UNIT 17 NATURAL RESOURCES

Structure

17.1 INTRODUCTION

In Unit 16, you have studied changes in the environment due to greater pressure on natural resources to meet the demands of present day world. Now you would be interested to know, what our natural resources are. There are both living and non-living resources on land as well as in the ocean. The living resources include forests, wild life, and creatures living in water or on land. The non-living resources are water in the rivers or under the ground, soil and mineral deposits. Some of these resources are found in abundance, while others are found in limited quantities and that too in some restricted parts of our land or the ocean. Here you would study how these resources are explored. In the next unit you would study how best they can be utilised.

Objectives

After studying this unit you would be able to:

- define renewable and non-renewable resources
- describe types of natural resources available on our earth
- describe the non-conventional sources of energy and explain how they can be tapped for the production of energy for domestic and industrial use
- outline different methods for resource exploration and various ways in which resource mapping is done.

17.2 NATURAL RESOURCES

Resources, or the wealth nature has bestowed on us are essential for civilised living, and therefore, they have to be wisely used. However, it is believed that these resources are being used indiscriminately. This is partly because of the tremendous increase in population and partly because there is insufficient realisation that these resources will one day be exhausted. Industrial and technological progress which the world has experienced has increased the rate at which these resources are being used. A significant factor has been that, for centuries, the resources of some countries have been exported as raw materials to the dominant or imperial countries. The poor countries still have to export some precious minerals to the same countries which are now called developed countries. For example, we are now-a-days exporting cadmium, a soft silvery metal, to foreign countries so as to earn foreign currency to meet our other necessities. The metal is extremely useful and is used for a variety of purposes like making cadmium rods for nuclear reactors and cadmium—silver cells for electronic watches etc. At present, we are not able to make much use of this metal in our country because of the low level of technological development. If tomorrow our mineral reserve of this metal is exhausted, we may be forced to import it at a much higher cost. Some countries which are importing this mineral may be stock-piling it and they will sell it at exorbitant price when our stocks are exhausted.

We should, therefore, know what our natural resources are, what their uses are and how judiciously we can make use of these resources. Careful and planned use will no doubt increase the life span of our resources. For this it is necessary that we are able to explore our natural resources and estimate their reserves. Modern technology has made scientific exploration of natural resources possible.

Our resources are basically of two kinds, viz, renewable and non-renewable. Let us see what they mean.

Some of the resources of the earth are replaced from time to time by natural multiplication as for example, is vegetation. In other words, these resources are inexhaustible and are therefore called **renewable** resources. Forests, pastures, wild life, and aquatic life are renewable resources. Water is also a renewable resource because it recycles. There are some other resources, such as minerals which once used are lost for ever. They cannot be regenerated. Mineral deposits were formed slowly in millions of years. Once a deposit is used, it cannot be regenerated. For example, petrol gets burnt up and cannot be recovered. These are known as **non-renewable** resources. Similarly, the formation of soil is a very slow and long term process and it takes thousands of years. It is, therefore, not renewable in the life span of even several generations of people. Hence it is also a non-renewable resource.

Let us look at some of these resources of our country in detail. To begin with let us see what our renewable resources are.

17.2.1 Renewable Resources

As stated earlier, renewable resources are in principle inexhaustible, because they get regenerated naturally. However, through misuse we can interfere in this natural process and cause irreparable damage to these resources. Water and forests are our main renewable resources.

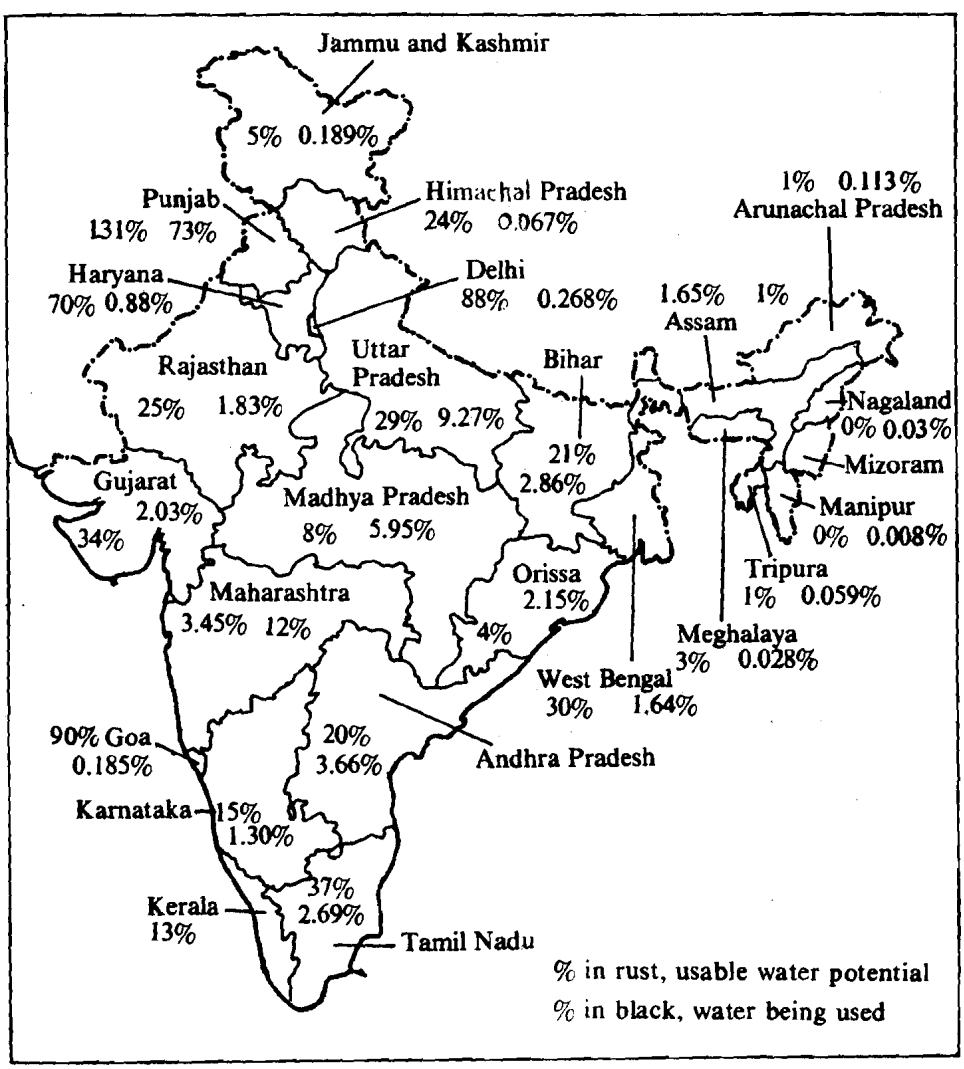

Fig. 17.1: Ground water potential in the Indian Sub-Continent

Water Resources

Water, as you know, is the most essential component of life. Our water resources are limited, though apparently, water is available in an abundant quantity. There is scarcity of usable quality of water in large parts of the world. You will be quite amazed to know that only 2.7% of the total water resources of the earth consist of fresh water, fit for drinking, irrigation and such other purposes. Water flowing in the streams and rivers is only 0.0001% of the total water resource on the earth, i.e., one bucket in 10,000 buckets! Fresh water lakes contain only 0.009% of total water. Ground water upto a depth of about 150 metres accounts for only 0.625%. Water found in the frozen state as snow on high mountains, which cannot be directly used, accounts for about 2.15%.

The total volume of water found in underground reservoirs, called aquifers, which can be pumped out is estimated to be 42.3×10^{10} cubic metres, of which only a quarter is being used, and the rest can be utilised in future for irrigation, industries and homes etc. The hydrological map of India given here (Fig. 17.1) shows that there are many regions of the country, such as parts of Andhra Pradesh and Tamil Nadu, which have a low ground water potential. That is, the amount of ground water is in small quantity in these regions.

From the above, we can see that water which is required for various purposes like irrigation, navigation, generation of hydro-electricity and domestic and industrial needs is rather scarce. It is, therefore, necessary that water resources should be exploited judiciously.

Forest resources

Forests are our treasures, which provide us a wide variety of commodities we use in the form of fuelwood, fodder, fibre, fruit, timber, herbal drugs, cosmetics and many raw materials that are used in wood-based industries. A great many types of animals and birds, which live in the forests, serve as useful living resources. Forests play a great role in maintaining oxygen supply in the air we breathe, and they affect the climate.

Analysis of satellite photographs shows, that in 1982, about 14% of the geographic area of our country was covered with forests of which nearly 11% were closed forests and 3% degraded forests (Fig. 17.2). As a result of increased utilisation of wood and other forest

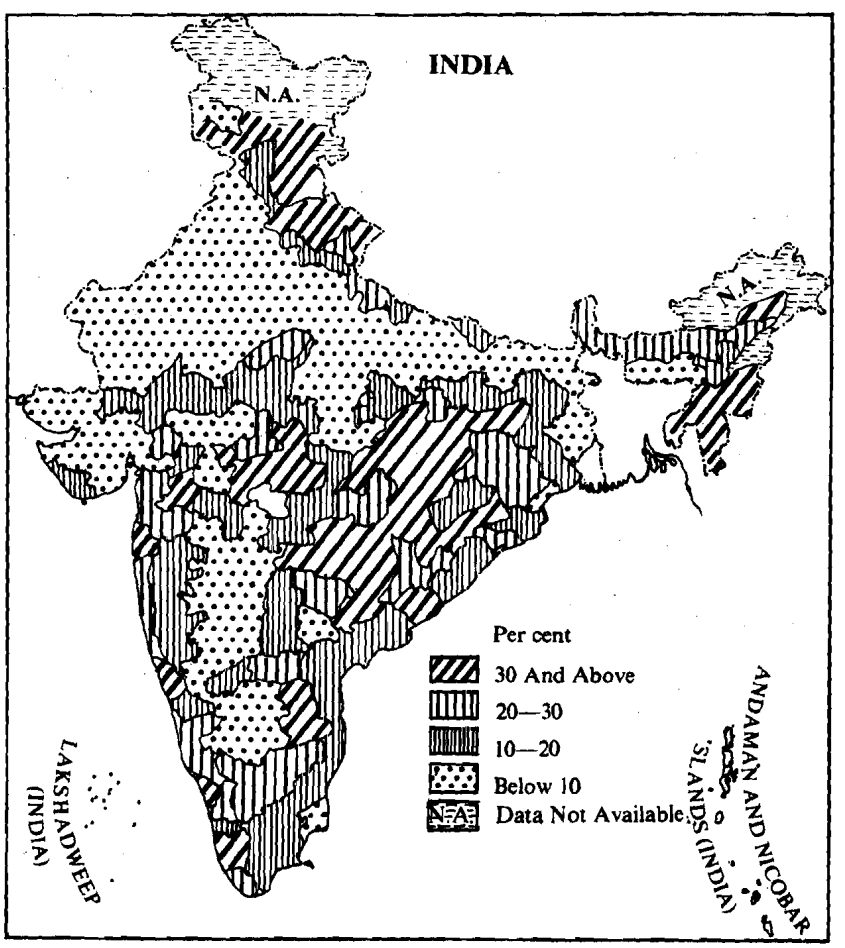

Fig. 17.2: Area under forest cover as percentage of total area

products, without putting in adequate efforts to regenerate them, the forests are known to be fast disappearing. This has caused an environmental imbalance. For example, rain water flows unimpeded over the mountain slopes and often causes floods. The excessive washing away of top soil results in low fertility and decreased production of crops. It is because of these evil effects of deforestation, that a strong policy has been adopted by our government to protect forests and to plant more trees.

17.2.2 Non-renewable Resources

After learning about the renewable resources like water, forests etc., you would like to know what our non-renewable resources such as land, mineral, oceanic resources are. These resources can neither be regenerated nor expanded.

Land resources

Land is a basic resource for us. As you have learnt in the previous unit, it is, in fact, the foundation on which the entire ecological system rests and it is the living ground (habitat) for all terrestrial plants and animals. The capability of land to support life and various activities of man and animals is dependent both on its biological productivity, and load bearing capacity of the soil and rocks.

Land is under great pressure due to increase in population. Our land mass which was, in 1901, inhabited by 238 million people, is now shared by more than 780 million people. Mismanagement of the land resource as a result of indiscriminate cutting of trees or deforestation has caused considerable damage to the quality of the soil and landscapes. Today, per capita land resource available in India is less than 0.4 hectare and it is presumed that with the present rate of population growth, it would be reduced to about 0.33 hectare by the end of twentieth century. Thus, you can realise the magnitude of the pressure on our land resources.

Soil resources

Soil, which forms the uppermost layer of the land, is the most precious of all resources, because it supports the whole life system, provides food and fodder in the form of vegetation and stores water essential for life. It contains sand, silt and clays, mixed with air and moisture. It possesses rich organic and mineral nutrients.

The type of soil varies from place to place. Those soils which are rich in organic matter are fertile. Fertility is also dependent on the capacity of the soil to retain water and oxygen. The following major types of soil are recognisable in the Indian sub-continent (Fig. 17.3).

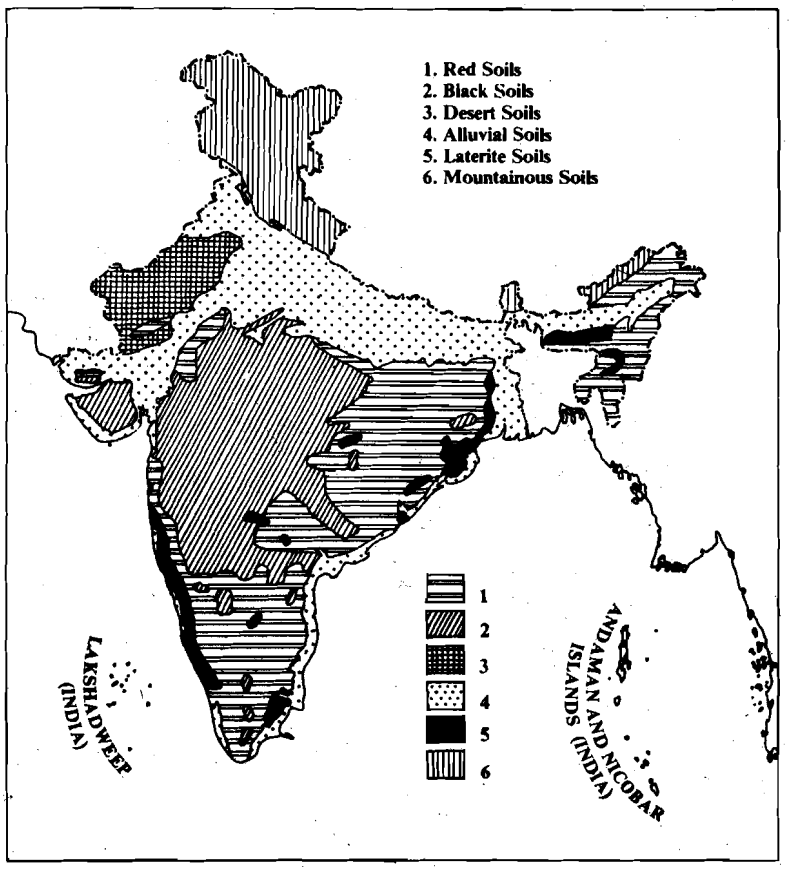

Fig. 17.3: Type of soils found in the Indian sub-continent

i) Deep red soil is found on plateaux and lowland areas of Eastern Bihar, Madhya Pradesh and North Andhra Pradesh, where rainfall is 100-300 cm/year and temperature remains above 22°C. The soil supports rain forests and grasslands and is good for cultivation of potatoes, bananas, pineapples and rubber etc.

ii) The type of soil found on the Deccan and Malwa plateaux of western and central India has a cover of clay and is loamy and black. It is very fertile and supports mixed grasslands, forests, crops of sugarcane, groundnut, soyabean, cotton and rice etc.

iii) The soils of the desert region of western India are low in organic matter and generally considered to have low fertility. However, if water is provided they can be made very fertile. Over-irrigation, on the other hand, leads to salinity of these soils, thus reducing their productivity.

iv) Another type of soil, forms part of the Indo-Gangetic plain extending from Pakistan to Assam. It is found in the delta regions on the coasts of Bengal, Orissa, Andhra Pradesh, Tamil Nadu, Kerala and Gujarat. This soil is characterised by loamy texture, dry composition and variability of thickness from place to place. The soil is highly productive and supports crops of all kind. In the arid conditions, it becomes locally alkaline or saline and is not very productive.

v) The soil that forms part of the low-lying wet land or marshy land in the deltas of Ganga, Godavari, Krishna, Kaveri and in the river basins of Kerala, contains rich organic matter such as decomposed farmyard manure (dung) and plant material (wood peat), and as such is very fertile.

vi) Another type of soil found on the mountainous Himalayan region, which is ash grey to pale yellow-brown in colour, has low fertility and supports coniferous plants such as pines, deodar and oak etc.

The system of soil classification that you have read above is based on their general characteristics. There are many differences within these types of soil which are due to differences in climate and natural vegetation.

Mineral resources

Minerals, natural substances got from the earth by mining, are the backbone of our industries, and hence of commercial and economic use. Now-a-days, minerals such as uranium are also used for generating atomic energy as an alternate source of energy. A great variety of minerals like coal, iron, copper, aluminium, petroleum etc. are indispensable to meeting our day-to-day requirements.

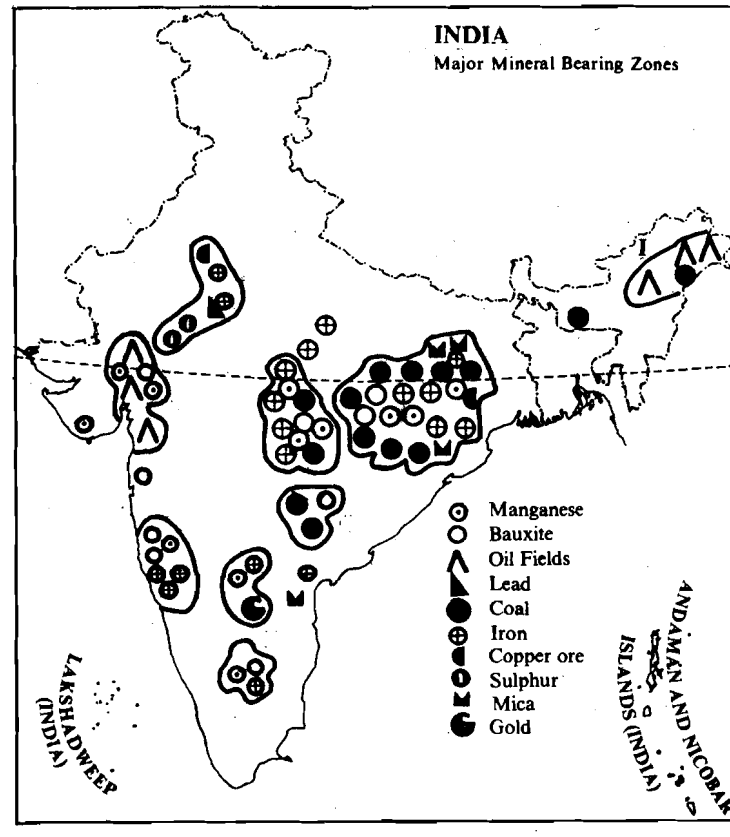

Fig. 17.4: Mineral producing Zones of India

We are predominantly dependent on petroleum for generating energy for all purposes, but the world stock of underground resources of this fuel is believed to be exhausting.

India is self-sufficient in 35 minerals, which are used as raw materials in basic industries. We have iron, aluminium, coal etc. in enough quantity, but for the requirement of phosphates which are used in making fertilisers, crude oil and non-ferrous metals like cop per, zinc and lead, we are dependent, to some extent on imports from foreign countries.

Our mineral producing states are Bihar, Madhya Pradesh, Bengal, Gujarat, Rajasthan and Andhra Pradesh (Fig. 17.4). With the introduction of modern technology, it is now possible to locate the reserves of petroleum on the land as well as in the ocean bed. Pictures sent by the satellites, satellite imageries, help us to pin point the area where mineral deposits are likely to be found in abundance. Earlier, before we had the satellites in space, this was not possible.

Oceanic resources

Various minerals are found in the sea basins. Among the minerals found at a depth of 4000-5000 metres below sea level are the "nodules" or lumps of manganese oxides (Fig. 17.5) and sulphides of cobalt, nickel, copper and iron. India is also trying to exploit this resource. Today more than 1/5th of the world's oil and natural gas production comes from offshore wells. The Bombay High, for example, has petroleum reserves of the order of 7,400 million tonnes. Deltas of the Kaveri, Godavari and Mahanadi are also found to have big deposits of natural gas and oil. The coastal sands of Kerala and Orissa contain many valuable minerals such as monozite (raw material used in generation of atomic energy) and zircon. Many other metals like tin, gold, platinum etc. are also found in the deposits on the coast.

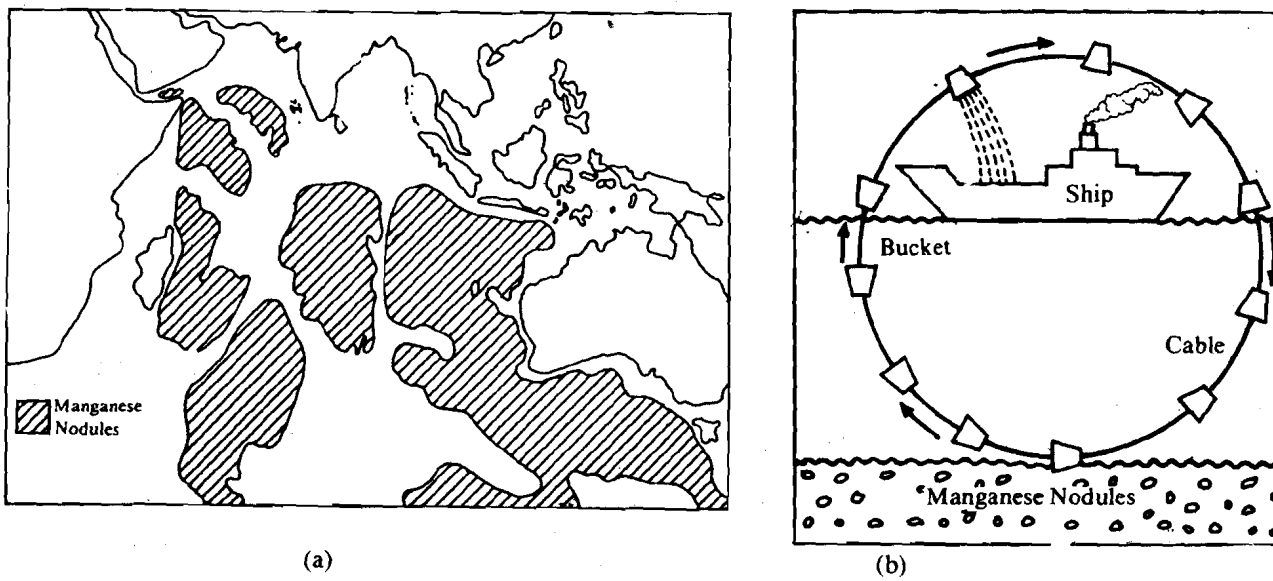

Fig. 17.5: (a) Distribution of manganese nodules in the Indian Ocean; (b) Technique of ocean bedding.

The living resources of the ocean such as fish and plants serve as good food to meet the needs of the people or as a source of some medicines.

SAQ 1

a) Complete the following statements:

i) Resources which are inexhaustible are called ..... and the resources which once used are lost for ever, are known as .....

ii) Forests, pastures, wildlife and aquatic life constitute .....

iii) The capability of land to support life and various other activities depend on its ..... and .....

iv) The uppermost layer of the land forms .....

v) Fertility of soil depends on the capacity of soil to retain .....

vi) The deep red soil found on plateaux and low-land areas of Eastern Bihar, Madhya Pradesh and North Andhra Pradesh is good for the cultivation of. .....

vii) The type of soil found in the mountainous Himalayan region is ..... in colour.

b) Answer the following questions:

i) Why is there a scarcity of usable quality water?

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ii) What are the two major environmental imbalances caused by deforestation?

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iii) Name four important minerals which are used as raw materials in the industries of our country.

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iv) Give two reasons for increasing the importance of the exploitation of oceanic resources.

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17.3 ENERGY : A NON-CONVENTIONAL RENEWABLE RESOURCE

The demand for energy doubles every 14 years and is taken as one of the indicators of development of a country. India, with 16% of the world's population consumes only 1.5% of the total energy produced in the world, in comparison to USA which has 6.25% of the world's population and utilises 33% of the energy produced. This gives us an idea of the low level of our development and should be an incentive to better utilisation of our resources for generating more energy, so that we can meet our growing demands of energy. Even today, about 80% of our population continues to depend on fuelwood, dung and agricultural wastes. We know that non-renewable reserves such as fossil fuels, coal and petroleum, are not going to last for long. Forests are also being depleted at a fast rate due to indiscriminate felling of trees. Therefore, it has become necessary to think of alternative, non-conventional sources of energy. Some of these sources of energy are discussed here.

Solar energy

The energy we get today from the fossil fuels like coal, is in reality sun's energy, trapped in them millions of years ago. Plants make their food and grow because they use solar energy for photosynthesis. Millions of years ago, huge forests got buried in the earth's crust and under great pressure and temperature, they were converted into coal or oil. Hence coal and oil are called fossil fuels. Solar energy is the great source for production of vegetation which serves as food and fuel for us.

Solar run refrigerators have been developed for rural areas. These keep vegetables, fruits fresh for a longer period.

However, nowadays, we have learnt to trap solar energy for various purposes. Solar energy can be used directly to give us hot water during winter (Fig. 17.6), or run a refrigerator. It can be used for heating rooms (Fig. 17.7) in colder regions. It can also be used, with the help of a "photocell" to produce electricity for driving vehicles and illumination of streets (Fig. 17.8). In a desert like Rajasthan, the earth's surface receives solar energy at the rate of 200 watts per square metre per hour. Since this is an unfailing source of energy, it would be a great advantage to develop cheap and efficient photocells or photovoltaic devices to harness solar energy. A feature of using solar energy is that it can be generated where needed. Solar cookers are being used in many homes to cook food. Photocells are also becoming common, though their efficiency has to be improved and their price brought down.

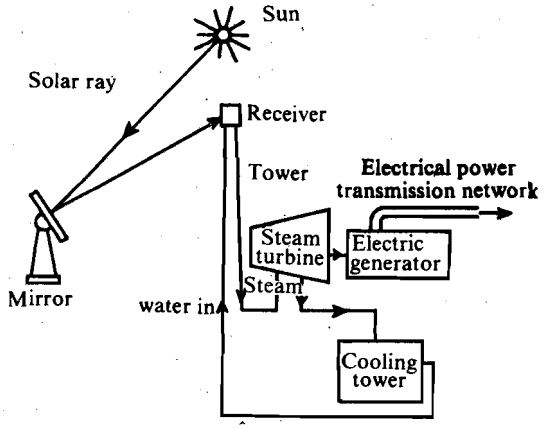


Fig. 17.6: Solar energy being used for heating water

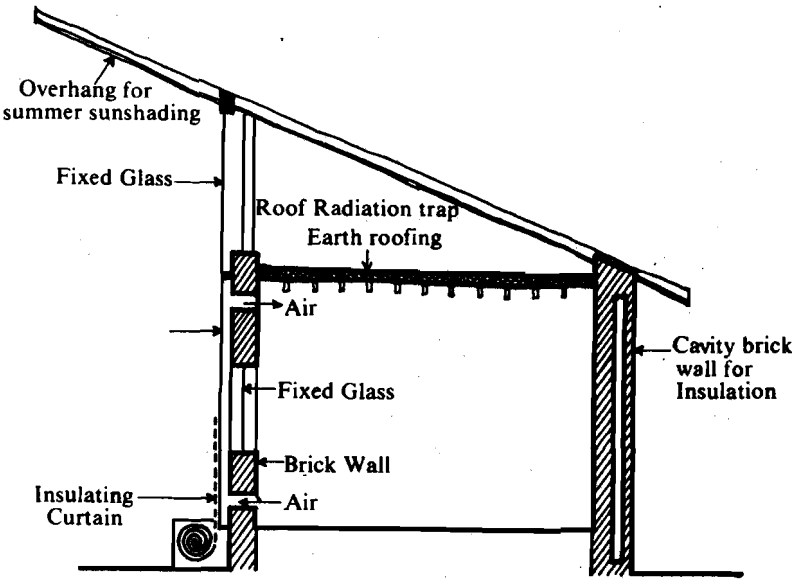
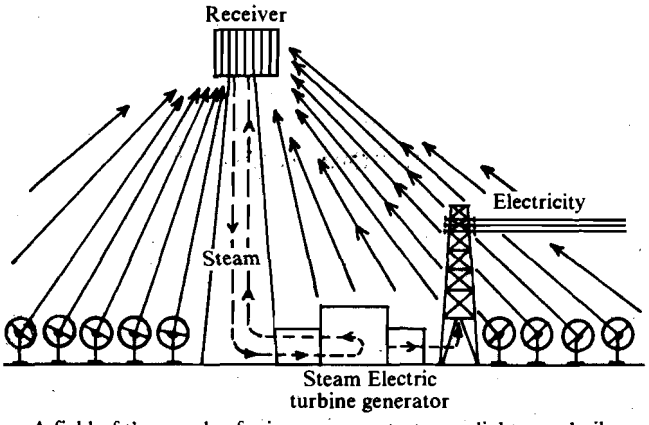


Fig. 17.7: Solar heated room



A field of thousands of mirrors concentrates sunlight on a boiler mounted atop a 300 foot tower to produce steam, which is used to generate electricity.

Fig. 17.8: Method of tapping solar energy for electricity

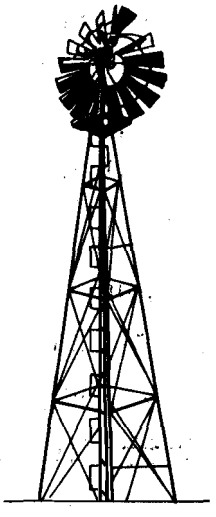


Fig. 17.9 A wind mill

Wind energy

Like solar energy, wind flow can also be harnessed to obtain mechanical energy for fetchin water from the wells or from rivers. Once the windmill (Fig. 17.9) is turning due to force of the wind, it may as well run a generator to get electrical energy. In the coastal and hilly regions, where wind blows at high speed, a wind mill can be used for the supply of electricity to a small town. Windmills have been used since long in many countries, but in India they have only been recently introduced.

Wave and tidal energy

Waves and tides are another source of energy which is perpetual and can be converted into electric energy, particularly where sea water can move into a narrow cut, such as is provided naturally where rivers flow into the sea. Energy carried by water has also been widely used in India's hilly regions, since a wheel with pedals can be made to turn when it is put in a fast flowing stream. Flour mills of small size built on this principle were used in Kashmir for long time. In fact, large "hydroelectric" power stations work on the same principle. A natural or artificial water fall is made to turn a modern kind of pedal wheel, called a turbine, which rotates and causes electricity to be generated.

Geothermal energy

Hot water and superheated steam of hot springs are a natural phenomenon and can be used to generate electricity. In our country there are 46 hydrothermal areas where the temperature of the spring water exceeds 150°C. These hot springs can be used to generate electricity for heating homes, or glass-houses to grow vegetables.

Atomic energy

In view of the fast depletion of our non-renewable resources like coal and petroleum, and because of pollution which power stations burning coal cause, there has been a move to use other means of obtaining energy. Since the energy of the atom had already been unleashed in the form of a bomb, efforts were made to release atomic energy in a controlled manner. The device used for this purpose is called an atomic reactor (Fig. 17.10). Nuclear reactors produce heat, which is commonly used to raise steam, which rotates turbines and generators of electric power. It is estimated that 1 kg of natural uranium, written as U^{23}, generates energy equal to that produced by 35,000 kg of coal. Thus production of energy from nuclear fuel like uranium is efficient, and since great loads of coal or diesel are not consumed daily, this energy is convenient. Nuclear reactors need to be situated at places far away from habitations. They have to be operated under strict safety control, so that there are no accidental leakages of radioactive material. The radioactive wastes have to be carefully disposed off. India is very short of energy and all of you may have heard or experienced power cuts or load-shedding. We have plans to set up several nuclear reactors to generate a good position of our total power requirement.

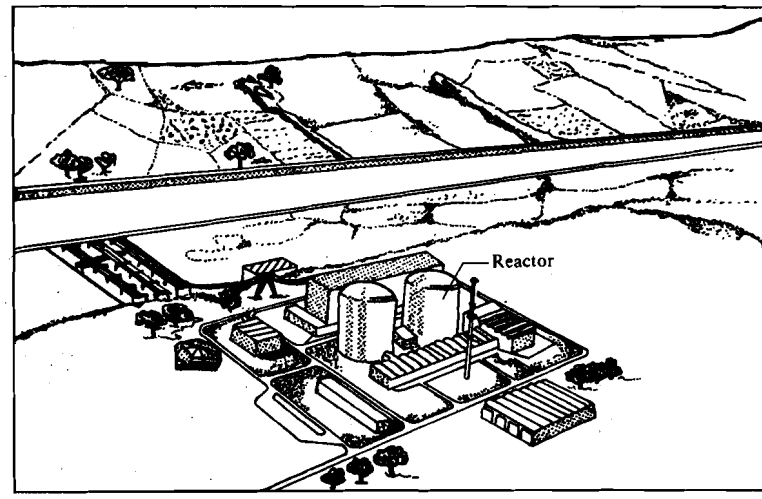


Fig. 17.10: A view of Narora Atomic Power Station

Biogas

You may have heard of the use of cattle dung for production of biogas which is used for cooking (Fig. 17.11). Water weeds like water hyacinth, water lettuce, salvinia, hydrilla, duck weeds and algae are found to be useful supplement to cattle dung. Biogas can be used not only as cooking gas, it can also be used to raise steam, which can be used for running engines or machines in the factories or for running turbines to generate electricity. It has been found that large biogas plants can supply the needs of a number of families or even small villages. What is left over after generating the gas, can be used as manure. Hence this is also an economical way of getting more energy. That is why in countries like China or India, great efforts are being made to instal tens of thousands of biogas plants in rural areas. Now that you have studied about various kinds of resources, you would like to know about the methods used for exploring these resources. But before that, you may try the following SAQ.

Fig. 17.11: A village lady using biogas burner for cooking food.

SAQ 2

Tick mark (√) the correct answers in the statements given below:

i) Solar energy is a:
   a) renewable resource
   b) non-renewable resource

ii) Plants manufacture their food by using:
   a) energy from fossil fuels
   b) solar energy
   c) energy from organic nutrients

iii) Use of non-conventional source of energy like solar energy, biogas, wind energy is gaining importance over conventional sources such as wood, coal or other fossil fuels because it is:
   a) cheap
   b) pollution-free
   c) both cheap and pollution free

iv) Reactor generates:
   a) Biogas
   b) Geothermal energy
   c) Atomic energy
   d) Tidal energy

17.4 METHODS OF EXPLORATION OF RESOURCES

Exploration of resources involves complex techniques which depend on the physical, chemical and biological properties of a particular resource. Now-a-days, in our country, much of the exploration is done by analysis of photographs taken from aircraft or spacecraft (satellites) and other data supplied by the sensors mounted on these vehicle by a method called' remote sensing'. You may like to know something about the methods used for exploration of resources.

17.4.1 Conventional Methods

In olden days, discovery of minerals or of petroleum was purely accidental. People used to know about the hidden treasures of the Earth, when they used to dig out land for water or for construction of houses. Sometimes, while tilling land, farmers struck luck and discovered precious metals and minerals. However, in this way, they could only hit upon the mineral wealth which lay close to the surface. Now, many techniques are used for systematic exploration of the hidden resources, and drilling or digging is undertaken when preliminary surveys have clearly indicated what is underneath and how much is likely to be found.

17.4.2 Remote Sensing Method

Principle

Remote sensing is a method of collecting information about ground objects like soil, water, vegetation and minerals, from a remote place, such as an aircraft or a satellite. This technique not only enables us to locate various resources, but also helps us to know about their quantity and quality. The simplest device could be a camera carried by an aeroplane to photograph large areas of land systematically. Television cameras could be mounted on satellites and they could take pictures showing details of clouds, water, forests or buildings on the earth. Both these are "optical" methods of remote sensing because visible light is used by the cameras. But one could send out radio waves from the satellites and observe how they are reflected or absorbed on the surface of the earth. Usually radio waves of wavelengths as small as a few centimetres called 'microwaves', are used for such studies, because these waves penetrate through clouds and their reflections also go through the clouds to reach the satellite. Similarly, infra-red signals can be sent from the satellite and reflections studied to reveal the nature of the reflecting surface.

Remote sensing of water resources

Radio waves of the shortest known wavelengths are called 'gamma rays'. These are given off by atoms of several elements. As a result, the ground soil sends out gamma rays which

can be picked up by detectors in the aeroplanes or satellites. This emission is affected by the presence of moisture or water in the soil and hence, it can be easily detected whether or not the soil holds water. Moreover, in the pictures taken from space, the wet soil will have altogether different appearance compared to dry or waterless soil. Due to the presence of moisture, the water rich soil will not only show day time (diurnal) variation in temperature on its surface, but will also have a cover of vegetation. Analysis of the type, density and pattern of the vegetation growing on the wet soil helps us in locating the areas of potential ground water. Similarly, the belts of hotsprings may be identified and will show up in thermal or infra-red detectors.

Survey of the vegetation cover

Forests of deciduous trees which shed leaves in a certain season can be easily identified with the help of pictures taken from the spacecraft specially during autumn when the deciduous trees shed leaves and there is no snowfall as yet to conceal the vegetation.

Vegetation cover can be surveyed by measuring and analysing infra-red reflection, or with the help of photographs. The density of vegetation, shape and size of the plants and even size, orientation and health of the leaves can be studied from afar. The pattern of seasonal growth of deciduous trees is different from that of the coniferous trees like pine and deodar and thus the difference can be detected in the photos taken by the spacecraft.

Plants absorb solar energy to make carbohydrates. A part of the absorbed energy is given out and therefore the leaf temperature remains 10-15°C higher than the surrounding air temperature during sunniest part of the day, and about 5°C below the air temperature at the coolest hour of the night. So by measuring ground temperature from a distance, the presence or absence of vegetation can be detected.

Search for mineral deposits

Aerial photos and satellite pictures show very clearly if there is a break in the continuity of layers of rock, or other unusual features on the surface of the earth. The distinctive linear features are found to be very common centres where mineral deposits and ground water are accumulated. Radio waves and magnetic measurements also provide information about minerals and oil under the surface.

17.4.3 Types of Resource Maps

Generally, several types of maps, based on the type of resources, are prepared. Some of these are:

Soil Maps showing the types of soil (Fig. 17.3), their composition and biological productivity.

Mineral Maps showing locations of various kinds of mineral deposits in relation to settings of the earth's crust.

Hydrological Maps show presence of underground water aquifers, i.e., rock formation containing water in recoverable quantity, in terms of the depth of water table (Fig. 17.1).

Snow Cover Maps demarcate the extent of snow packs on high mountains.

Resource mapping

Using various techniques, Resource Mapping is done to locate different resources like water, minerals, forests, vegetation as well as the types of land. Mapping of resources makes it possible to visualise how land use could be managed to best advantage. The rural land use map tells us about the health of forests and the state of deforestation, about pastures, and agricultural crops. It also tells us how much land and of what kind is unutilised. The urban land use maps show housing, commercial buildings, sports facilities, essential services such as roads, water supply and disposal of waste etc. Likewise, the preparation of **regional land use maps** will focus upon the broader aspects of development such as land used for agriculture, industrialisation and urbanisation, for obtaining natural resources (forestry, mining etc.), water resource development (dams, reservoirs and canals), transportation net work (rails, road etc.) and also the zones prone to natural hazards like floods, cyclones, earthquakes, landslides and avalanches etc.

SAQ 3

Which of the following statements are true and which false. Write (T) for true and (F) for false.

i) In remote sensing, visible light can be used by the camera for collecting information from the surface of the earth. [ ]

ii) Analysis of density and pattern of vegetation growth on the wet soil helps us in detecting areas which have potentials of ground water. [ ]

iii) Deciduous forest, which does not shed leaves, can be identified with the help of the pictures taken from the space-craft during winter when trees are concealed by snow. [ ]

iv) The linear features on the surface of the earth are very common centres of mineral deposits and accumulation of underground water. [ ]

v) The preparation of urban map helps us in identifying the health of forest and the state of deforestation, about pastures and agricultural crops. [ ]

17.5 SUMMARY

In the present unit you have studied about two categories of natural resources viz.

i) Renewable resources, such as water and forests.

ii) Non-renewable resources, like minerals, fossil fuels and land.

- You have learnt that it is important to make best use of the limited resources we have got on our earth. Besides this, you have also learnt about various sources of energy like the sun, wind, waves, hot springs, atomic energy and biogas etc. which can be used as alternate sources of energy.
- You have also studied various ways through which exploration of resource is done, particularly with the help of aircraft and satellites, which are able to "see" large tracts of the earth's surface at once. This helps in locating new resources and monitoring deforestation.

You have been acquainted with various types of maps, indicating the type of resources, their quality, quantity and more precisely their location.

17.6 TERMINAL QUESTIONS

Answer very briefly the following:

1 What do you understand by renewable and non-renewable resources?

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2 What are the various mineral resources which can be recovered from the ocean?

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3 How is biogas helpful in meeting the energy crisis of people living in rural areas?

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4 What are the methods used for resource exploration?

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5 How are hidden resources of water investigated?

6 How is the quality of a forest surveyed through satellite imageries or air photos?

17.7 ANSWERS

Self Assessment Questions

1) a) i) renewable resources, non-renewable ii) renewable resources, iii) biological productivity, load bearing capacity of the soil and rocks, iv) soil, v) water and oxygen, vi) potatoes, bananas, pineapples, rubber etc., vii) ash grey to pale yellow-brown.

b) i) only 2.7% of the total water resources of the earth is fresh water which is used for drinking and other purposes.

ii) Oxygen supply in the air is lost and due to rain soil erosion and flood occur.

iii) Coal, iron, aluminium, tin etc.

iv) Firstly various minerals like nodules of manganese oxide and sulphides of cobalt, nickel, copper, iron etc. are found in the sea basin. Secondly there are big deposits of natural gas and oil in the sea.

2) i) a, ii) b, iii) c, iv) c.

3) i) T, ii) T, iii) F, iv) T, v) F.

Terminal Questions

1 Some of the resources of the earth grow and go on multiplying naturally such as vegetation, forests, pastures, wild life, aquatic life etc are renewable resources. Whereas the other resources like minerals, coal, petroleum etc which are once used are lost for ever, are known as non-renewable resources.

2 Various minerals like nodules or lumps of manganese oxides and sulphides of cobalt, nickel, copper, iron are found in the sea basin. Besides, petroleum, natural gas and oil are extracted from the sea.

3 The raw materials such as water weeds, cattle dung etc which are used for the production of biogas, are found in abundance in rural areas. If the use of the biogas for kitchen cooking is encouraged, the fuel or energy crisis can be solved to a greater extent.

4 In olden days discovery of minerals and oil was purely accidental. People used to come across the hidden treasures of the earth while tilling land for agriculture or construction. These days remote sensing device is used to locate resources like soil, water, vegetation, minerals etc.

5 The ground soil sends out a kind of radio waves of the shortest known wavelengths, which can be picked up by detectors in the aeroplanes or satellites. The emission is affected by the presence of moisture or water in the soil and hence it can easily be detected whether or not the soil holds water.

6 The quality of the forest cover can be surveyed by measuring and analysing infra-red reflection or with the help of photographs taken from aeroplanes or satellites.