1.3 SUMMARY

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- The relationship between man and his environment has traditionally been a focal point of environmental enquiry.
- In this context, 'environment' refers to the sum total of conditions which surround man at a given point in space and time.
- The environment of early man was dominated by natural factors such as climate, soil, vegetation and other animals, whereas modern man has increasingly surrounded himself with an environment of his own design and construction, which is geared to the provision of food, shelter and access.
- There are a number of ways in which the man–environment relationship can be perceived. In this unit, we have examined the relationship between man and environment from five different perspectives.
- In the first approach, you have learned determinism in the context of the man–environment relationship. The approach stresses that man is subordinate to, and hence largely controlled by, the natural environment. The views of several renowned scholars and thinkers have been discussed.
- The second perspective is the teleological approach of man–environment relationship which stresses that man is superior to nature, and he thus has the potential for complete control over all aspects of nature.
- The third perspective describes the man–environment relationship from the possibilistic approach. According to this approach, the physical environment tends to provide the opportunity for a range of possible human responses and that people have considerable direction to choose between them through their creative genius and creativity.
- The fourth approach is economic determinism; that is how economy determines the man–environment relationship. The approach addresses man's mastery over increasingly larger parts of the environment. This approach favours continued economic and industrial expansion, and it sees in scientific research and industrial development the opportunity for increasing control over individual parts of the environment.
- The last perspective is the ecological approach. This is the latest approach in understanding the man–environment relationship. According to this approach, man is an integral part of nature and his relationship with the natural environment should be symbolic and not exploitative or suppressive.
- Thus, each perspective is valuable in certain circumstances and since environmental problems are multidimensional, each approach has a contribution to make to the man–environment debate.

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1.4 KEY TERMS

- **Natural Environment:** It includes various elements like location, water bodies, landforms, climate, soil and mineral deposits, natural vegetation, forests and wildlife.
- **Cultural Environment:** It comprises man-made features and human talents. The cultural environment includes religion, races and systems of political government, density and distribution of population.
- **Deterministic Approach:** It focuses on man–environment inter-relationship and propounds that man is the slave of his environment.
- **Modern and New Deterministic Approach:** Friedrich Ratzel is considered the founder of new determinism. In his approach he gives more importance to location in relation to topographical features. He argued that similar location leads to similar modes of life. He regarded cultural forms as having been adapted and determined by natural condition.
- **Teleological Approach:** This approach shows events which can only be explained as stages in a movement towards a preordained end; the end may be defined by those involved in the event or it may be externally defined as in many religions.
- **Possibilistic Approach:** This approach holds that the physical environment tends to provide the opportunity for a range of possible human responses and that people have considerable direction to choose between them through their creative genius and ability.
- **Economic Deterministic Approach:** This approach addresses man's mastery over increasingly larger parts of the environment. It favours continued economic and industrial expansion, and it sees in scientific research and industrial development the opportunity for increasing control over individual parts of the environment.
- **Ecological Approach:** According to this approach, man and environment are equally important. It is the most scientific approach and most widely accepted.

1.5 ANSWERS TO 'CHECK YOUR PROGRESS'

1. (a) 2. (a) 3. (c) 4. (a), (b) 5. (b) 6. (a) 7. (a), (d)
8. (d) 9. (c) 10. (d) 11. (a) 12. (d) 13. (a) 14. (b)

1.6 QUESTIONS AND EXERCISES

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Short-Answer Questions

1. Write a short note on the rise of the determinist approach of the man–environment relationship.
2. Write a short note on the possibilistic approach.
3. What are the objections raised by some scholars against the deterministic approach?
4. What is ecosystem with regard to the ecological approach?

Long-Answer Questions

1. Critically analyse the deterministic approach on man–environment relationship.
2. Write a note on the teleological approach on man–environment relationship.
3. What are the various viewpoints regarding the possibilistic approach on man–environment relationship?
4. Discuss the ecological approach on man–environment relationship.
5. Analyse the economic deterministic approach on man–environment relationship.

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UNIT 2 ENVIRONMENT AND SOCIETY

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Structure

2.0 INTRODUCTION

All around us, we see evidence of environmental change. There is clear evidence of a buildup of earth-warming gases, disappearance of wildlife and forests that threaten to change our climate by changing the circulation and composition of air and water. Among the most important of these changes is the undesirable buildup of gases, especially carbon dioxide, in the environment. This is a result of environmental interaction with society, pollution, technology and many other factors. In this unit, our main concern is to show you the environment's interaction with society, pollution, and technology.

In this unit, you will learn about the interaction between environment and society. The emergence of human society has changed the nature of this interaction between the life processes and the environment. Various social scientists have long striven to develop an understanding of the interaction between the environment and society. In an environment, society is considered to be the most imperative part constituted by mankind. Thus, men are the most important part of society. Since their evolution, man has been continuously interacting with his environment. In fact, all life in the society interacts with its natural environment, is influenced by it and adapts to it in the course of biological evolution. Life uses the resources of the environment for its survival, and the products and results of its activities modify the environment.

You will also learn the interaction between pollution and environment with respect to atmosphere, biosphere and hydrosphere. Today, environmental pollution has become a very serious problem. It is the contamination of the environment, i.e., air, water and land, by harmful wastes resulting from human activities.

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You will understand the technology–environment interaction, the upside and downside of the role of technology in environmental change. There have always been two different views in understanding the interaction between technology and the environment. According to the first view, technology is the foundation of all prosperity. It has helped mankind to advance. In contrast, the other view states that technology can lead to massive environmental destruction. But the fact is that it is both and neither. Technology has helped bring prosperity to the world and also been the cause of much of the harm to the earth and the life on it. Whether it is good or bad totally depends on how you take it.

Finally, you will learn about the relationship between the environment and development. The two have assumed phenomenal importance at the global, national and local levels. To understand the relation between environment and development, we have presented two different approaches, i.e., the Northern approach and the Southern approach. Understanding each of these views is critically important for our survival.

2.1 UNIT OBJECTIVES

After going through this unit, you will be able to:

- Explain the interaction between society and the environment
- Describe the interaction between pollution and the environment
- Analyse the interaction between technology and the environment
- Describe the relationship between environment and development

2.2 SOCIETY–ENVIRONMENT INTERACTION

Meaning of environment and society

The term 'environment' originated from the French word *environ* or *environner* meaning 'around' , 'round-about', 'to surround' or 'to encompass'. The environment can be described as the natural world that includes land, water, air, plants, humans, animals, light and heat we receive from the sun, and so on. It is viewed and defined in different ways and from different perspectives by different groups of people and disciplines. The environment is an inseparable whole and constitutes the interacting systems of physical, biological and cultural elements which are inter-linked individually as well as collectively in different ways.

There is an overwhelming influence of environment on society, technology, development, pollution and other spheres of human life. And there is also a reverse influence.

Environment and its types

The environment is broadly characterized into two parts: the physical and biological environment, and the natural and cultural environment.

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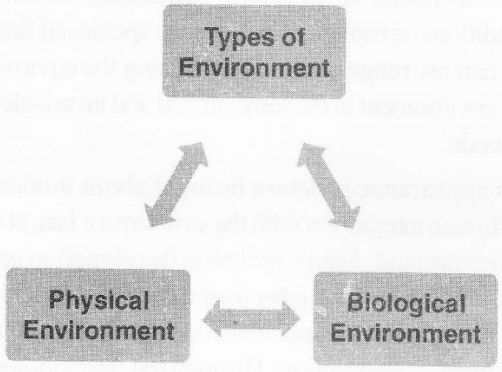
The physical environment include biotic and abiotic components of the earth such as land, water, air, plants and animals. The biological environment refers to and includes all life forms on the earth like plants, bacteria and animals.

The abiotic environment is further divided into atmosphere, hydrosphere and lithosphere, which are collectively called the physical environment. In other words, all abiotic components of the earth such as land, water and air are collectively termed as physical environment. Distribution and abundance of life are controlled by both physical and biological environments.



Natural environment

This includes elements like location, landforms, water bodies, climate, soil and mineral deposits, natural vegetation, forests and wildlife. Climate is the most significant of all these elements of the natural environment. These elements are provided by nature and man has to utilize them in the best possible and most sensible manner to suit his needs and ensure that the coming generations will not suffer for want of these resources.

Cultural environment

It comprises man-made features and human talent. Human actvities applied to the natural environment and surroundings constitute the sphere of cultural landscape. In other words, a cultural landscape refers to the substitution of the features of the original natural landscape by man-made features. However, there are still certain areas on the earth where man has not effected any change to the natural landscape. Time and place are very important in the cultural environment. The elements of the cultural environment include race, religion, systems of political government and density of population, to name a few.

Society and its interaction with the environment

Society is also a kind of environment created by human beings where they share a defined territory and culture and also interact with nature.

Alarm has been raised in many countries over the negative effects of the interaction between society and environment. Various social scientists have long striven to develop an understanding of the interaction between environment and

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society. Human society plays an important role in the environment. Since their origin on earth, humans have been continuously interacting with their natural environment—they are being influenced by it and are also adapting to it. Humans use the resources of the environment for their survival, and in turn their activities modify the environment. The emergence of human society has a specially strong impact on other life processes and the environment.

Our environmental (land, water and air) marvels have a great variety of life forms that evolution has produced over hundreds of millions of years, and the adaptability of these forms to different situations, sometimes to extreme environmental conditions, is remarkable. Yet each species of flora and fauna exists only in a relatively narrow range of conditions, using the environmental resources and influencing the environment in the same limited and invariable manner according to its nature and needs.

Soon man's appearance in nature brought about fundamental changes to the environment. Human interaction with the evironment has, at an ever-increasing rate, altered the environment. Man's brain has developed to an incredible extent over the ages. This has allowed him to become more independent of animal instincts and more capable of exploratory and creative actions. But, at the same time this has increased his powers of destruction. Through the development of these powers, man has increasingly exploited, destroyed and modified much of the natural environment and created an artificial environment of his own.

In order to understand the interaction between the society and the environment, it is necessary to briefly review the human interference and intervention with nature. Some 15,000 years ago human society was not that developed, man was an unobtrusive species within the environment, his influence on the environment was relatively little and he was well adapted in the society and ecosystem, like any other species. In the society, man was using only a small amount of natural resources and with little efficiency. His impact on the global environment was, as a whole, insignificant. In earlier times, the coexistence of human society and the physical environment was on the level of a friendly relation, not of conflict or oppression of one by the other.

With the development of the human brain, man's interaction with his environment greatly increased and in different ways. He started to cut down forests and grow crops, build more durable huts and domesticate animals. This meant that man gradually changed from a nomad to a settler surrounded by his fields and his domesticated animals.

Man learnt how to store the grains he grew and preserve the fish and meat he procured to meet his needs in periods of scarcity. He discovered fire and used it for cooking and preserving, for clearing land before planting, for keeping warm in colder regions and later on for moulding metals to make tools for hunting, for war and for agriculture. Thus by gradually interacting with the environment, human society shifted from the Stone Age to the Bronze Age and then to the Iron Age. With advancement of civilization, man started felling more trees and building more

homes and towns. Now he had more animals to care for, more fields to be tilled and tools to be made. Man became more advanced and specialized; and there was greater division of labour, and more roads were built to link villages. Soon, with prosperity, larger towns and cities were constructed with modern amenities. Our modern world is the logical outcome of these trends.

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The entire phenomenon changed sharply in the modern world where man has aquired greater power for subduing nature and harnessing natural resources. The number of human beings in the society has increased phenomenally. At first the growth rate was slow but gradually the demand of the economy led to population explosion. Imagine what this means in terms of demand for food, water, housing, power and other amenities. As the population in the society increased, people's involvement in environmental degradation also increased. They moved from rural areas to urban regions for better quality of life. Now the situation is that neither urban nor rural resources are safe or carefully utilized. Human intervention has led to rapid environmental destruction.

With the growth of the forces of productive and exploitation of natural resources, the biosphere has suffered considerable damage. Animal and plant species are dwindling, and soil is getting eroded. Today the concern is how long the existing natural and mineral resources, particularly oil, will last. Pollution is becoming an irreversible problem. There is fear that the world will not be able to accommodate the rapidly increasing population. The population explosion, together with man's technical advancements, has put tremendous pressure on the natural environment.

Check Your Progress

1. The word 'environ' from which the term 'environment' is derived has its roots in
   (a) Roman
   (b) Greek
   (c) Latin
   (d) French
2. Population growth in human society has led to the demand for more
   (a) Food
   (b) Housing
   (c) Oil
   (d) All the above
3. Gradually interacting with environment, the human society has shifted from
   (a) Stone Age to Bronze Age
   (b) Stone Age to Iron Age
   (c) Iron Age to Modern Age
   (d) Stone Age to the Modern Age

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2.3 POLLUTION–ENVIRONMENT INTERACTION

In order to understand the interaction between pollution and environment, it is necessary to know the meaning and definition of the word 'environment' and the role of the various components of the environment. The environment is a creator of life form. It is not uniform and varies from place to place and from country to country. For instance, the mountainous environment of the Himalayas is entirely different from the environment of the Thar Desert. There are various factors such as the sun, moon, sea, ocean, earth, forest and desert, that together constitute the environment in which all living and non-living things exist and are affected by. Each component of the environment has its own role to play and by playing its part, tries to maintain a balance.

Pollution is the contamination of the environment, air, water and land, with harmful wastes resulting from human activities. The problem of pollution is as old as human history. It is adversely affecting various parts of the environment, including the atmosphere, biosphere and hydrosphere.

Pollution–environment interaction in the atmosphere

The atmosphere is a blanket of gases which covers the earth. The atmosphere plays a very important role in the environment. It acts as a transporter, both vertically and horizontally, of heat, moisture and other injected materials. In addition, it also impacts various biological activities and exerts a remarkable influence on both the biosphere and hydrosphere. It traps heat from the environment to keep the earth's temperature constant and also helps in the formation of weather systems such as hurricanes, rains, winds, etc. In terms of biological activities, it protects life on earth from harmful radiation and cosmic debris. For instance, the ozone layer in the earth's atmosphere protects the biotic environment from harmful ultraviolet rays of the sun.

To make sure that the composition of the atmosphere remains balanced in the environment, the gases present in the atmosphere must not be upset. But it has been found that due to excessive intervention of man with the environment by way of industrialization, the atmospheric composition is continuously changing. The main pollutants of air are smoke, dust, ash, pollen grain, poisonous gases and tiny particles of materials produced mainly by the burning of fossil fuels like coal, petrol and natural gas. Industrial plants, power plants and automobile engines add a lot to atmospheric pollution. They produce carbon dioxide, oxides of nitrogen, sulphur dioxide, carbon monoxide, particulate matter, etc. The smoke emitted by factories, automobiles, trains, ships, etc., also releases poisonous particles into the air. Such forms of pollution not only affect the biological elements in the environment such as plant, animal and man, but they also affect natural aspects of environment such as weather, climate, ocean, etc.

Increase of carbon dioxide level in the atmosphere poses a serious threat to the environment. Prior to industries polluting the atmosphere, the amount of carbon

dioxide in the air was 275 to 285 parts per million. By 1980 this increased to 338 parts per million. In the beginning of the 21st century, this has further increased to 400 parts.

The heat energy radiated from the earth is in the form of long waves. About 90 per cent of this heat is absorbed by the atmosphere. The atmosphere heats up mainly due to this terrestrial radiation. The complete absorption of terrestrial radiation and the non-capturing of solar radiation by the atmosphere is called Green House Effect. In a green house, the glass walls and roof allow the sunlight to reach the earth but do not allow the terrestrial radiation to go out.

On a global scale, the carbon dioxide in the atmosphere acts as a green house gas. Carbon dioxide is largely transparent to incoming light energy, but outgoing infrared radiation from the earth is absorbed by the carbon dioxide in the environment leading to a warming up of the atmosphere. If the amount of carbon dioxide in the environment continues to increase, the atmospheric temperature will become so high that the ice in the polar regions will melt and the water level in the oceans will rise, leading to flooding of coastal areas.

Air pollution also affects the direction of winds, climate, temperature and weather causing acid rain. The phenomenon of acid rain was noted by Hales in 1738. It mainly occurs when gases such as nitric and sulphuric acid present in the atmosphere react with water, oxygen and other chemicals to form various acidic compounds.

Pollution–environment interaction in the biosphere

The biosphere refers to all living things or life on earth. Everywhere on the earth we find life. From the tops of mountains to the depths of the oceans and even within the pores of rocks there are millions of different kinds of life forms. Earth is home to an estimated thirty million different kinds of living things, including human beings, plants, bacteria, viruses, animals and birds. All these are an integral part of the biosphere. In the ecosystem, the biosphere influences various processes like photosynthesis and the food chain; and one form of life depends on the other for survivial. But with time, the increasing interference of human beings and expansion of the man-made environment, the biosphere is losing its original balance. One of the worst outcomes of human development is the pollution in the environment. This is mainly due to the misuse or overuse of the advances in industrialization and urbanization and ignoring the environment. Pollution is the word generally used to describe the contamination of the environment. The increasing pollution is continuously depleting plants' ability to perform photosynthesis and is adversely affecting the food chain in the ecosystem. It has also resulted in deforestation and desertification.

With excessive pollution in the air, water, land and soil, the habitant as well as the habitat (the biosphere) is on the verge of extinction. It has been noted that whenever there is excessive air pollution, the size of the stomata in plants reduces, which interferes with gas exchange during the process of photosynthesis. Also,

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pollution of the soil impacts the health of plants. Because of air, water and soil pollution, plants lose their ability to perform photosynthesis. The growth of plants also gets hampered. This affects the environment by causing deforestation and desertification and creates an imbalance in the food chain.

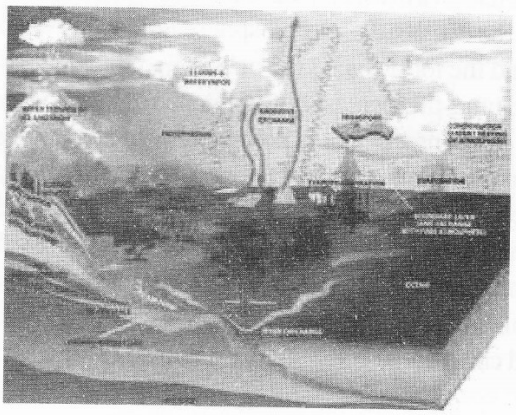
Among humans, various forms of pollution such as air pollution and water pollution can cause many diseases among like allergies, cancer, lung malfunctioning, cough, cold, heart trouble and asthma.

Pollution–environment interaction in the hydrosphere

Water on the earth's surface, in the form of fresh water in rivers and lakes, saltwater of oceans and seas, groundwater and water vapour, is collectively termed as hydrosphere. The hydrospheric environment plays a very important role in keeping us alive. Water not only acts as a habitat to many living organisms like fish, but it also regulates the climate of the environment by regulating the temperature on the earth by being part of climatic cycles. It also provides all beings the much needed water for drinking.

Water cycle

Water on earth is always changing states due to the water cycle or hydrological cycle. Heat from the sun changes the water into water vapour and that vapour rises into the atmosphere to form clouds, condenses and falls back to earth in the form of precipitation or rain. But with increasing pollution in the atmosphere, the balance of the water cycle is getting upset. It has been found that due to excessive pollution, a haze has developed around the earth. This haze is mainly made up of aerosol particles formed by nitrates, sulphates, fly ash, organic particles and mineral dust—the products of fossil fuel burning and rural biomass burning. The haze does not allow the desired amount of heat to reach the ocean and thus slows down the process of the water cycle.



Besides affecting the water cycle, pollution also affects the aquatic habitat. It is the hydrosphere which is the habitat for many plants and animals; they perform various actions for their survival. But due to excessive pollution in the hydrological environment, living things are finding it difficult to survive. The most common cause

of hydrological pollution is the disposal of waste products from humans and industries, nutrient pollution and oil spills.

Thus, we can conclude that the various forms of pollution are gradually interacting with environment (atmosphere, biosphere, and hydrosphere) and affecting the processes of the environment. Pollution is slowly degrading the environment from its root and making our future uncertain.

Check Your Progress

4. The phenomenon of acid rain was noted by
   (a) Hales in 1738
   (b) Hales in 1743
   (c) Hales in 1758
   (d) Hales in 1778
5. Prior to industrial polluting of the atmosphere, the amount of carbon dioxide was
   (a) 275 to 295 parts per million
   (b) 275 to 285 parts per million
   (c) 285 to 275 parts per million
   (d) 275 to 235 parts per million
6. Air and water pollution can cause
   (a) Water cycle
   (b) Photosynthesis
   (c) Lung malfunctioning
   (d) Asthma
7. The most common cause of hydrological pollution is
   (a) Smog
   (b) Haze
   (c) Environmental expansion
   (d) Disposal of waste products

2.4 TECHNOLOGY–ENVIRONMENT INTERACTION

The power to think and create new products and technologies is one of the most unique abilities that distinguishes man from other living creatures on earth. The use of technology increasingly depends on the environment for raw materials.

There have always been two different views in defining the interaction between technology and environment. According to the first view, technology is the foundation of all prosperity. It has given advancement to mankind. In contrast, the other view states that technology can lead to massive environmental destruction. But the fact is that it is both and neither. Technology has both

helped bring prosperity to the world, and has been responsible for much of the harm to the earth and its life. Whether it is good or bad totally depends on the point of view you take.

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It is best to remind ourselves of some of our technological successes with respect to the environment in the broadest sense. It is technology, above all, that made possible the Green Revolution. India, thanks to the Green Revolution, quickly reached self-sufficiency in cereals and was able to provide massive food aid to the newly independent Bangladesh. In fact, for a while, India became the second largest donor of cereals after the United States. The negative effect of this revolution was that small farmers were not able to afford expensive new seeds or the fertilizers which were required to make the seeds more productive. They ended up by giving their land to rich farmers who could afford the use of the new technology. In addition, the variety of crops grown diminished as monocultures took hold, and biodiversity suffered as traditional agricultural methods that were friendlier to wildlife disappeared. Thus, the tale tells both the advantages and disadvantages of the environment–technology relation. Besides the Green Revolution, there were several other new technological developments that took place, including the use of bio-fuels, solar photovoltaics, solar power, genetically modified crops, nanotechnology and automatic surveillance techniques. On the one hand, these developments may be beneficial for man, while on the other development may pose considerable risks. It totally depends on for how and for what the technology is developed and used.

Now let us focus on the advantages of the environment–technology interaction. At the time of the Green Revolution, the concept of 'appropriate technology' also emerged. The term appropriate technology refers to those technologies that are environment friendly and culturally suitable to a society. One good example of appropriate technology is renewable energy. The sources of renewable energy are the sun, wind and water that are freely available in nature. All these sources generate energy for development and do not contain harmful gases such as carbon dioxide. These sources are helpful in combating global warming.

The interaction of the environment and technology has also offered certain solutions to mankind in both developed and developing nations. For instance, a student of Massachusetts Institute of Technology developed an environment-friendly technology that produces charcoal briquettes from sugarcane bagasse. This charcoal is better than wood and causes less indoor pollution. In a semi-nomadic community of Mexico, people have combined technology with traditional craft. People weave and sew high-brightness light-emitting diodes (LEDs) into textiles to produce portable lights. Usually, they hang the textile outside their houses in the day to get it charged by solar energy. Once charged, they provide light for at least four hours.

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LED Textiles

Technology has also brought tremendous change in the high altitude environment. In the higher regions of the Himalayas where temperatures dip to –40° C, people are growing medicinal plants and herbs and vegetables with the help of greenhouses without applying any fuel to heat them. They mostly grow vegetables in the solar green houses that capture heat directly from the sun.

With the increasing awareness about protecting the environment, today the world is looking more at bio-fuels as alternatives. Bio-fuels are mainly composed of bio matter from corn, sugarcane, vegetable oils from palm, soy and rapeseed, and animal dung. Such fuels are environment friendly.

With the help of new green technologies, people are now able to produce different kinds of cloth from vegetative waste materials. In Japan, a denim-like material is made from banana stems and in India, they are trying to make clothes and saris from banana fibre. Also, vibrant summer shirts are woven from fibre made from stems of ginger which are treated as waste after the plant's aromatic and antibacterial leaves have been used in cosmetics and other products. Such materials all use previously untapped resources, which are also environmental-friendly.

'Permaculture' is another innovation of human technology that is environment friendly. It is a simple system for creating a sustainable human environment where every land resource is used in such a way that the environment remains undisturbed. Permaculture is an approach to designing human settlements and agricultural systems that are modelled on the relationships found in natural ecologies. Permaculture is a sustainable land use design. This is based on ecological and biological principles, often using patterns that occur in nature to maximize effect and minimize work. Permaculture aims to create stable, productive systems that provide for human needs, harmoniously integrating the land with its inhabitants. The ecological

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processes of plants, animals, their nutrient cycles, climatic factors and weather cycles are all part of the picture. Inhabitants' needs are provided for using proven technologies for food, energy, shelter and infrastructure.

A Bay Area Permaculture Group brochure, published in the West Coast Permaculture News & Gossip and Sustainable Living Newsletter (Fall 1995) describes permaculture as a practical concept, a concept that is applied in the environment, including city, farm and wilderness. The basic principle of permaculture is to empower people to establish highly productive environments providing food, energy, shelter and other material and non-material needs, including economic needs. Permaculture adopts techniques and principles from ecology, appropriate technology, sustainable agriculture and the wisdom of aboriginal peoples. The basic principle of permaculture is earth care and maintaining a system which is environment friendly.

The developing science of nanotechnology in terms of environment-friendliness has offered benefits like providing safe drinking water by developing water filtration systems.

The advancement of technology has also allowed scientists and researchers to capture carbon dioxide from the environment. The process of CO_2 capture is done through a new technology called oxyfuel combustion, where fossil fuels are burnt in pure oxygen, leading to the emission of only CO_2 and water, which can then be easily separated. One method of storing CO_2 is pumping it into the ocean. The pumping of CO_2 into the ocean can be done from ships or pipelines. CO_2 is sent directly to the seabed, more than 3 kilometres down, where the high pressure turns the gas into a liquid much denser than seawater, so that it cannot rise to the surface. The disadvantage of this technology of storing CO_2 in the ocean is that it is gradually but surely erodes the ocean environment by increasing the acidity of the water and polluting the entire marine environment.

From the above discussion, we can conclude that the interaction between technology and environment has both upsides and downsides. Technology has provided several benefits to the environment and at the same time it is also posing a threat to the environment. The harmful effects of technology have compelled humans to pay attention only to the upside of the technology and not the downside where it is adversely affecting the environment.

Check Your Progress

8. Oxyfuel combustion is done to
   (a) Produce LED textile
   (b) Capture CO_2
   (c) Fibres
   (d) Produce jeans material

Contd. ...

9. The Massachusetts Institute of Technology has developed an environmental friendly technology that produces
   (a) Charcoal briquettes
   (b) LED textile
   (c) Biofuel
   (d) Oxygen
10. A denim-like material is made from banana stems in
   (a) China
   (b) Korea
   (c) Malaysia
   (d) Japan
11. A system for creating sustainable human environment is termed as
   (a) Agriculture
   (b) Nanotechnology
   (c) Permaculture
   (d) Green technology

2.5 RELATIONSHIP BETWEEN ENVIRONMENT AND DEVELOPMENT

The relationship between environment and development has assumed phenomenal importance at the global, national and local levels. The term 'development' has been in use for many decades, evoking powerful images signifying progress, aspirations, ideals, promises or plans which in common addressed a desire for social, political and economic betterment. Later it was widely understood that protecting the environment ensured economic growth in the long run, modernization, distributive justice and socio-economic balance. In more recent years, development has been further redefined to take account of the erosion of environmental resources.

Like the environment, development too can now be said to have its own downward spiral, i.e., the very resources on which it is based are increasingly at risk from existing management practices and environmental exploitation being undertaken in its name.

Agriculture, forestry, energy production and mining generate at least half the gross national product of many developing countries. To attain high economic growth, developing countries face enormous pressure to overexploit their natural resources. Earlier it was viewed that focusing more on protecting the environment can hamper economic growth. But now it is increasingly recognized that environmental deterioration can in fact undermine economic development in the long run. Today, there is equal concern about the ways in which environmental degradation can be slowed down or economic development reversed. In many

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regions, investigation and documentation may reveal how environmental degradation is eroding the resource base of the potential for further development. Presently, much of the development aid aims at replenishing the resource base rather than at being a prerequisite to generating new economic activities. That is, the very process of development itself cannot subsist upon a deteriorating environmental resource base. The environment cannot be protected when development ignores the cost of environment destruction and the necessity of replenishment and enhancement.

These increasing explicit links between development and environment prompted the United Nations General Assembly in 1983 to appoint a World Commission on Environment and Development. Its aim was to re-examine critical environment and development issues and to propose long-term strategies for achieving sustainable development that takes into account the interrelationship between people, resources, environment and development.

An Indo-British seminar on the relationship between environment and development was held in 1993 involving experts from the UK and India. In the seminar, the UK was present as a mature industrial economy whose fossil fuel resources were of moderate quantity; the UK is an important member of EEC and has wide-ranging global experiences. On the other hand, India was a developing nation whose population was very high and fossil fuel resources limited; when seen on per capita basis it was not even modest. The country was making serious effort to industrialize itself to improve the quality of life of its people.

The debate[1]

The texture and tone of the debate on the relationship between the environment and development has undergone substantial change with the passage of time. The Cartesian view of man being the controller of nature has generated an economic system, whether capitalist or socialist, which exploits nature to produce more and more goods to meet the material needs of man. The pursuit of this approach to development led to the exploitation of nature to a point where survival of the human race was jeopardized. During the initial years, therefore, the question asked and solution sought revolved around the issue of whether to have development and ignore environment, or preserve environment and foreclose development.

It was soon realized that the drama of man's march from barbarism to civilization is the drama of development and growth, and that there is no intention to stop that march of development. Development is inevitable; but preserving environment, ecology and biodiversity at a 'warranted' level was also crucial. The discussion has thus transformed itself into how to have development without causing further injury to the environment. From this crucible emerged two approaches to understanding the relation of environment and development, i.e., the Northern approach and the Southern approach. There is also a common approach on tackling the problems of environmental degradation and prospect of development.

[1] ***Source:*** *Environment and Development*, Amitava Mukharjee and V.K. Agnihotri.

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The common ground

There is virtual unanimity in the view that development and peaceful environmental management complement each other, given that on one side, development itself contributes to environmental regeneration and rejuvenation and that on the other hand, a healthy environment is a necessary condition for sustainable development. There is widespread realization of the depressing phenomenon that over one billion people in the world are in abject poverty, and the next generation will see the same phenomenon, despite the campaign to reduce population growth. What is more worrying is that most of the births will be in poor families, which makes alleviating poverty not only a moral responsibility of the current generation but also a necessary condition for environmental sustainability of this earth and for leaving intact the very basis of future generations' welfare.

It has been noted that no country has so far won the war against poverty without economic development, but economic development has itself often caused serious environmental damage, threatening the present and future quality of life.

It is true to say that development is essential for progress but where growth is achieved at the cost of polluting air, water and land, and by destroying forests and depleting natural resources, the development in real terms could be lower and such development does not amount to welfare.

Northern approach

It is pointed out by the North that setting environmental priorities inevitably involves choices by developing countries of the South to address the risks to health and economic productivity associated with dirty water, inadequate sanitation, air pollution and land degradation, all of which are hazardous for human health.

For improved environmental management, the North feels corporations, household, farmers, and governments of developing countries of the South will have to mend their behavioural patterns. Two sets of policies are seen to be critically necessary. For one, policies should be directed towards harnessing the positive connection between environment and development; policies that are not concurrently both development and environment friendly should be eliminated. It is noted that liberalizing trade and investment, promoting macro-economic stability, and improving the access of the poor to health, education and family planning will facilitate environmental protection. For the other, targeted policies to ensure that environmental values are properly reflected in the economic activities of both the public and the private sectors, need to be operationalized. The interventions that work best are those that combine incentive and regulatory policies, recognize administrative constraints and are tailored to solve specific problems.

Thus, it is held by the North that a sound environmental policy is not an anathema to developmental objectives. Nevertheless, wise policies are exceptions rather than the rule because principally such policies often involve removing

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well-entrenched 'rights' to pollute or use resources that tend to benefit the wealthy and influential, often at the expense of the poorer sections of the society.

The North argues that governments in the developing countries must conserve their scarce resources and administrative capacity to implement change. For this, an improved information base, analytical capability, informed priority setting and policy design and responsive and effective institutions, must be developed. The North also put special attention on water supply, sanitation, waste management, energy consumption and industry pollution. It also put stress on Rural Environmental Policy, and how to protect environment from man's development.

Thus, the debate on environment and development from the Northern perspective explores the relationship between development and the environment from two perspectives: first, the environmental quality itself is a part of the development and, second, damage to environment can undermine present and future growth in productivity, which again leads to development.

Southern approach

According to the Southern view, there are a few important gaps that have been left unnoticed by the North. The first point the South pointed out was there is a failure in the sense that much of the blame for environmental problems, current and potential, has been laid on population growth. There can hardly be any debate that population growth has vital links with the environment via the 'consumption function' and the 'welfare function', but there is an inadequate understanding in the North about two important dimensions of population growth; one the bearing that the 'locale' of population growth has on the issues at hand and two, the fact that all the environmental problems currently identified as being due to population pressure is not based on sound arguments.

The locale of population growth in the coming decades needs to be examined. The environmental impact of one unit of population growth in the high income, developed countries far outstrips the impact of one unit of population growth in the low income, developing countries.

It is held by the South that attributing all environmental problems to population growth is not necessarily based on concrete evidence. For instance, the case of tropical deforestation which has been worrying the developed North for quite some time now, including at the Rio Earth Summit, is cited by the South as a case in point. There is an increasing number of researchers who are examining the elements relevant to tropical deforestation and agricultural frontier extension. Comparative analysis of 24 Latin American countries highlights an indirect relationship between population pressure and frontier expansion, in that an increasing number of urban consumers raise the demand for domestic production and hence agricultural land. This has an adverse impact on tropical deforestation. Increase in domestic roundwood and per capita GNP had smaller positive impacts and population had a negative impact on deforestation. Thus, South argues that to relate population growth in unequivocal terms to deforestation is incorrect.

Indeed according to the Southern view, there is a plethora of both endogenous and exogenous variables that operate upon tropical forests for food and cultivation: climatic factors, lack of affordable low-input technology for improving productivity of traditional varieties, increased concentration of the poor on marginal lands, pressure of livestock, pattern of land ownership, access to on-farm and off-farm employment, level of skills and education, cultural and ethnic origin, economic role of women and children and so forth, all have a bearing on frontier expansion. Thus, the South forcefully puts forth the argument that though it is true that population growth and uneven distribution in some areas complicate natural resource management, it is as also true that 'population pressure on resources usually reflects the extremely skewed distribution of resources. When farmers encroach on tropical forest, population pressure is blamed, but the pressure typically stems from the concentration of land in large holdings'. The debate in the North on environment and development, when seen from this side of the globe, appears not to have been apparently finetuned to capture the effects of these elements in the picture.

Thus, the views of the two sections of the world have more differences than commonalities. Reconciliation and an understanding of each other's views are critically important if we are to survive.

Check Your Progress

12. Comparative analysis of 24 Latin American countries highlights an indirect relationship between population pressure and
    (a) Frontier expansion
    (b) Educational expansion
    (c) Environmental expansion
    (d) Cultural expansion
13. The world must conserve its scarce resources and administrative capacity to implement change. This view was presented by
    (a) Southern countries
    (b) Northern countries
    (c) Developing countries
    (d) Underdeveloped nations
14. An Indo-British Seminar on the relationship between environment and development was held between
    (a) India and USA
    (b) USA and UK
    (c) India and UK
    (d) India and China

Contd. ...

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15. The World Commission on Environment and Development was established in the year
    (a) 2000
    (b) 1999
    (c) 1987
    (d) 1983

2.6 SUMMARY

- The environment is a most fascinating subject and is essential for our survival. But large-scale human interaction and intervention is negatively affecting the environment. In this unit, you have learned about the interaction of environment with society and technology, and about environmental pollution.
- You have learned about the interaction between society and the environment. Man is the most important part of society and since his origin has been continuously interacting with the environment. Social scientists have long striven to develop an understanding of this interaction between the environment and society.
- The unit has also dealt with the interaction between pollution and the environment, especially the atmosphere, biosphere and hydrosphere. Pollution is the contamination of the environment – air, water and land – with harmful wastes resulting from human activities. Today, environmental pollution has reached unprecedented levels.
- You have learned about technology–environment interaction and the upsides and downsides of the role of technology in this interaction. There are two views with regard to the interaction between the technology and environment. According to the first view, technology is the foundation of all prosperity. It has helped in the advancement of mankind. In contrast, the other view states that technology can lead to massive environmental destruction. But the fact is that it is both and neither. Technology has helped bring prosperity to the world but it has also been instrumental in harming the earth and the life on it. Whether this development is good or bad depends on one's perception and viewpoint.
- Finally, the unit discusses the relation between the environment and development. The two have assumed phenomenal importance at the global, national and local levels. Two different approaches have been presented to explain this relation. These are the Northern and Southern approaches. Understanding each view is critically important for man's survival.

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2.7 KEY TERMS

- **Environment:** It is the natural world that includes land, water, air, plants, humans, light and heat received from the sun, animals, etc.
- **Biological environment:** It refers to and includes all life forms on the earth like plants, bacteria and animals.
- **Physical environment:** The abiotic or physical environment comprises the atmosphere, hydrosphere and lithosphere.
- **Natural environment:** It includes various elements like location, land-forms, water-bodies, climate, soil and mineral deposits, natural vegetation, forest and wildlife.
- **Cultural environment:** It comprises man-made features and human talents.
- **Society:** It is the environment created by human beings where they share a defined territory and culture and also interact with nature.
- **Pollution:** It is the environment, air, water and land by harmful wastes resulting from human activities.
- **Biosphere:** It includes all living things or life; a global sum of all eco-systems.
- **Water cycle:** Also known as the hydrologic cycle, describe the constant movement of water above and below the surface of the earth, as it changes from the liquid to the gaseous and solid states.
- **Appropriate technology:** It refers to those technologies that are environmental friendly and culturally suitable to a society. Good examples of appropriate technology are renewable energies like solar energy, wind energy, etc.
- **Permaculture:** It is sustainable land use design based on ecological and biological principles, often using patterns that occur in nature to maximize effect and minimize work.

2.8 ANSWERS TO 'CHECK YOUR PROGRESS'

1. (d) 2. (d) 3. (d) 4. (a) 5. (b) 6. (c), (d) 7. (d)
8. (b) 9. (a) 10. (d) 11. (c) 12. (a) 13. (b) 14. (c)
15. (d)

2.9 QUESTIONS AND EXERCISES

Short-Answer Questions

1. Write a short note on environment and society.
2. Write a short note on the pollution–environment interaction with respect to the biosphere.

3. Write a note on the society–environment interaction.
4. Write note on the advantages and disadvantages of technology and environment interaction.

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Long-Answer Questions

1. How does pollution affect the atmosphere, hydrosphere and biosphere of the environment?
2. Discuss the relationship between the environment and development.
3. Discuss the pollution–environment interaction with respect to the hydrosphere.
4. Explain the meaning and principles of permaculture.
5. Explain the role of nanotechnology and the environment.

2.10 FURTHER READING/REFERENCES

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UNIT 3 ENVIRONMENTAL DEGRADATION

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Structure

3.0 INTRODUCTION

Environment is a very precious asset of nature. It is not only a habitat for us and other living and non-living things but it is also a source of livelihood for all living beings. With time, the resources of the environment is diminishing and the main cause of this is stress and pressure of man and his activities on the earth. In this unit, we are going to deal with some of the sensitive aspects of environmental issues such as deforestation, depletion of water resources, and water, soil, air and noise pollution.

With the growing population and increasing demand for food, water, infrastructure and other resources for livelihood, the problems of scarcity and pollution are increasing and the environment is losing its natural assets. In each section of this unit, we give special attention to different environmental issues, their causes and consequences and also present governmental approaches adopted to solve these problems.

The first concern is of deforestation which is a global concern. Its causes and consequences and the various measures to control deforestation will be covered. The unit will cover water depletion, its causes and consequences, and the ways to conserve water.