite (94-98 percent carbon)
2. Bituminous (78-86%)
3. Lignite (28-30%)
4. Peat (27%)

Bitumen, coal gas and Ammonia are produced when coal is heated at 1000-1400 degree celsius temperature in the absence of air.

Pic. 12.9 Coal

This process is called as destructive distillation of coal. In India coal is mainly found in Jharkhand, Madhya Pradesh, Orissa, West Bengal and Andhra Pradesh.

12.5.2 Petroleum.

Petroleum is a very useful mineral that is very much used in daily life. like coal, petroleum is also a fossil fuel. It is also formed like coal, due to the burrying of vegetation and organisms under earth and in long period of time because of extensive heat and pressure they got converted into coal and petroleum. The petroleum found in nature is also called crude oil, unrefined oil, rock oil etc. which is a thick, black coloured liquid that contains different components.

Fig. 12.10 Petroleum

These components are separated by the fractional distillation method. By fractional distillation petrol, diesel, kerosene, natural gas, Vaseline, lubricants are separated.

Coal and petroleum are fossil fuels which are non-renewable resources of nature. These are formed in hundreds of years and their quantity in nature is limited. If humans continue to use them indiscriminately then these resources will end in the future, therefore they should be used very prudently and judiciously. Apart from this, non-conventional sources like air, water and light should be used as an alternative, which are abundant in nature Biogas can be used in place of natural gas.

Biodiesel is obtained from biological sources and is equivalent to diesel as a fuel. It is purely made from renewable resources. This can run traditional diesel engines without any alteration. This is a clean substitute for conventional fuels. It is considered as the fuel of future. It is non poisonous and biodegradable. The good thing about bio diesel is that like other fossil fuels it is not harmful for the environment. Rajasthan Government has set up Bio fuel Mission and Biofuel Authority to promote biodiesel in the state.

12.5.1 Sustainable development

Use of any resources should be cautious so that not only we can use them, but also the generations to come can use them to fulfill their needs.

12.6 Participation of people in conservation of natural resources

Man is a social animal. Clean environment is essential for any society. Human life and health are directly connected with clean environment. Today development has become the cause of destruction. This has caused huge damage to all the aspects of the environment. Though the water, air, land all have become polluted, the human's uncontrolled and irrational economic development journey is continuing. The harmony between the economic development and environment protection has ended. Environmentalists are constantly warning that if natural resources are continue to be exploited, balance between environment

and ecosystem may have to face serious crisis. In spite of all, some successful experiments and mass movements are also running, which are playing their role in maintaining balance in the environment and ecosystem.

12.6.1 Chipko movement

Chipko movement is a progressive step in the direction of protection of forests. Its main purpose is to protect forests from contractors and prevent cutting of trees. This movement has started from Khejarli village in Jodhpur district of Rajasthan, where 363 vishnoi men, ladies and children sacrificed their lives with Amrita Devi Vishnoi.

Fig. 12.11 Amrita devi (Chipko movement)

In 1730 AD wood was required for the construction of the palace of Maharaja of Jodhpur. His soldiers reached Khejarli village and started cutting the trees of Khejri. On hearing the sound Amrita Devi and her three daughters came there and politely requested the soldiers not to cut the trees, but the soldiers did not stop their axes, then Amrita Devi and her daughters hugged the trees. Soldiers cut them along the trees. News spread like fire throughout the village and surrounding areas. People came over there, hugged the trees and sacrificed their lives. In this way 363 people sacrificed their lives to protect the trees. Even today Vishnoi community is committed to preserve the plants and wildlife. After the sacrifice of Khejarli, in 1973 women in Uttrakhand launched the Chipko Movement for the protection of trees. This movement lasted for eight years, then in 1981 government banned the cutting of green trees in areas with height above 1000 mtrs. Sundarlal Bahuguna extended the Chipko movement after the Khejarli sacrifice. Same kind of movement was also run in Karnataka, which was called Appiko. Appiko is a kannada language term which means, to stuck. Today khejarli sacrifice is an ideal for the protection of forests. Khejri trees still remind of the sacrifice and provides inspiration. Khejri is considered as the kalpvriksh of Thar. Its scientific name is *Prosopis cineraria*. In 1983 Khejri was declared as the state tree.

Important Points

1. Human existence depends on natural resources. Natural resources are renewable and non-renewable.
2. Forest are green gold, which requires significant evaluation, plantation and protection.
3. Social forestry is a special program of the people, for the people and by the people for forest safety.
4. Due to the destruction of natural habitat, pollution, population expansion, illegal hunting etc, the wildlife survival is in danger.
5. Endangered species are notified in Red Data Book.
6. Due to the presence of water, Earth is called as Blue Planet. Conservation of water is the conservation of life.
7. Coal and petroleum are mon-renewable sources of fuel. They should be exploited prudently and rationally.
8. Chipko movement was launched to protect the forest from being cut.
9. Amrita Devi Vishnoi wildlife protection award is given for the safety of wildlife and environmental protection.

Practice questions

Objective type questions

1. Who is associated with Khejarli sacrifice-
   (a) Baba Amte
   (b) Sunderlal Bahuguna
   (c) Arundhati Rai
   (d) Amrita Devi
2. Reasons for ground water crisis.
   (a) Pollution of water sources
   (b) Over exploitation of ground water
   (c) More demand of water
   (d) All of the above
3. Red Data Book is related with-
   (a) Endangered wild life
   (b) Rare wild life
   (c) Extinct species
   (d) All of the above
4. Sariska wild life sanctuary is situated at
   (a) Alwar
   (b) Jodhpur
   (c) Jaipur
   (d) Ajmer
5. Which Coal contains highest amount of Carbon.
   (a) Peat
   (b) Lignite
   (c) Anthracite
   (d) Bituminous

Very short type questions

6. What is meant by endangered species?
7. What is a National Park?
8. What are the various methods of irrigation?
9. Flying squirrel is found in which sanctuary.
10. Write down the components of petroleum.

Short type questions

11. Explain the three principles of water conservation and management.
12. What is social forestry?
13. Write the name of different types of coal?
14. What is the meaning of sustainable development?
15. What is meant by wild life conservation?

Essay type questions

16. Write the methods of water conservation and management.
17. Explain the measures for forest conservation.
18. Describe the causes of wildlife extinction.
19. Describe the various traditional methods of water harvesting in Rajasthan.
20. Write an article on the Chipko movement.
21. What are natural resources? Describe different types of natural resources.
22. Describe the different species classified by IUCN.

Answer key

1. (d) 2 (d)
3. (d) 4. (a)
5. (c)