UNIT 1 INTRODUCTION TO HUMAN ENVIRONMENT

Structure

1.1 INTRODUCTION

We live on earth in different types of surroundings. This surrounding is our environment. We eat, breathe, clothe ourselves, reproduce and then die. The next generation comes and the cycle goes on; and the human race flourishes on earth. The physical environment on the earth provides favourable conditions for the existence and growth of different life forms, including man. These living beings constitute the biological environment. Both the physical and biological environments are in a close interaction with each other and form a stable self perpetuating system. In prehistoric days man lived in harmony with nature but in the course of his evolution man has developed a new type of environment, the man-made environment. Man is a social animal; the socio-cultural environment also plays an important role in his life. In this unit you will study these three types of environments i.e. natural, man-made and social environment. In the next unit you will learn about the global patterns of climate in general and about the climate and resources in various regions of India in particular.

The environment is constantly changing and this affects life on earth; some of these effects can be lasting and irreversible. So we must realise that we should be concerned about environment. Finally we bring in a note of caution regarding the consequences of environmental mismanagement by relating two case studies Bhopal disaster and Chernobyl accident.

Objectives

After studying this unit you will be able to :

- define environment, list and describe the components of natural, man-made and social environment,
- identify features of man-made environment and distinguish between natural and man-made environment,
- suggest ways in which human beings may be made aware of the environment, and
- cite examples of the potential hazards of industrial development in case due precautions are not taken.

1.2 WHAT IS ENVIRONMENT?

Each and every living organism has specific surroundings or medium with which it continuously interacts, and to which it is fully adapted. This surrounding is the 'natural environment'. The word 'natural environment' brings to mind broad aspects of landscape, such as soil, water, desert or mountains which can be more exactly described in terms of

biological influences. **Thus, environment is the sum total of living and non-living components; influences and events surrounding an organism.** Living components are called **biotic components** while non-living are called **abiotic components.**

No organism can live alone without interacting with other organisms so each has other organisms as a necessary part of its environment. We know that all animals are directly or indirectly dependent upon green plants. However, plants also depend on animals for a few things such as pollination of flowers and dispersal of seeds or fruits.

Let us try to understand the concept of environment with some examples. Figure 1.1 shows a pond. What would be the components of its environment? The abiotic factors in the pond's environments are light, temperature and water in which nutrients, oxygen, other gases and organic matter are dissolved. The biotic components include microscopic as well as larger plants and animals. The plants are of different kinds such as phytoplankton, partly submerged plants and plants growing around the edge of the pond. The animals consist of zooplankton, bacteria, insects, worms, molluscs, tadpoles, frogs, ducks and several kinds of fishes. The characteristic features of the pond will also depend upon such abiotic features as the intensity and amount of sunlight, altitude, temperature, depth of water and nature of the underlying rocks etc.

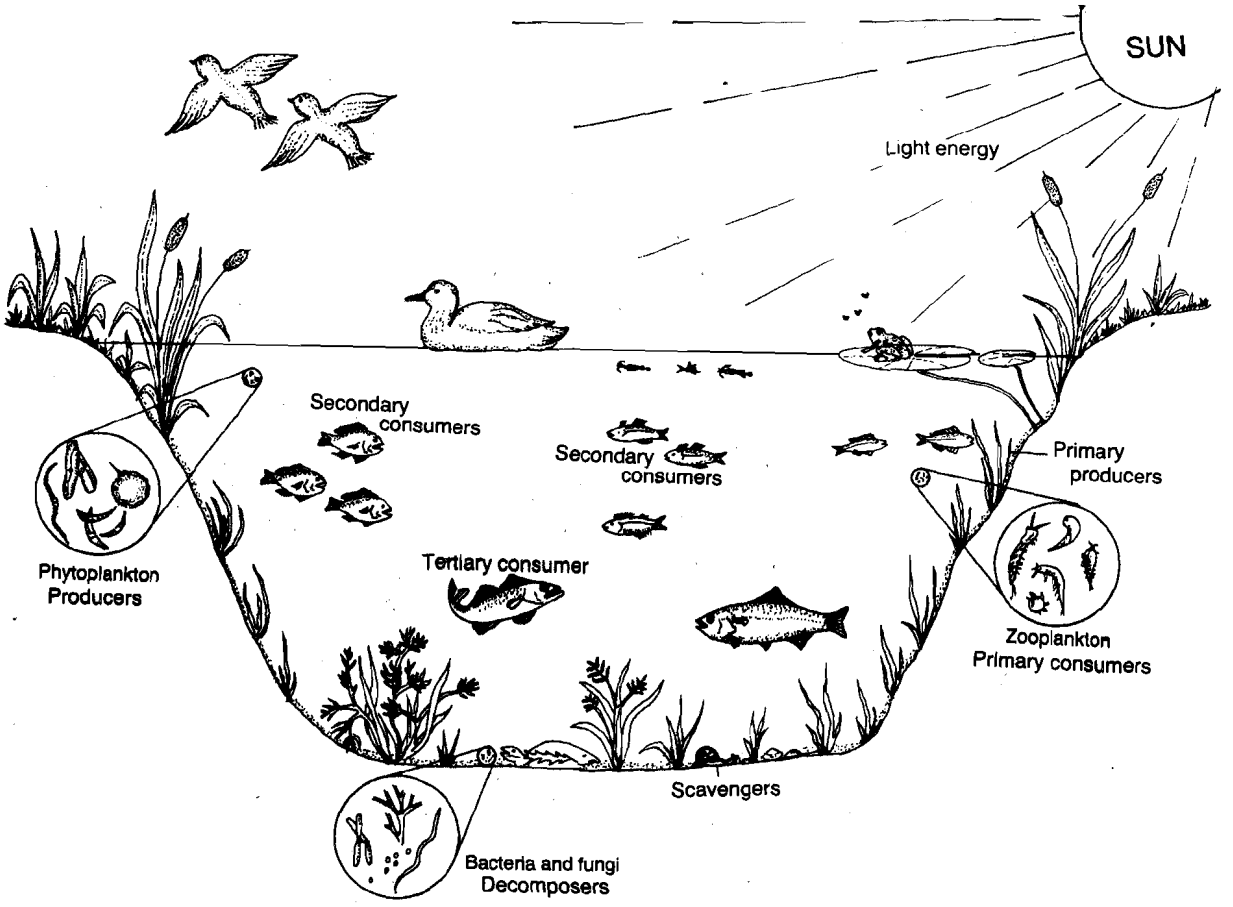

Fig. 1.1: The pond ecosystem.

Now we consider another example, of fish in this pond. The living and non-living constituents in the pond would make the environment of the fish. We can call it the external environment. There is another environment within the body of fish, its internal environment. The body surface acts as an exchange barrier between the external and the internal environment. The internal environment is relatively stable as compared to the external environment. However, it is not absolutely constant. Illness, injury or environmental stress can upset it. But when the cause for the upset is removed, internal environment comes back to its natural condition.

1.2.1 Natural Environment and its Components

Environment includes a number of components. For convenience we have divided them into two categories: abiotic and biotic.

Environmental Factors

Abiotic	**Biotic**
Energy	Microbes
Radiation	Plants
Temperature and heat flow	Animals
Water	(including human beings)
Atmospheric gases and wind	
Fire	
Gravity	
Topography	
Geological Substratum	
Soil	

Living beings normally cannot exist more than a few kilometers below the surface of the earth, or more than a few kilometers above it. Life occupies an incredibly thin 'skin' at earth's surface. This is known as the biosphere. The biosphere includes four major environmental categories or **habitats—marine, estuerine, fresh water** and **terrestrial**. The terrestrial habitat is further classified in **biomes** about which you will study in later units.

All the four habitats have sub-types, which have a typical set of physical and biological features and form different ecosystems. Thus, ecosystem is a natural unit of biosphere which is composed of abiotic and biotic components whose interactions result in a stable self-perpetuating system.

Among the main abiotic components of an ecosystem are climatic factors such as solar radiation, temperature, wind, water currents, rainfall; physical factors such as light, air pressure, geomagnetism; and chemical factors such as oxygen, carbon dioxide, acidity, salinity and the availability of inorganic nutrients needed by plants but which affect animals and plants alike. The biotic factors in an ecosystem are the totality of all living organisms and their organic by-products. This includes each and every plant and animal, irrespective of its size, ranging from bacteria in soil and sediment to large mammals.

In considering ecological factors separately for distinguishing and measuring the effects of each, one must remain aware that in nature these factors never act alone. The "real life" of organisms involves the simultaneous and continuous impact of all existing ecological factors. You will read more about the biosphere, the structure and functioning of ecosystems and the impact of ecological factors on an organism in the next unit. On the basis of what you have read above, you may try the following SAQ.

SAQ 1

a) List abiotic and biotic factors of the environment in which you are living (specify the place).

.....

.....

.....

.....

.....

.....

b) Put (√) against the correct statement and (×) against the incorrect statement.

i) There is no interaction between abiotic and biotic components of an ecosystem [ ]
ii) Geomagnetism is a biotic factor. [ ]
iii) Each abiotic factor operates in isolation. [ ]

iv) Organism is subjected to many influences at the same time and the effect of one factor is usually modified by the other factors. [ ].

1.2.2 Man-made Environment

So far we have discussed only about the natural environment but there are several components of environment which are created by man. Thus, environment is a totality of natural plus man made environment, the latter including crop fields, cities, industrial space etc. (Fig. 1.2). These are the places which are artificially made by man by planned manipulation. To understand the artificial nature of this environment we can take an example of man in a city.

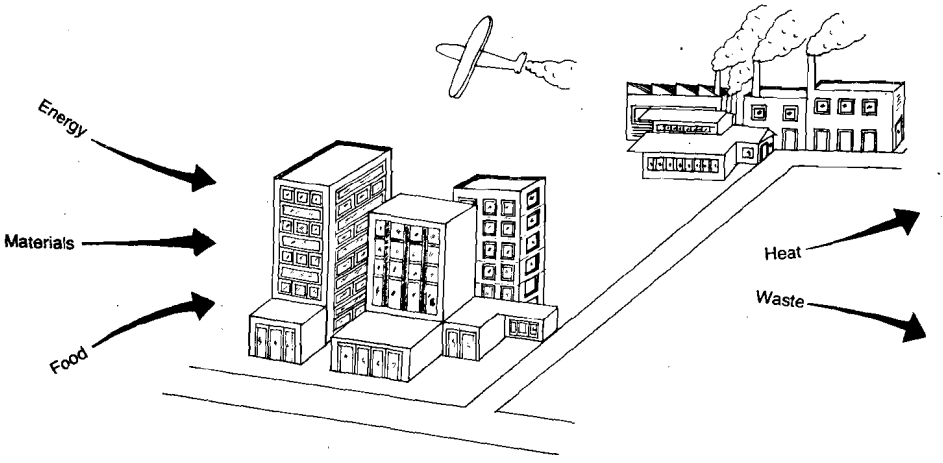

Fig. 1.2: Man-made environment.

The city environment is created by man himself. One of the most important components of life, i.e., water is not taken from streams directly. It is filtered and purified and then used for drinking and other municipal purposes. The metabolic wastes and garbage are not disposed off locally but are carried for treatment or for dumping to a remote place, away from the city Food for the people in cities often comes from rural areas.

City atmosphere is generally more polluted than that of the rural areas. Factories, vehicles and power plants contribute to pollution of the atmosphere. Residences of city people are made up of bricks and cement, not of mud with thatched roof. So, resources are continuously drawn from rural area for the buildings. The modes of transport are cars, buses, trains, etc., which consume large amounts of energy and pollute the atmosphere. Man has manipulated the environment in a way that suits his convenience and luxury (Fig. 1.3).

Fig.1.3: Modes of transport are a major source of pollutants in cities.

Man-made environment results in consumption of excessive amount of materials and energy, necessiating care, supervision and management, and often interfers with the natural environment. Man-made environment of developed countries has changed very much because an average man in developed countries has far more facilities than even the rich people in developing or underdeveloped countries. Let us look at some of these transformations.

Residential

Human settlement is essentially a total concept which is applicable to a city, town or village. Each has a basic organisaion with its own social, economic and cultural aspects.

The basic requirements include housing, water and sanitation, transport, communication, food, energy, education and health. Shelter is one of the most important needs, with potable water and sanitation coming next.

In olden days, most human settlements used to be along river banks which provided some basic facilities. Economy was agrarian and people mostly lived in rural areas. With the growth of trade and commerce, cities came into being. As population started growing, people started migrating towards towns and cities. Today, the most important cause for migration is rural poverty. Rural people come to towns for earning a livelihood. It may be mentioned here that man-land ratio in India is one of the lowest in the world. Though people migrate to urban areas to better their prospects the reality of life is harsh; many of them have to spend their entire life on pavements.

According to 1981 Census, over 40% of our population, particularly in the rural areas, is below the poverty line.

Let us study the residential and related facilities in rural and urban areas and the environment in which people live.

Bulk of our rural people live in very bad conditions, in make shift huts under leaky roofs often infested with insects and pests. Inhouse sanitation facilities are not available, so there is open-air defecation. Clean, piped water supply is absent. So is the sewer system. Open drains wherever they exist do not work because of poor maintenance. The atmosphere in the countryside, however, is not polluted because the traffic is not so heavy, and there are no factories, mills etc.

Let us see the residential conditions of urban people. Population growth and migration of the poor from small towns and villages is a continuous process. Unable to meet the staggering demand for basic civic amenities, our cities have become teeming hovels of dirt, diseased and crime. Housing in urban area, mostly in big cities, is the biggest problem. Population pressure is felt in the cities with an ever increasing number of pavement dwellers. This has resulted in the paradox of sky scrapers, coexisting with slums (Fig. 1.4). The atmosphere is polluted by excessive traffic, factories, mills and domestic smoke.

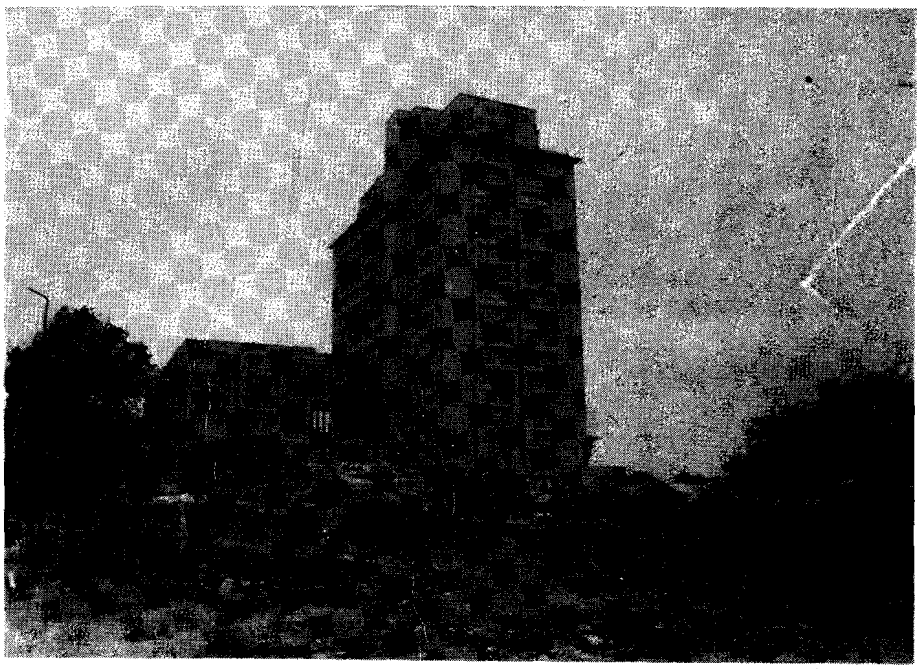

Fig. 1.4: Increasing urban population has resulted in slums coexisting with sky-scrapers.

Work Place Including Agricultural Fields

In earlier days it was all natural environment and man was a passive participant in the natural processes. But the growth of agriculture and industry has changed everything — buildings, roads, railways, water-supply lines, cables for telecommunications, sewers, and several other kinds of infrastructure which had to be provided has changed the environment. Living conditions in developed countries may have improved, but these are based on a high level of energy consumption and exceedingly expensive system of transportation.

In developing countries, most of the people are denied the essential urban amenities and services. Urban amenities are only for the upper rich strata who can afford them at the expense of others. But factors such as noise, pollution and physical stress are borne by all the people living in an area. It is well known that if there is an undesirable change in physical, chemical or biological properties of air, land or water, it will always result in harmful effects. The poor have to suffer these harmful effects without any compensating advantage of urban amenities or services.

India is an agricultural country, so let us see how the crop yields have changed from earlier days. As the population is growing day by day, we have to keep the pace of crop yield with growing population. The present day agricultural production depends upon high inputs of energy and materials in the form of deep ploughing, fertilisers, irrigation, and use of pesticides to protect the yield. There is an increase in yield but side by side there is an increase in salinity, depletion of soil, and pollution of soil and water. Intensive agriculture can also have an adverse impact on civilisation. This can be inferred from the fact that large centres of agriculture based civilisations in the past disappeared leaving only desert, as in Sindh, Middle East, Abyssinia and Central Amercia. To sustain our agricultural production, proper and judicious use of available land acreage is necessary. Soil fertility has to be increased through balanced use of synthetic fertilisers and organic manures, introduction of high yielding as well as disease resistant varieties, mixed cropping, balanced utilisation of available water resources, proper weed control, proper conservation of germplasm resources, and avioding soil erosion and loss of nutrients through maintenance of a vegetation cover round the year.

The site of Mohenjodaro and Harappa was heavily forested and had a lush green countryside at one time.

We will take up social environment in the next sub-section. Try the following SAQ to see if you have understood what we have discussed about the natural and man-made environment above.

SAQ 2

In the following put a tick (√) in the box for correct statement and a (×) for wrong statement:

i) Man-made environment is independent of the natural environment and never interferes with nature. [ ]

ii) Man-made environment is extracting the natural resources at a fast rate and causing imbalance in natural environment. [ ]

iii) In developing countries most of the people are denied many urban amenities and services. [ ]

iv) The modern intensive agriculture would have adverse impact on civilisation. [ ]

1.2.3 Social Environment

You already know that man lives in an environment where both abiotic and biotic factors affect him. He learns to adapt himself to these in several ways. There is also another kind of environment which plays an important role in man's living conditions, this is the social environment.

Social environment includes cultural norms and values. Political, economic and religious institutions constitute an important part of the social milieu and often decide how the environmental resources will be utilised by people and for whose benefit these will be utilised. As such, these factors put constraints on resource utilisation.

The social environment can be understood in terms of broad structural arrangements of the society. Let us first be clear about what we mean by social structure. Social structure has been described as the network of social institutions. It is a complex of various groups and institutions which constitute the society.

The existence of human society requires certain arrangements which can be delineated in terms of patterned relationships between groups and institutions. The minimum requirements seem to be:

i) An economic system dealing with the production and distribution of goods.

ii) A system of communication which includes developing a language and also technology so that information can flow from one part to other. Language changes according to one's culture. To illustrate new scientific knowledge new technical language has had to be evolved to explain various concepts in science and technology. Various media, print and electronic are all a part of communication technology.

iii) Arrangements including family and education; or raising a well balanced family including the education of children so that every individual is able to contribute towards society.

iv) A system of authority and power. This is done through political institutions, which are necessary for the attainment of public goals.

v) A system of ritual, serving to maintain or to increase social cohesion and to give social recognition to significant personal events such as birth, courtship, marriage, and death.

The major institutions and groups of the society are concerned with such basic requirements; together they constitute social environment. Let us talk about some of them in a little more detail.

Family

Family is one of the basic institutions of social organisation. In the wide context of the socio-cultural environment, it performs various functions including reproduction of humans, socialisation of children, transferring of cultural traditions from one generation to another, and so on. Functions of the family are varied in nature, based on the norms, values, beliefs and morals of the society.

Groups of families live together and form communities. These communities could be classified on the basis of their occupation, religious faith, country, etc., and together they form the society within a geographical boundary. Thus, society can be called a group of interacting people who live in a specific geographical area, who are organised in a cooperative manner and who share a common culture.

Culture

So, the question arises "What is culture?" Culture is the man-made part of the environment. It determines social environment and social action. Culture guides a person to select a particular set of behaviour that is permitted to him by his biological heritage. According to Edward Tylor, a British anthropologist, "culture is that complex whole which includes knowledge, beliefs, arts, morals, law, customs and any other capabilities and habits acquired by man as a member of society". The cultural environment cannot remain unaffected by its social norms, economics, political and religious institutions.

Economy is an important factor which determines how resources are acquired and used. For example, surface mining of coal is preferred to underground mining in many parts of the world because it is much cheaper though it is environmentally much more destructive, especially as it adversely affects wildlife habitat. Thus economic activity is directly related to one's survival and is in turn affected by the total cultural environment.

The legal system helps to regulate the social mores of society. It defines the rights and privileges of the citizens. It can play an important role in conserving the natural habitat. For example, Conservation Law can affect — how much habitat is destroyed, how much hunting and poaching occurs, and which species will or will not be hunted. Similarly appropriate legislation can ensure proper land use by preventing undue urbanisation of agricultural land by fixing a suitable proportion of built-up area to green-belts which function as lungs of the large cities. Legislative measures can also ensure a judicious and equitable distribution of land.

SAQ 3

Some statements are given below. Write true (T) for correct statement and false (F) for incorrect statement.

i) Social environment is independent of natural and man-made environment. ☐

ii) Language is an important part of one's culture. ☐

iii) Cultural environment can put restraints on the use of natural resources. ☐

iv) The cheaper economy in developing countries is acting like slow poison. ☐

1.3 WHY SHOULD WE BE CONCERNED ABOUT THE ENVIRONMENT?

Nowadays you must have heard about the growing concern towards global environmental problems. One may ask why there is so much concern about the environment. The answer is simple and clear ; our very existence depends on conservation of the environment. The unprecedented economic progress of 19th and 20th centuries have pushed the environmental and ecological awareness into the background. However, today the whole world, particularly the developing countries, face a near-crisis situation—both economic and environmental.

Perception of environmental concerns differ. Broadly, there are three types of responses. The first one says that environmental concern is a conspiracy of the developed First World against progress in the Third World and that environment will become an issue of importance only when the underdeveloped countries reach the levels of production and consumption of the industrialised nations. The second argues strongly that all this nonsense about preserving the tiger and the aesthetic beauty of green belts is diverting the attention from the problems of the poor and that environment has nothing to do with trying to give a better deal to the large and ever-growing population. The third, in a paradoxical turn, holds this very same large and ever-growing population responsible for environmental crisis, maintaining that there is too little of everything except people. The three different views illustrate how little we know of ecosystem and ecobalance. Let us examine each of these arguments briefly.

The first argument is that environmental concerns are the business of rich countries which cause most of the pollution. But environment and development are not necessarily incompatible. The mistake made by developed countries can be avoided if proper developmental strategies are worked out. Further, there is no division such as the environment of developed countries and that of developing countries. Degradation of the environment is going to affect each of us irrespective of the country, region or area. An example is the Chernobyl disaster which may take a total of thousands of human and animal lives and devastate large areas of land within and outside the Soviet Union. You will read more about this in Section 1.4.

Proponents of the second argument would prefer development to improve the lot of the poor at the cost of environmental conservation. But in this model the poor will get the worst of everything, including the effects of pollution resulting from industrialisation and urbanisation. We had a burning example of this in Bhopal tragedy in which thousands of the poorest of poor people died. They are worst affected by impure drinking water, insanitary living conditions, disease and so on.

The point raised in the third argument that population pressure leads to environmental degradation is an old one. The problem is not so much of the poor destroying the environment by their sheer numbers as that they are deprived of their share in the distribution of resources. It should, therefore, be clear that there are factors other than poverty and population which are responsible for the pollution of earth. Mrs Indira Gandhi said in the United Nations Conference on Human Environment held at Stockholm in June, 1972 that poverty is the biggest pollutant. So you can see that causes of environmental degradation may differ but the dangers of this degradation are enormous for mankind.

After studying the above, you would be interested in environmental problems. We will talk about them in brief here. In later units you will study them in detail.

In the main, the environmental problem is three-dimensional : (i) environmental pollution, (ii) ecological decay or destruction, and (iii) resource depletion. Many of these are irreversible. The greatest pollutant or "environmental killer" today is radioactive fallout from nuclear testing, nuclear plants and the long term storage of nuclear materials, disposal of nuclear wastes and occasional nuclear accidents.

The other types of air pollution have also been a matter of international concern. One, the increasing concentration of carbon dioxide in atmosphere due to large scale burning of fossil fuels, coal and petroleum, in modern industry and transport leading to a "greenhouse effect". The other threat arises from aircraft exhausts and the chlorofluorocarbons (CFC) used in aerosol sprays and refrigeration causing ozone layer depletion.

Apart from air pollution, land and water are being widely poisoned by the large-scale use of pesticides and chemical fertilisers in modern agriculture in developed countries and developing countries including India. All these will be dealt with in detail in the next block.

Another serious environmental and ecological problem has arisen from large scale deforestation which, in turn, has led to increased floods, soil erosion, silting of rivers and eventually desertification. This reckless operation, especially in the Third World, leads to deforestation to the extent of 11 million hectares every year. These are some major problems which threaten the environment.

Environment is not just pretty trees, threatened plants, animals and ecosystem. It is literally the entity on which we all subsist, and on which the entire agricultural and industrial development depends. Development without concern for the environment can only be short term development. In the long run such a development can go on only at the cost of enormous human suffering, increased poverty and oppression.

On a world scale environmental awareness often finds expression at the Conferences of Human Environment organised by the United Nations Environment Programmes. India is an active member and also an original signatory to the protocall adopted at the UN conference held at Stockholm in the year 1972. The concern of India toward environment is also reflected in articles 48A and 51A of the Constitution which read as follows:

Article 48A
The State shall endeavour to protect and improve the environment and to safeguard the forest and wild life of the country.

Article 51
It shall be the duty of every citizen of India to protect and improve the natural environment including forests, lakes, rivers, and wild life, and to have compassion for living creatures.

These efforts at the world and national levels clearly suggest that extended control of man over nature has threatened the very survival of man in years ahead. Try the following SAQ to see if you can reason that environmental concern is necessary for our survival.

SAQ 4
Write five lines on the statement "We should be concerned about our environment".

.....

.....

.....

.....

.....

1.4 POTENTIAL HAZARDS OF CARELESSNESS IN DEVELOPMENTAL ACTIVITIES

Few people in India are really concerned about the negative aspect of industrialisation and the growing danger of resulting environmental pollution. We have said earlier that extensive industrialisation, use of chemicals and fertilisers for agriculture and high energy input

technologies are a potential risk to the environment. Overconsumption and wasteful use of resources by the developed nations and the privileged strata in the developing world pose another kind of threat to the environment. However, global problems created by inequitable development go far deeper. While acid rain and ozone layer depletion are indicators of a slow poisoning of the environment (to be dealt in Unit 10, Block-3), Bhopal tragedy and Chernobyl accident are examples of increasing catastrophic hazards.

1.4.1 Bhopal Tragedy

Coming of Union Carbide to Bhopal was welcomed by all, because it meant jobs and money for Bhopal and saving in foreign exchange for the country, with the rising demand for the pesticides. The MIC plant was troublesome from the very first year and there were several leakages, light and heavy, until "the Bhopal disaster".

The Fateful Night at Bhopal

Exactly what happened in the Union Carbide factory that night on 3rd December, 1984 is still not known officially. But press reports have pieced together the following sequence of events.

Methyl isocynide (MIC) gas is a highly toxic, volatile and inflammable chemical. It is to be stored always in stainless steel 304 and 316 equipment since metallic impurities would cause violent reaction. Highly purified MIC reacts with itself spontaneously releasing heat. With these sensitive properties MIC qualifies as an explosive beside being a highly poisonous chemical. This is used in the manufacture of a pesticide carbanyl or sevin.

MIC was stored in three double-walled, partly buried stainless steel tanks — code named 610, 611 and 619. These tanks were supposed to be kept at 0°C by cooling through refrigeration. However, the cooling machines had been out of order for quite some time. Early that night, one of the workers noticed that pressure was increasing in tank 610 — the tank from which the MIC finally escaped. But nothing was done about it. UCC's report on the incident claims that tank 610 had 42 tons of MIC at the time of the accident. For approximately two hours, the safety valve remained open releasing more than 20 tons of MIC in vapour and liquid form, as well as other gases, like phosgene, hydrogen cyanide, and carbon dioxide etc. The safety mechanism for burning off MIC in case of an accident and thus rendering it harmless also did not work. The gases surged past into the atmosphere, got condensed with cold air (remember it was a cold December night) and aided by atmospheric inversion settled down slowly on the ground starting the tragedy.

What Caused the Violent Reaction that Night ?

The Carbide's scientists had been aware of the possibility of an explosive 'runaway reaction'. This gas can react with almost any chemical including itself generating substantial quantities of heat and carbon dioxide. The longer the MIC sits in storage tanks, the greater is the chance of side-reactions building up to a runaway reaction. The MIC at the Bhopal plant had been 'sitting' in the storage tank since October, 1983.

The precise causes of the violent reaction still remain obscure. Carbide's report has claimed that it was a unique combination of large amount of water (approximately 500-1000 litres); higher than the normal amount of chloroform in the stored MIC which was several per cent instead of a maximum of 0.5 per cent and an iron catalyst resulting from the corroded tank, that led to the violent reaction in MIC, stored at a higher temperature than specified.

Dr S. Varadarajan, who led the investigations on behalf of the Indian Government, has given a different explanation. According to him, even small quantitites of water probably as little as two to three litres, could have reacted with phosgene in the tank. Phosgene is mixed with MIC to keep it stable during storage. The phosgene-water reaction produced heat, carbon dioxide and hydrochloric acid. The heat and hydrochloric acid acted as accelerators for the polymerisation of MIC leading to a runaway reaction.

The Death Toll

Exactly how many people died in the Bhopal disaster remains a mystery. By the end of January, 1985, over 2,500 were counted dead and over 1,00,000 injured with irreparable damage to a high percentage of them. But there are many who believe that even the unofficial figures are not anywhere near the truth. A UNICEF official who returned to New Delhi after a week-long visit to Bhopal pointed out in his confidential report in December that death toll may have been as high as 10,000. Those who died were the poorest, living near the factory.

Issues after Bhopal

The Bhopal disaster has raised a series of questions: where have other hazardous plants been built in India? Why were so many people living so close to the plant in Bhopal? How do we develop a policy for deciding the sites of hazardous factories? Do multinationals operate with

lower standards for health and safety in their Third World plants than in their home country? There are some important points to be considered.

A number of pesticides and drugs banned or heavily restricted elsewere are being knowingly imported or manufactured in India. An example is polychlorinated biphenyls (PCBs), which are extensively used as pesticides.

Choice of technology is another factor, for instance, many companies manufacture carbayl without MIC, and indeed, Union Carbide itself switched over to using MIC only a decade before the Bhopal plant was licensed. On the contrary, France refused to allow MIC to be produced in their country.

Another important point to be considered is the behaviour of multinational corporations which have repeatedly exported banned drugs and pesticides and even entire factories to the Third World.

So much time has passed since the Bhopal tragedy, but the government has still not taken any steps to prevent the recurrence of Bhopal-type disasters. One point is clear, however, that the government has not even thought of developing any emergency response system to industrial disasters. The Third World lacks capital, coupled with general inefficiency within the bureaucracy and callousness towards the underprivileged bred by the duality of the society.

SAQ 5

Comment on the statement "The Bhopal disaster could have been averted if proper technology was used". Limit your answer to five lines.

.....

.....

.....

.....

.....

1.4.2 Chernobyl Accident

After Chernobyl accident, the nuclear industry faces a crisis of confidence. The severe fall-out from the damaged reactor has shaken the faith of even staunch supporters of nuclear energy.

What Happened at Chernobyl ?

The accident started as a test of the newest of the Chernobyl power plants' four reactors. During the test the safety systems were disconnected and safety procedures were not followed causing the reactor to become unstable. The fuel rods overheated, ruptured and turned cooling water into steam so rapidly and perhaps generating explosive gases, that the 1000 ton top of the reactor was blown off. The uranium continued to fission, air was sucked in, and smoke, gases and radioactive particles were released into the atmosphere. Clouds of the dark and dangerous radiation spread over European countries affecting a vast population. This is just one of the situations that can arise in a nuclear reactor. It poses potential dangers which have to be on a large scale. We can not afford to learn by much mistakes. The radiation coming out of Chernobyl has long as well as short term ill-effects. Although only 31 people have been reported to have died as a direct result of the initial explosion or as a consequence of intense radiation exposure during the first few months, the estimate of people likely to be affected varies from a few thousand to more than a million. 1,35,000 people have been evacuated from the area within 30 km from the plant and no one is expected to return for about 4 years when the radiation is supposed to go down to safe limits.

Issues after Chernobyl Accident

Antinuclear lobby contends, probably rightly, that nuclear power is simply too demanding a technology for fallible human beings. Moreover, it poses a threat to human beings due to nuclear proliferation and burnt up waste which has a lifetime of millions of years. Faced with these daunting problems, it will become increasingly difficult to justify the cause of nuclear power as a future source of energy. Perhaps the real answer to the greater demands for energy needed for development lies in the 'cleaner' non-conventional sources like solar energy.

SAQ 6

Mark the correct answer with (√) and wrong answer with (×).
Nuclear disasters are harmful because:

i) They kill the people instantaneously. [ ]

ii) They have short term effects and as well long term effects due to their long half-life period. [ ]

iii) Radioactive fall out is carried away by wind to long distances. [ ]

iv) Changes are brought in heredity material which are passed from generation to generation. [ ]

v) They harm the living beings outwardly only. [ ]

1.5 SUMMARY

In this unit you have studied the following:

- Environment is the sum total of living and non-living components that surround and influence an organism. Living components are called biotic components while non-living are called abiotic components.
- All the natural factors interact with each other and together form the natural environment. Man has modified the natural environment into a man-made environment. A lot of imbalance in nature is caused by man-made environment. There is also another type of environment known as social environment which is important as it puts restraints on the use of natural resources, and also puts various kinds of stress on human beings.
- Human beings in search of food, shelter, and material comforts affect the environment either advertently or inadvertently. The impact of human activity during the last million years has multiplied. This, however, has attained unmanageable proportions mainly due to reckless use of modern technology since the onset of Industrial Revolution.
- In view of the disasterous consequences of environmental mismanagement we must become aware of the environmental problems. We need to redesign and refashion our major industrial, agricultural and social subsystems so as to ensure a liveable environment in the years to come.

1.6 TERMINAL QUESTIONS

1) Which one of the following best explains the man-made environment.

   Man made environment has resulted in

   a) modification and interference in the natural ecosystems.

   b) release of pollutants.

   c) increasing use of fossil fuels.

   d) mass scale destruction of vegetative cover.

2) Can man be considered an ecologically dominent being? Explain your answer in 5-8 lines.

   .....

   .....

   .....

   .....

   .....

.....

.....

.....

3) Why is it important to become aware of the present day environmental problems? How can you help at the individual level?

.....

.....

.....

.....

.....

.....

1.7 ANSWERS

Self Assessment Questions

1) a) Suppose you live in a village, you could describe your environment under the following headings.

Abiotic factors

Average temperature; rainfall and humidity; atmospheric quality—whether polluted or non-polluted; availability and kind of water—soft or hard; altitude and topography—hilly, plain or coastal; soil quality—fertile, infertile, excessively saline, etc.

Biotic factors

Kind of plants and animals; the people of the area; scavengers and decomposers etc.

b) i) × ii) × iii) × iv) √

2) i) × ii) √ iii) √ iv) √

3) i) F ii) T iii) T iv) T

4) Refer to Section 1.3 in text.

5) The choice of technology is an important factor for manufacturing of a particular product. In case of Bhopal disaster the technology used was to manufacture the carbayl with MIC whereas, several companies manufacture, carbayl without MIC. If we, like France had not allowed the technology which used MIC to be followed, we would have averted the Bhopal disaster.

6) i) √ ii) √ iii) √ iv) √ v) ×

Terminal Questions

1) a)

2) Man is considered ecologically dominant in his environment because he has greatly altered the biotic mantle of the biosphere. Modern man has changed the environment according to his needs in the cities and rural areas where he lives. As man became more civilized the cultural, social, economic conditions also improved but being dominant he is creating imbalance by utilising resources at great speed, and polluting the environment with his energy intensive technologies.

3) Refer to text.