MANGALORE UNIVERSITY

CENTRE FOR DISTANCE EDUCATION
MANGALAGANGOTHRI - 574 199
DAKSHINA KANNADA DISTRICT, KARNATAKA STATE

COURSE 12(b)

ENVIRONMENTAL EDUCATION
(Optional Course)
BLOCKS 1 & 2

B.Ed. DEGREE PROGRAMME
(OPEN AND DISTANCE LEARNING)

SECOND YEAR B.Ed.

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Contents

Overview of the Course

Dear Students,

As you know Teachers play a pivotal role in Environmental Education. The environment is not only an ecological entity, it is a construct influenced by social, cultural, and political domains. How it is perceived and defined influences how Environmental Education (EE) is taught and how we evaluate environmental issues. Mounting evidence indicates that lack of EE in teacher education is one of the obstacles to the successful implementation of EE in schools. It is important to include Environmental Education in teacher education programs because of the state of the environment and the need to develop students who will become stewards of the environment. This course will focus on developing a holistic and multidimensional view of the environment; this holistic view includes understanding that people and the environment are interdependent. Besides, teachers should understand that teaching about that environment means more than learning about living and non-living objects (animals, rocks, plants, and so on). It also includes social, economic, and political dimensions. It would also be valuable for teacher training programs to discuss why environmental education is relevant to any field of teaching (not just science) and also provide teachers with strategies for how to implement environmental education perspectives in their classrooms. The pre-service teacher training in EE is to make efforts to increase awareness, knowledge, and experiences about environmental issues, problems, policies, movements, and developments related to Environment. This course helps to explore the problems the environment is facing. In addition to creating awareness about Environmental issues faced at local, national, and global levels, a profound understanding of the environment will help us tackle these issues efficiently. It also refers to organized efforts to teach how natural environments function, and particularly, how human beings can manage behavior and ecosystems to live sustainably. Environmental Education is a very essential discipline in our academic, professional, and personal life. So, the teaching of Environmental Education has been considered an important phase in our curriculum right from primary to higher education level. Still, you might have observed that the Environmental Education imparted from school to college level is not satisfactory. Hence this subject will impart knowledge about the current situation and prospects of nature. It teaches people to explore all the problems related to the environment, and engage in wise ways of preserving it. As a result, individuals develop a deeper understanding of environmental issues and have the skills to make informed and responsible decisions. Hence, this course on “Environmental Education” will expose you to various dimensions of the Environment to impart EE in Schools.

With this rationale, in the first block, the meaning and concept of Environment Education and the different environmental hazards have been discussed. The importance, scope, and guiding principles of Environment Education, factors contributing to the degradation of the environment, the different hazards in the path of protecting the environment, environment protection, management also have been analysed.

The second block deals with the different issues and policies about the environment. The major environmental problems in India, the different policies to protect the environment, environmental conservation measures, constitutional amendments concerning the environment, and the different movements to save and conserve the environment have been dealt with in this regard. The teacher trainees are expected to make use of this knowledge and promote appropriate values and attitudes among the students so that conservation and development and protection of environment can be well taken care of in our country and also around the world.

Block 1 : Environmental Education and Environment Hazards

Unit 1 : Meaning, Definitions, and Characteristics of Environmental Education

Unit Structure

1.1.1. Learning Objectives

After completing this Unit, the student teachers will be able to

- Bring out the meaning of environmental education;
- Cite various definitions of environmental education; and
- Explain the characteristics of environmental education.

1.1.2. Introduction

Dear student, In the past few decades, concerns have been expressed all over the world about the way our environment is getting degraded and its effect on life support systems. Never before in human history has so much been talked and written about the problems of the environment as it has been done today. As you are aware, both the developed and the developing countries are facing innumerable environmental problems resulting out of human greed and quest for progress and development. Just think for a while. What would happen if the present rate of environmental destruction continues unchecked? It is predicted that the results would be catastrophic, threatening the very existence of life on earth. Although the severity of the problem and its magnitude has been realized all over the world, much needs to be done to overcome the mounting problem.

India is a country that is highly diverse in its physical, biological, and cultural elements. It is characterized by a multitude of climates, soil types, and complex ecosystems. In addition to its biological and ecological heritage, India has also its rich cultural heritage. Indian culture has always given importance to the environment and its conservation. Despite its natural and cultural heritage, India, like most other countries of the world, is also challenged by several environmental problems and concerns. Some of the pressing environmental problems include depletion of forests and natural resources, loss of soil cover, loss of biodiversity, widespread diseases, shrinking energy resources, etc. The most important environmental challenge that India is facing today is that of population growth and poverty. This has created enormous pressure on the country's natural ecosystems and resources.

There is a growing awareness in the country that it is only through education that people could be made aware of the various environmental problems and find a solution to overcome them. As a result of this, Environmental Education has become a part of our school, college, professional, and technical education curricula. Knowledge of Environmental Education is vital to teachers as it helps them in planning Environmental Education programmes and activities in their schools for training the youth to think and act for the environment.

In this Unit, you will study the meaning, definitions, and characteristics of Environmental Education.

1.1.3. Learning Points and Learning Activities

1.1.3.1. Meaning of Environmental Education

Before we make an effort to understand the meaning of Environmental Education, it is better if we have some idea about the environment itself. What is the environment according to you? The environment is the sum-total of physical and biotic conditions influencing the response of the organism. All of the external physical and biological factors that directly influence the survival, growth, development, and reproduction of organisms are depicted as the environment. It comprises the biotic or living environment which refers to the relationships between different organisms and the physical or abiotic or non-living environment controlled by physical factors such as temperature, soil, and light. The life-supporting environment of planet earth is composed of three components mainly air, soil, and water. Life cannot be imagined without these components of the earth.

Man's environment is all that surrounds him wherever he lives. It has natural, physical, social, and cultural dimensions. Man not only adopts himself intelligently to his environment but seeks to control, modify, and regulate it to his advantage. He also tries to understand and master it and utilize its immense potential for his benefit. While man has the nature-given right to utilize all-natural resources moderately, even maximally, for his benefits he has no right to exploit them beyond reasonable limits and upset the balance, harmony, and rhythm in natural systems. He has to realize that this would cause serious threat and harm to his own life on this earth. What is true of the natural environment is true of the man-made environment too. Both should be sustained, enriched, and utilized in wholesome ways.

How do we understand the environment more precisely in terms of its various elements and our interaction with it? Some of the commonly referred definitions of the environment are given below. Examine these definitions critically and analyse them keeping the following questions in mind.

1. What are some of the key terms referred to in the definition?
2. Do they reflect any particular element of nature or viewpoint?
3. Are they comprehensive in portraying the various elements that constitute our environment?

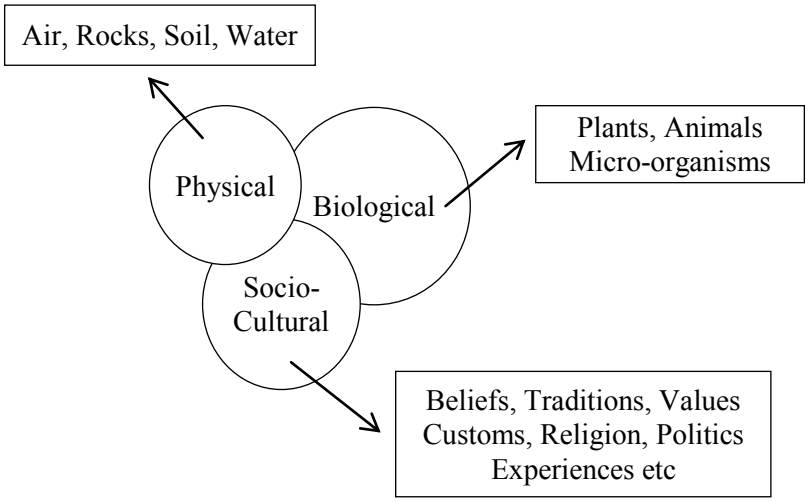
1. "Environment includes a complex of natural, built and social components in the life of the humanity and that the social components constitute a set of cultural, moral, personal values and interventions". (Tbilisi Conference, 1977).

2. “Environment includes water, air and land and the interrelationship which exists among and between water, air and land and human beings, other living creatures, plants, micro-organisms, and property”. (The Environment Protection Act, 1986, Govt. of India).
3. “Environment is simply the world around us. It starts with the skin of our body and reaches out in all directions, in ever-widening circles, until it embraces even the universe”. (Jos Elstgeest, 1989)
4. “Environment is not only the sum of all the material things that constantly interact with each other and which make up the mosaic of the countryside landscape. It is much more than this. It also includes the economic structures and the outlook and habits of people in different parts of the world”. (UNESCO,1990)
5. “Environment is the sum of all the external conditions and influences affecting organisms. The environment consists of abiotic (non-living) and biotic (living) components. The abiotic components include soil, water, air, sunlight, etc. and the biotic component includes all the living organisms. The environmental components act as a whole”. (Centre for Environmental Education, Ahmedabad, 1990)
6. “Environment includes all that is “within” and “without” us. Etymologically, the environment means ‘surroundings’. It includes all the living and non-living objects as well as situations and factors, which affect the organism directly or indirectly and includes substances (soil, water), conditions (temperature, light), forces (wind, gravity), organisms (plants, animals) and time. It is well said that ‘with every breath, you draw in, a part of the environment becomes part of you’. Similarly, ‘with every breath you give out, a part of you becomes a part of the environment’. (Sharma,1999)
7. “The environment is the complex of climatic, edaphic, and biotic factors that act upon an organism or an ecological community and ultimately determine its form and survival. It is also an aggregate of social and cultural conditions that influence the life of an individual or a community”. (Webster’s Dictionary)

What observations have you made after analyzing the above-given definitions of the environment? A careful analysis of these definitions would reveal that environment involves elements and factors of nature and human interactions. You would notice, from a comparison of the definitions that they are very broad and include not only physical or biological but also socio-cultural aspects of the environment. The socio-cultural aspects of the environment include man-made things that are products of civilization, technological development, and progress. The socio-cultural environment specifically refers to the social, cultural, economic, political, and religious aspects of the environment. All these aspects constantly influence the interaction between living and non-living organisms.

Thus, the environment could be visualized as the sum total of all the physical, chemical, biological, economic, social, and cultural aspects influencing and interacting with the organisms. It is the whole set of natural and social systems in which people and other organisms live and draw their sustenance from. This interaction has been presented in the following diagram.

Diagram: Interaction of various components of environment.



As mentioned earlier, in nature, everything is connected, be it biotic (living) or abiotic (non-living), directly or indirectly. They are interconnected, interrelated, and interdependent. Human beings are only a part of this complex web of life. If human actions/ behaviors do not respect this cosmic reality, then it violates the integrity of Earth's wholeness. To avert the impounding disasters, we need to become aware of our critical role in maintaining the balance on the planet Earth and strive for its maintenance. This is very critical because we, the modern generation, have always taken the environment for granted and have lived apart from it, rather than being a part of it. Unfortunately, it is this concept and the resulting behaviors that have led to all of our environmental disasters and problems which we are facing today.

Now let us understand what Environmental Education is, Environmental Education is education about the environment, for the environment, and through the environment. Its purpose is to protect, conserve, and sustain the environment and to regulate its utilization in wholesome ways. It calls for human beings to live in harmony with their natural world, embracing all plants and animals, on which they depend for their survival and well-being.

All human beings have to recognize that it is we who are responsible for creating the present environmental crisis and it is only we who can check further degradation. Since our survival depends on a healthy environment, we need to evaluate carefully the effects of our actions on the environment. We can no longer be complacent with the thinking that the environment exists only to serve our needs and wants. We must realize that much of our so-called "Progress and Development" has resulted in the depletion and degradation of the environment. Protection and preservation of the environment must be integrated for the benefit of further generations. To achieve this, an environmentally enlightened community with sound, environmental knowledge, attitudes, values, and skills is necessary. Environmental Education is expected to play this critical role.

Environmental Education enables us to:

- Understand that human beings are an inseparable part of the environment. We are part of a complex web of systems that links individuals, their culture, and the biotic and abiotic elements of nature.

- Recognize that it is ‘we’ who are responsible for creating the present environmental crisis and it is ‘we’ who can mitigate the problems of the environment, strengthen and maintain the health of this planet Earth.
- Recognize that each one of us has a moral responsibility to develop and maintain high-quality natural and social systems that will advance human well-being and maintain ecological stability.
- Recognize that the bio-physical world contains a range of renewable and finite resources, which human beings can develop to satisfy their needs and wants. However, we need to limit our needs and wants with due consideration for the generations to come.
- Understand that our environment is getting degraded day-by-day due to the unwise use of natural resources. We need to modify our lifestyles to ensure ecologically sustainable development.

Environmental Education is a continuous activity and a life-long process. It should be extended to all people, in different age groups and places with appropriate aims and contents, methods, and strategies. It should adopt a combination of formal, non-formal, and informal approaches. It would essentially be multi-disciplinary as it includes contents from Geography, Geology, Biology, and even other physical and social sciences. It should aim to develop appropriate awareness, knowledge, attitudes, and skills.

Check Your Progress - 1

1. Fill in the blanks.
2. Environment consists of _____ and _____ components.
3. Man’s environment has _____, _____ and _____ dimensions.
4. Environment is of two types namely _____ and _____
5. All citizens must have sound Environmental _____ , _____, _____and _____ .
6. Environmental Education should adopt _____ , _____ and _____ approaches.

1. Classify the following into physical, biological, and socio-cultural components of the environment.

Water, plants, values, air, animals, customs, knowledge. soil, beliefs, rocks, religion, politics, micro-organisms traditions, laws.

1.1.3.2. Definitions of Environmental Education

After having understood the meaning of environment and environment education, let us now consider some of the definitions of Environmental Education.

Below are given a few of the definitions of the term Environmental Education as defined by various International and National Commissions and Individuals. Read the definitions and analyse them critically for the different perspectives, objectives, and outcomes which each one of the highlights. What do they share in common? You can record your observations in the space provided.

1. The purpose of Environmental Education is to create an awareness and understanding of the evolving social and physical environment as a whole, its natural, man-made, cultural, and spiritual resources, together with the rational use and conservation of these resources for development (Nairobi Conference, 1968).
2. Environmental Education is the process of recognizing values and clarifying concepts to develop skills and attitudes necessary to understand and appreciate the interrelatedness among man, his culture, and his biophysical surroundings. Environmental Education also entails practice in decision-making and self-evaluation of a code of behavior about issues concerning environmental quality. (International Union for Conservation of Nature, 1971).
3. Environmental Education aims at developing a citizenry that is aware of and concerned about the total environment and its associated problems and that has the knowledge, attitudes, motivation, commitment, and the skills to work individually and collectively towards a solution of current problems and prevention of new ones(Belgrade Charter, 1975).
4. Environmental Education is a process of developing a world population that is aware of and concerned about the total environment and its associated problems and which has the knowledge, skills, attitudes, motivation, and commitment to work individually and collectively towards a solution of current problems and the prevention of the new ones (Tbilisi Conference, 1977).
5. Environmental Education is aimed at producing a citizenry that is knowledgeable concerning the biophysical environment and its associated problems, aware of how to help solve these problems, and motivated to work towards their solution (Stapp, W.B, 1986).
6. Environmental Education is an across the curriculum approach to learning which helps individuals and groups to understand the environment with the ultimate aim of developing caring and committed attitudes that will foster the desire to and ability to act responsibly in the environment. Environmental Education is also concerned not only with knowledge but also with feelings, attitudes, skills, and social action. (Australian Association of Environmental Education, 1993).
7. Environmental Education is the interdisciplinary process of developing a citizenry that is knowledgeable about the total environment - including both its natural and built aspects - that has the capacity and the commitment to engage in inquiry, problem-solving, decision making, and action that will assure environment quality (Disinger, 1993).
8. Environmental Education is a life-long process that involves all of us as learners and educators; is interdisciplinary, integrates the historical, political, social, economic, and cultural contexts; covers a wide learning spectrum from awareness, action understanding; values indigenous and local knowledge; recognizes the role of both women and men in environmental protection, while contributing to the empowerment of women; is contextualized to the local and global realities and explores participatory and creative learning methods that are culturally appropriate (ASPBAE, 1996).

You might have noticed one thing in common in all the definitions, that is, all of them consider the environment in its totality and highlight the need for developing favourable behaviours – knowledge, attitudes, and skills for protecting and preserving the environment.

Check Your Progress - 2

1. Quote any two definitions of Environmental Education.

1.1.3.3. Characteristics of Environmental Education

What makes Environmental Education? Environmental Education has been often confused with nature camping, trekking in forests, wildlife education, etc. It has been most of the time taken to mean an understanding of the environment. However, with the increasing awareness of the environmental problems and the need to equip people with the necessary knowledge, attitudes, values, and skills to solve them, today, Environmental Education is expanded to include not only education about the environment but also education in and education for the environment. These three prongs of Environmental Education have been described briefly in the following paragraphs.

1. Education about the environment
    a) Provides an understanding of how natural systems work.
    b) Provides an understanding of the impact of human activities upon them.
    c) Develops environmental investigation and thinking skills.

2. Education in the environment
    a) Gives reality, relevance, and practical experience to learn through direct contact with the environment.
    b) Develops skills for data gathering and analysis.
    c) Develops aesthetic appreciation.
    d) Fosters environmental awareness and concern.

3. Education for the environment
    a) Develops concern and responsibility for the environment.
    b) Develops an environmental ethics
    c) Develops the motivation and skills to participate in environmental improvement.
    d) Promotes a willingness and ability to make lifestyle choices compatible with the wise use of environmental resources.

While education in the environment and education about the environment aimed at creating an awareness and understanding of the complexities of the environment (relationships factors), education for the environment aims at helping students to develop appropriate behaviors – attitudes, values, and convictions – required for effectively participating in activities of environmental protection and conservation. Thus Environmental Education should not be confused with that of any narrowly defined discipline. It is a life-long education.

Hart (1981), through a study of several reports on Environmental Education, has listed 25 important characteristics of Environmental Education. These have been reproduced below.

1. **Interdisciplinary and multidisciplinary:** Environmental Education should be a part of every subject taught.
2. **Multilevel:** Environmental Education should be taught at all grade levels.
3. **Global views:** Environmental Education involves the development of integrated environmental ethics.

4. **Concepts:** Environmental Education involves the development of awareness and understanding of basic environmental concepts (Ex: limiting factors, carrying capacity)
5. **Process development:** Environmental Education involves the development of cognitive, affective, and skill behavior processes.
6. **Problem-solving**: Environmental Education involves helping students develop processes of thinking which could be more effective in resolving complex environmental problems.
7. **Values clarifying:** Environmental Education involves exploring personal assumptions, values, and feelings towards self and society as well as the relationship of these to the natural world.
8. **Systems thinking:** Environmental Education implies that one must learn to think in terms of systems of interacting factors that is to think not only rationally about the parts of a complex system but to develop an intuitive feeling for the dynamic behavior of such a system as a whole.
9. **First-hand experiences and activities:** Environmental Education requires situations where learning can be best nurtured through first-hand experiences and activities which foster a deep respect and love for the natural world.
10. **Environmental issues-oriented:** Environmental Education involves the use of local environmental issues as well as case studies, role-playing, and games that provide opportunities to examine and participate in the complexities of decision making, understanding of personal and alternative values, and the actual operation of systems –natural and man-made.
11. **Present and future orientation:** Environmental Education continually assesses the present and promotes an ideology that examines desirable images of the future.
12. **Active participation:** Environmental Education emphasizes active participation in preventing and solving environmental problems.
13. **Individual learning:** Environmental Education involves certain degrees of independent study of a diverse number of interdisciplinary environmental problems.
14. **A team approach to teaching/learning:** Environmental Education involves teacher participation in environmental problem-solving learning situations as a team member.
15. **Productive student-teacher relationships:** Environmental Education emphasizes problem-solving including recognition of the values and biases of oneself and others and responsibility for working individually and collectively in a process of informed environmental decision making.
16. **Community-oriented:** Environmental Education involves the entire community as a learning environment in the achievement of Environmental Education objectives.
17. **Field studies**: Environmental Education includes the provision of field experiences which are first-hand experiences.
18. **Communication networking:** Environmental Education involves communication skills as a process that can provide complete and accurate images of environmental problems.
19. **Co-ordination and co-operation:** Environmental Education promotes the values of and necessity for local to international co-operation in the solution of environmental problems.
20. **Flexible administrative patterns:** Environmental Education requires institutional flexibility to cope with evaluation and provide adequate instruction because of its interdisciplinary nature.
21. **Reform of educational processes and systems:** Environmental Education requires modification of existing educational structures.

22. **Curriculum development base:** Environmental Education requires the development of new curricula according to needed content and strategies.
23. **Curriculum evaluation base:** Environmental Education involves the evaluation of processes that lead toward the achievement of intended outcomes for effective programme development.
24. **Research base:** Environmental Education requires a sound research base to identify its strengths and weaknesses.
25. **Teacher education:** Environmental Education is part of the teacher education programme aiming at the improvement in professional development through pre-service and in-service programmes.

We can conclude by saying that Environmental Education is an education in the environment, education about the environment, and education for the environment.

Check Your Progress - 3

Classify the following into those belonging to education about the environment, education in the environment, and education for the environment.

1. Fosters environmental awareness and concern.
2. Provides an understanding of how natural systems work.
3. Develops an environmental ethic.
4. Develops aesthetic appreciation.
5. Develops concern and responsibility for the environment.
6. Provides an understanding of the impact of human activities upon them.
7. Gives reality, relevance, and practical experience to learn through direct contact with the environment.
8. Develops environmental investigation and thinking skills.
9. Develops skills for data gathering and analysis.
10. Develops motivation and skills to participate in environmental improvement.

1.1.4. Let us Summarise

- The environment is the sum-total of physical and biotic conditions influencing the response of the organism. It comprises a biotic or living environment which refers to the relationships between different organisms and the abiotic or non-living environment controlled by factors such as temperature. Light and soil.
- Man's environment is all that surrounds him wherever he lives. It has natural, physical, economic, social, and cultural dimensions. Man not only adapts himself to his environment but seeks to control, modify, and regulate it to his advantage. Both the natural environment and man-made environment should be sustained, enriched, and utilized in wholesome ways.
- Environmental Education is education about the environment, for the environment, and through the environment. Its purpose is to protect, conserve, and sustain the environment and to regulate its utilization. An enlightened community with sound environmental knowledge, attitudes, values, and practices can be created through Environmental Education.
- Environmental Education is a continuous and life-long process. It is to be extended to people of different age groups and places with appropriate aims, contents, methods, and strategies. It is essentially multi-disciplinary in nature.
- Environmental Education has been defined by various national and international commissions and individuals. All of them consider the environment in its totality and

highlight the need for developing favorable behaviors-knowledge, attitudes, and skills for protecting and preserving the environment.

- Three prongs of Environmental Education are education about environmental education in the environment and education for the environment. Education in the environment and education about the environment create an awareness of the environment and education for the environment helps to develop appropriate behaviors about the environment.

1.1.5. Answers to 'Check Your Progress - 1, 2 and 3

Check Your Progress – 1

1. 1 Biotic (living) and abiotic (non-living)
   2. Physical, natural, social and cultural
   3. Natural and man-made
   4. Knowledge, attitudes, values, and skills
   5. Formal, non-formal, and informal

2. Physical component: water, air, soil, rocks
   Biological component: plants, animals, micro-organisms.
   Socio-cultural component: values, customs, knowledge, beliefs, religion, politics, traditions, laws.

Check Your Progress - 2

1. Refer section 1.1.3.2

Check Your Progress - 3

1. Education about the environment: b, f, h
2. Education in the environment: a, d, g, i
3. Education for the environment: c, e, f

1.1.6. Unit end Exercises

1. What is the environment? Mention its components and give examples for each.
2. Explain the meaning of the term Environmental Education.
3. Give your definition of Environmental Education.
4. List the characteristics of Environmental Education.

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Block 1 : Environmental Education and Environment Hazards

Unit 2 : Importance, Objectives, Scope and Guiding Principles of Environmental Education

Unit Structure

1.2.1. Learning Objectives

After completing this Unit, the student teachers will be able to

- Justify the importance of Environmental Education;
- List the objectives of Environmental Education;
- Explain the scope of Environmental Education; and
- Discuss the guiding principles of Environmental Education.

1.2.2. Introduction

Dear student, in the previous Unit of this block you have studied the meaning and definitions of Environmental Education. You also studied the characteristics of Environmental Education. This Unit deals with the importance, objectives, scope, and guiding principles of Environmental Education.

Man's appearance was a crucial event in organic evolution. He has evolved through many stages of civilization stretching over thousands of years. In the process he has increasingly used environmental resources, made innumerable discoveries and inventions, and adopted a variety of activities and processes, all meant to improve his living conditions. He has, at the same time, corrupted the natural environment, disturbed its equilibrium, and upset its balance without taking adequate corrective measures.

In the recent past, a few hundred years ago came the industrial revolution. It resulted in a knowledge explosion in almost every field leading to various discoveries and inventions. The needs and wants of an ever-growing population have multiplied the demands. Lifestyles have been changing rapidly especially in respect of food, clothing, shelter, and comforts. To meet the ever-growing demands man has had to harness more and new sources of energy-steam, electricity, gas and oil, coal, solar energy, wind energy, and atomic energy. His activities have led to pollution of air, soil, and water. Deforestation is taking place at a rapid

rate. These have upset the natural systems and seasons, apart from affecting the health and life of human beings.

You have observed that man has increasingly moved away from natural habitats to man-made villages, towns, and cities and from ways of living close to nature towards artificial comforts and luxuries. Urbanization has led to growth in population, the alarming density of population, overcrowded dwellings, concrete jungles, and high-rise structures.
Modernization has been achieved at the cost of the destruction of the environment. Even modern agriculture is affected by chemical fertilizers and insecticides.
All these factors are threatening the very survival of man and other forms of life.

You will agree that the protection and conservation of the environment and its proper management is one of the biggest challenges that today's world is facing.
Environmental problems are not restricted to any one country or region. Environmental problems such as global warming, ozone depletion, greenhouse effect, acid rain, loss of forests and biodiversity, pollution of oceans and seas have all become international problems involving more than one country in terms of being responsible for the problem, dealing with its impact and ultimately for providing solutions.

Recognizing the role of education in solving environmental problems, several national and international committees and conferences have asserted that education is the only hope and the most effective means that society possesses for confronting the challenges of the future. It is strongly believed that it is only education that can shape the world of tomorrow.

1.2.3. Learning Points and Learning Activities

1.2.3.1. Importance of Environmental Education

You have already understood that Environmental Education is a process by which people develop awareness, concern, and knowledge of the environment and learn to use this understanding to preserve, conserve and utilize the environment in a sustainable manner for the benefit of present and future generations.

On the role of education in solving environmental problems, UNESCO asserts that "Education is the means for disseminating knowledge and developing skills for bringing about desired changes in behaviours, values, and lifestyles.
Education is the best hope and the most effective means in the quest to achieve sustainable development. Education has the potential to make people wiser, knowledgeable, informed, intelligent, ethical, and responsible".

The report of the UN Conference on Environment and Development Popularly known as Earth Summit (1992) held at Rio de Janeiro and adopted by several countries as an agenda (Agenda – 21) for environmental action endorses the potentials of education by stating that "Education is critical for promoting sustainable development and improving the capacity of the people to address environment and development issues. It is critical for achieving environmental and ethical awareness, values and attitudes, skills, and behaviours consistent with sustainable development and for effective public participation in decision – making".
Environmental Education is thus crucial and critical for everyone as it provides opportunities to acquire the knowledge, values, attitudes, commitment, and skills needed to protect and improve the environment. It also develops and reinforces new patterns of environmentally

sensitive behaviour among individuals, groups, and society as a whole for a sustainable environment.

Environmental Education relates to every one of us. It is not a subject of only environmentalists. Intending to increase public awareness of the mounting environmental problems and generate necessary actions for mitigating them, Environmental Education is being introduced at all levels of education, from primary to post-graduate and technical and vocational levels.

Environmental Education at all levels and for all people is crucial because the more knowledge the public has about the environment, the better, the more rapid, and the more effective decision-makers they can be. Furthermore, Environmental Education is the cornerstone of long–term environmental strategies for (i) Preventing environmental problems (ii) Solving those which arise or have occurred, and (iii) Assuring environmentally sound, sustainable development.

Recognizing the importance of Environmental Education, the National Policy on Education (NPE, 1986) emphasized that "There is a paramount need to create a consciousness of the environment. It must permeate all ages and all sections of society, beginning with the child". As Environmental Education is about the environment, its protection, and conservation, we need to educate our younger generation about the problems and perspectives on the environment and prepare them to face them and find solutions to many of them. This demands incorporating real-life situations into our educational transactions and providing learners with opportunities to think and act for the environment.

The following points highlight the importance of Environmental Education.

1. Nature is man's greatest protector, provider, and promoter. The more he understands and appreciates nature's provisions and systems the better for his safety and survival.
2. Man is a part of nature and is bound by its basic laws. The more he crosses his limits and flouts natural laws and tendencies the more does he invite danger.

Nature is man's largest reservoir of resources.

1. While he can draw from these for meeting his needs and purposes he has to prevent their depletion and destruction beyond safe limits.
2. Nature's components and systems work in co-ordination resulting in balance and harmony. The man should understand this and see that they are not seriously disturbed.
3. Nature has its forms and sources of energy. The more man unravels, understands, and utilizes these, the better for the enrichment of his environment and his life.
4. Man with his superior capacities is the greatest consumer of natural resources and also the most prolific builder of artificial components and systems in his environment. This can disturb the equilibrium and health of the environment.
5. Uncontrolled deforestation, ill-planned construction of dams, production, and use of nuclear energy also pose a grave threat to the balance and rhythm in nature.
6. The rapid growth of population, crowded urban settlements, ever-expanding industrialization, increasing use of chemicals in agriculture, the uncontrolled output of industrial effluents and biological wastes, continuous expansion of modern means of transportation and communication, etc. pollute the environment and create hazards in the biosphere, hydrosphere, and atmosphere.

Environmental Education promotes the use of interdisciplinary and multidisciplinary knowledge as solving many of the environmental problems calls for knowledge of science and social science subjects. Since the environment forms a foundation for learning these disciplines, students' learning would become more meaningful, focused, and interesting. It also promotes group dynamics and collective effort which would be instrumental in solving future problems. Another advantage of Environmental Education is that it involves value education. It allows students to examine our thinking and practices, develop new ideas, and frame opinions of what is good and what is bad for the environment, evaluate the options and adopt those that are environmentally friendly.

Check Your Progress - 1

1. Fill in the blanks with appropriate words

1. Environmental Education is crucial and critical for everyone as it provides opportunities to acquire ----------, ----------, ----------, ---------- and ---------- needed to protect and improve the environment.
2. Nature is man's greatest ----------. ---------- and ---------- .

Choose the correct answer

1. Agenda – 21 is an official document of
2. Belgrade Charter (1947)
3. Tbilisi Conference (1977)
4. Earth Summit (1992)
5. None of the above.

1. "There is a paramount need to create a consciousness of the environment. It must permeate all ages and all sections of the society, beginning with the child". This is stated in :
2. Kothari Commission (1966)
3. National Policy of Education (1986)
4. Environment Protection Act (1986)
5. None of the above.

1.2.3.2. Objectives of Environmental Education

You are aware that education is a highly purposeful activity.
Any purposeful programme ought to have carefully selected and well-defined objectives. Objectives give a clear sense of direction and guide the planning, implementation, and monitoring of the programme. The effectiveness and success of the programme would depend on the realization of the objectives set forth.

What could be the objectives of Environmental Education?

Think and write them in the space provided below and match them with the objectives of Environmental Education listed in this section.

Activity: Space for writing objectives of Environmental Education.

The following objectives of Environmental Education have been identified based on statements and suggestions of different educationists, environmentalists, scientists, and other thinkers.

The Environmental Education programme must aim at developing the following in each individual and group.

1. Knowledge about the eco-systems in one's environment and their existence, functioning, and contributions.
2. Awareness and understanding of the components, processes, and their inter-relationships in the natural environment.
3. Sensitivity to events and changes in the physical, biological, and socio-cultural systems in the environment and problems relating to them.
4. Appreciation of the beauty, balance, and harmony in nature and the gifts of nature to man.
5. Desire to utilize the gifts and provisions of nature on the one hand and maintain its richness and balance on the other.
6. Readiness to devise and pursue ways and programmes for sustaining and enriching the environment.
7. Eagerness to identify and solve problems relating to the environment and communities living in the environment.
8. Urge to control and avoid activities that tend to disturb the equilibrium and activities that damage valuable components/systems in the environment.
9. Realization of the need to regulate the utilization of environmental resources and prevent their depletion.
10. Eagerness to take measures to curb excessive disturbance, depletion, pollution that spoil the environment.
11. Perception of the importance of controlling population growth, settlements, human activities in such a way to maintain and improve the quality of life in a healthy and rich environment.
12. Sense of responsibility and commitment to protecting and conserving the environment, maintaining its health for man's benefits.

The objectives of Environmental Education as stated by UNESCO's Tbilisi Conference are summarized below:

1. **Awareness:** To help individuals and social groups acquire an awareness of and sensitivity to the environment and its problems.
2. **Knowledge:** To help individuals and social groups gain a variety of experiences and acquire a basic understanding of the environment and associated problems.

3. **Attitudes:** To help individuals and social groups acquire a set of values and feelings of concern for the environment and motivation to protect and improve the environment.
4. **Skills:** To help individuals and social groups acquire the skills for identifying and solving environmental problems.
5. **Participation:** To help individuals and social groups to get actively involved at different levels in working towards the resolution of environmental problems.

All these should lead to sound choices and decisions, practices, plans and programmes, concerted actions, and pursuits. They are important not only for the sake of a better life for all but even for the very survival of man and other forms of life that enrich the world.

Check Your Progress - 2

1. Write any five objectives of Environmental Education.
2. What are the five major categories of Environmental Education objectives specified by the Tbilisi Conference?

1.2.3.3. Scope of Environmental Education

Given the ever-increasing magnitude, intensity, and above all the urgency of today's environmental problems, educationists, all over the world, have argued for incorporating Environmental Education into the formal educational setting. By its objectives and underlying principles, Environmental Education is considered as a form of good educational practice harmonizing the life of the society.

This can become possible only if all members of society – students, teachers, scientists, specialists, technologists, administrators, and lawmakers, etc. participate in the complex task of solving environmental problems. This can be achieved only with an environmentally enlightened society that is aware of its responsibilities.

Schools have an important role in imparting Environmental Education to the younger generation. We need to realize that Environmental Education is a permanent investment in creating a sustainable society and hence it should not be treated as an additional subject in the school curriculum. On the contrary, it should be viewed as a fundamental educational reform aiming at creating an environmentally literate society. Thus the scope of Environmental Education includes not only imparting knowledge about the environment but also (1) developing positive attitudes, values, and practices in students. (2) generating positive actions that will help improve the quality of the environment. (3) promoting a conservation ethic and encourage the adoption of environmentally responsible lifestyles. (4) creating a drive for greater involvement in the community-oriented environmental programmes.

Environmental Education is education in, about, and for the environment. Therefore its scope is very large. It begins from using the environment as a medium of learning to actions that can be taken for conserving our natural resources and maintaining its health for this as well as forth-coming generations. Thus it relates to a wide range of concepts, issues, and values about the protection and conservation of the environment and all life support systems such as air, water, soil, etc. Environmental Education will not only open our eyes to the disasters we have been causing to the environment but will enable us to think of the ways and means by which we can halt further deterioration of the environment.

The environment is full of exciting things. It exhibits a wide variety of phenomena, processes, and diversity. How many of us have concentrated on the flight of a bird and try to understand the laws of Aerodynamics? All the disciplines such as physics, chemistry, geology, geography have evolved from the observations made by people in the environment. To this extent, our environment is a wonderful laboratory to introduce students to the laws and principles of science and make them understand how they work.

Rabindranath Tagore has expressed that education divorced from nature has brought untold harm to young children. The sense of isolation that is generated through such separation has caused great evil to mankind. Tagore's philosophy of nature is based on the fundamental postulate that man has a spontaneous attraction for nature and this attraction is even more powerful during the formative years of the children. He has called for providing children with a large space for learning and this space is present in nature. Environmental Education through its various methodologies such as field trips, nature trails, trekking, etc, can introduce children to beautiful nature.

Environmental Education creates an awareness of the economic, social, political, and ecological interdependence of the modern world to enhance a spirit of responsibility and solidarity among nations.
Such awareness forms a pre-requisite for solving serious environmental problems.

The scope of Environmental Education is therefore not limited to students alone. It encompasses all sections of society. Hence, it should be aimed at all members of the community, in ways corresponding to the needs, interests, and motivations of the different age groups and socio-economic categories. Environmental Education should also take into consideration different socio-economic and cultural contexts and also the living conditions of the people of different communities in society.

Check Your Progress – 3

1. Fill in the blanks with appropriate words.

1. Environmental Education is a ----------, ---------- in creating a sustainable society.
2. Environmental Education is education ----------. ---------- and ---------- environment.
3. Environment exhibits a wide variety of ----------. ---------- and ---------- .
4. According to Rabindranath Tagore man has a ----------, ---------- for nature.
5. Environmental Education creates an awareness of the ----------, ----------, ---------- and ----------interdependence of the modern world.

1.2.3.4. Guiding Principles of Environmental Education

The Tbilisi Conference (1977) was instrumental in giving Environmental Education a comprehensive framework. In this Conference, many details of Environmental Education such as its goals, objectives, principles, content outlines, etc. were discussed and spelled out. These details are considered valid even today by the Environmental Education practitioners. The conference recommended several principles to help guide efforts in developing and promoting Environmental Education at the national, regional, and international levels. The International Conference on Environmental Education at Tbilisi in 1977 has made the following description of Environmental Education which has received wide acceptance internationally and has proved to be useful for guiding environmental efforts and actions.

1. The environment should include all aspects of natural and man-made environments. It is a complex of natural, built, and social components of the life of man. The social components constitute a set of cultural, moral, religious, and personal values.
2. The environment should be viewed in its totality blurring political, cultural, and physical boundaries since each affects others.
3. The interdisciplinary approach is best suitable for the study of the environment and its interacting and inter-dependent parts.
4. Environmental Education should be a lifelong process.
5. Environmental Education should help individuals work for the development and utilization of natural resources with the least destruction and pollution.
6. Environmental Education should help individuals to seek improvement of the quality of life for everyone by eradicating poverty, hunger, illiteracy, human exploitation, and dominance.
7. It should help individuals utilize technology not only for self-gain and a life of luxury in the short term but also for the survival of mankind in the long term.
8. Environmental Education should begin with the local, current, and most relevant environmental situations and issues and should move on to issues and situations that are national, regional, and global in scope.
9. Experience through participation in real environmental situations makes a greater impact. Hence local environmental problems are a good starting point for learning environmental attitudes and values.
10. Environmental Education should be regarded as a continuous process that involves a constant renewal of the approach, content, and methods resulting in knowledge appropriate to the changing conditions of the environment.
11. Environmental Education should cater to all ages and socio-professional groups of the population. It should be addressed to (a)the general non-specialist public groups of young people and adults whose daily conduct has a decisive influence on the preservation and improvement of the environment. (b) to particular social groups whose professional activities affect the quality of the environment and (c) to scientists whose specialized research and work provide knowledge based on which education, training and efficient management of the environment should be based.
12. For providing effective Environmental Education, both public and private facilities available in the society must be utilized to the maximum extent possible.

In brief, the following are the guiding principles of Environmental Education.

Environmental Education should:

1. Consider the environment in its totality – natural and built, technological and social.
2. Focus on current environmental situations.
3. Examine the environmental issues from local, national, regional, and international points of view.
4. Seek and promote local, national, and international co-operation in solving environmental problems.
5. Consider environmental aspects in various projects for development and growth.
6. Ensure learners' role in planning their learning experiences about the environment.
7. Relate environmental sensitivity, knowledge, values, and problem-solving skills to every stage of learning.
8. Help students to the identity or discover the real causes of environmental problems.
9. Emphasize the complexity of environmental problems and hence the need to develop critical thinking and problem-solving skills, in all individuals.

10. Utilize a wide variety of educational approaches in the teaching and learning process regarding environmental issues.

Check Your Progress - 4

1. Fill in the blanks with appropriate words.

1. The environment consists of ---------- and ---------- environments.
2. The best suitable approach for the study of environment _____.
3. Environmental Education is a ---------- process.
4. To make Environmental Education more effective we need to use both ---------- and ---------- facilities available in society.
5. The complexity of environmental problems requires us to develop ---------- and ---------- in all individuals.

1.2.4. Let us Summarise

- Environmental Education is crucial and critical for everyone as it helps to acquire the knowledge, values, attitudes, and skills needed to protect and improve the environment. Environmental Education is the corner-stone of long-term environmental strategies for preventing environmental problems, solving those which have occurred, and assuring environmentally sound, sustainable development.
- Nature is man's greatest protector, provider, and promoter. Man is part of nature and is bound by its basic laws. Uncontrolled exploitation of nature poses a grave threat to the balance and rhythm in nature. Environmental Education uses interdisciplinary and multidisciplinary knowledge since solving environmental problems requires knowledge of both science and social sciences.
- Several objectives of Environmental Education have been identified. These objectives give a sense of direction and guide the planning, implementation, and monitoring of Environmental Education programmes. UNESCO's Tbilisi Conference has emphasized the development of awareness, knowledge, attitudes, and skills in respect of the objectives of Environmental Education.

Environmental Education is a permanent investment in creating a sustainable society. The scope of Environmental Education lies not only in imparting knowledge about the environment but also in developing positive attitudes, values, and practices in students.

- The scope of Environmental Education is very large since it is related to a wide range of concepts, issues, and values about the protection and conservation of the environment. It is not limited to students alone. It encompasses all sections of society.
- The Tbilisi Conference was instrumental in giving Environmental Education a comprehensive framework. In this conference details of Environmental Education such as its goals, objectives, principles, content outlines, etc. were discussed in detail and spelled out. The conference has recommended several principles, to help guide efforts in developing and promoting Environmental Education at the national, regional, and international levels.

1.2.5. Answers to Check Your Progress - '1, 2, 3 and 4'

Check Your Progress - 1

1. (a) Knowledge, values, attitudes commitment, and skills.
2. Protector, provider, and promoter.
3. (a) b – Tibilisi Conference (1977).
4. b – National Police of Education (1986).

Check Your Progress - 2

1. Refer Section 1.2.3.2
2. Awareness
3. Knowledge
4. Attitudes
5. Skills
6. Participation

Check Your Progress - 3

1. (a) Permanent investment
2. In, about, and for
3. Phenomena, processes, and diversity
4. Spontaneous attraction
5. Economic, social, political, and ecological

Check Your Progress - 4

1. (a) Natural and man-made
2. Interdisciplinary
3. Life long (continuous)
4. Public and Private
5. Critical thinking and problem-solving skills.

1.2.6. Unit end Exercises

1. Bring out the importance of Environmental education with suitable examples.
2. What are the objectives of Environmental Education?
3. Explain the scope of Environmental Education.
4. Enumerate the guiding principles of Environmental Education.

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Block 1 : Environmental Education and Environment Hazards

Unit 3 : Factors of Degradation of Environment

Unit Structure

1.3.1. Learning Objectives

After completing this Unit, the student teachers will be able to

- Bring out the meaning of Degradation of the Environment;
- Explain the factors of Degradation of the Environment;
- Discuss the socio-economic impact of Degradation of Environment; and
- Suggest measures to prevent the Degradation of the Environment.

1.3.2. Introduction

Dear student, in the previous unit of this block you have studied about importance, objectives, scope, and guiding principles of environmental education. This unit deals with meaning, factors, socio-economic impact, and prevention of Degradation of the Environment.

Environmental Degradation is a process through which the natural environment is compromised in some way, reducing biological diversity and the general health of the environment. This process can be entirely natural in origin or it can be accelerated or caused by human activities. Many international organizations recognise environmental degradation as one of the major threats facing our planet and if the environment becomes irreparably compromised, it could mean the end of human existence on our planet.

Degradation of the Environment is one of the most serious challenges that human beings are facing in today's world. Human beings are facing a wide range of problems arising out of the Degradation of the Environment. Not only the number of problems arising out of Environmental Degradation is increasing but also their intensity is growing with time. Changes in the environment take place due to the multiplicity of several natural as well as human factors. All of them together bring about a change in the environment.

Natural forces like forest fire, volcanic eruption, earthquake, tsunami, floods, cloud burst, etc which occur from time to time cause serious damage to the environment. Similarly, human activities like deforestation can also generate a severe negative impact on earth

systems resulting in Environmental Degradation. The truth is that human factors are causing many times more damages to the environment than natural factors.

Problems started to grow with the human population and associated diversification of the economic activities. The industrial revolution has made these problems more and more acute. Industrialization, widespread deforestation, and population explosion have been considered as major causes of the Degradation of the Environment. Manufacturing of goods through the utilization of natural resources is causing the Degradation of the Environment in two ways – environmental pollution through industrialization and damage to the natural environment of various life forms through the exploitation of natural resources. Environmental Degradation caused by unsuitable land use is a worldwide problem that has affected sustainability.

1.3.3. Learning Points and Learning Activities

1.3.3.1. Meaning of Degradation of Environment

Let us now understand the meaning of the term Degradation of the Environment. Environmental Degradation is the deterioration of the environment through depletion of resources such as air, water, and soil, the destruction of ecosystems, and the extinction of wildlife. It is defined as any change or disturbance to the environment perceived to be undesirable. Environmental Degradation is caused by the combination of an already very large and increasing human population, continually increasing economic growth, and the application of resource depleting and polluting technology. Environmental Degradation is one of the ten threats officially cautioned by the high-level Threat Panel of the United Nations. The United Nations International Strategy for Disaster Reduction defines Environmental Degradation as "The reduction of the capacity of the environment to meet social and ecological objectives and needs". According to Business Dictionary, Environmental Degradation refers to "Erosion of the quality of the natural environment caused directly or indirectly by human activities".

When the environment becomes less valuable or damaged, we can say that Degradation has occurred. There are many forms of Environmental Degradation. When habitats are destroyed, biodiversity is lost or natural resources are depleted, the environment is hurt. Environmental Degradation can occur naturally or through human processes. The largest areas of concern at present are the loss of rain forests, air pollution and smog, ozone depletion, and the destruction of the marine environment. Pollution is occurring all over the world and poisoning the planet's seas and oceans. Degradation can be mainly grouped into (a) ecosystem imbalance (b) deforestation (c) freshwater degradation (d) soil degradation (e) marine degradation (f) air pollution (g) ozone depletion (h) global warming (i) solid and hazardous wastes.

Over the past 50 years, over one-tenth of the earth's vegetated soils have become so degraded that their natural functions have been damaged to the point where restoration becomes extremely difficult. In developing countries, more than 95% of urban sewage is released untreated into surface waters which poses a serious threat to human health. Urbanization is encroaching on more and more arable land, reducing the available land for farming. Countries throughout the world are being forced to look at the effects their activities are having on the natural resources on which they depend. Everyone has a responsibility to prevent Environmental Degradation from the individual picking up litter to stop an area looking dirty to a country that must stop its waste from poisoning its water resources. Though

Environmental Degradation is a global problem that requires global solutions, every citizen of this world has a definite role to play in preventing it.

List a few examples of Environmental Degradation that you may have observed around you in the box given below.

Activity:

Check Your Progress - 1

1. What is Environmental Degradation?
2. How does International Strategy for Disaster Reduction define Environmental Degradation?

1.3.3.2. Factors of Degradation of Environment

You have already understood the meaning of Degradation of the Environment. Environmental Degradation refers to the deterioration of the environment.
It is the result of the exploitation of the earth's natural resources. It is threatening the basic existence of life on our planet. Studies also reveal that the deterioration of the environment is occurring at an alarming rate.

Environmental Degradation can be attributed to various human activities and also some natural processes. Most of the natural resources on the planet earth are vulnerable to depletion and the rate at which we are exploiting them has already brought some of them to the brink of exhaustion. The exploitation of fossil fuels is the best example of this phenomenon. Large–scale exploitation of fossil fuels has depleted the reserves across the world leaving us with no option but to find an alternative source of energy. Other human activities that have contributed to Environmental Degradation are urbanization, overpopulation, deforestation, pollution, etc.

The hazardous wastes produced by industries contaminate the water bodies leaving the water unfit for drinking. In the same way, greenhouse gases that are released into the atmosphere such as chlorofluro carbons and carbon – dioxide have a devastating effect on the environment, making the planet vulnerable to a range of problems including global warming and climate change. Excessive deforestation to accommodate the growing population has resulted in the degradation of air and water.

After a point in time, the damage caused to the environment reaches a stage wherein it cannot attain the required balance on its own. In such a situation, we humans need to step in and ensure that the damage is curbed and balance is attained. Environmentalists all over the world are trying their level best to save the environment. On our part, we need to do our bit to make sure that they succeed in their efforts. The need of the hour is to identify the factors or the causes of Environmental Degradation and eliminate them one by one as early as possible.

Let us now consider some of the important factors of Degradation of the Environment.

1. **High quantity of exhaust gases:** One of the important reasons for the degradation of the environment is the exorbitant amount of gases released by various industries. Important amongst these gases are co2, so2 and NH3. These and many other gases are responsible for ozone holes and global warming.

2. **Deforestation:** Deforestation is taking place all over the world. It decreases the number of trees, which clean the environment, provides oxygen, and also affects rain patterns. This is why tree plantation is given much importance to make up for this loss.

3. **Mining:** Mining releases particulate matter. This particulate matter enters our lungs and causes harm to the respiratory system. Particulate matter can also be due to indoor pollution resulting from cooking on traditional 'Choolahs' and cottage industries like 'bangle making'.

4. **Chemical effluents:** Effluents are – products of industries and these pose a serious threat to the environment. Leather and tanning industries, petroleum industries, and chemical manufacturing industries create major waste products. These are directly released into nearby streams without treatment resulting in river pollution and causing harm to aquatic life.

5. **Transport:** The number of vehicles on the roads is increasing rapidly every day as the spending power of the population is also increasing. Smog is a nuisance that is created because of vehicular pollution. Hydrocarbons released from engines are the causes of the creation of lower level ozone that is harmful to humans.

6. **Construction:** Unprecedented construction activities that are being carried out has resulted in Urban Heat Island. Urban Heat Island is an effect caused due to trapping of solar radiation by concrete and cement which trap heat extremely well. Construction also causes the removal of a vegetative cover which usually allows for better exchange of heat. The heat island effect causes the constricted circulation of air which traps pollutants released in urban areas decreasing the air quality.

7. **Secondary pollutants:** These are not directly emitted but get created when primary pollutants react amongst themselves. For example, ozone is created from a reaction between non – burnt hydrocarbons and nitrous oxides. Stratospheric clouds are the main reaction sites for such pollutants.

8. **Agricultural policies:** Overloading the land with fertilizers and overgrazing are ruinous agricultural policies that degrade land, creating soil erosion that leads to silting in major rivers and reservoirs. Soil degradation leads to desertification and degradation of land quality.

9. **Population explosion:** The global population has experienced unprecedented growth from 1 billion in 1800 to 7 billion in 2012. Life expectancy has increased due to advanced medical science. Hence the population is expected to grow rapidly. Experts have predicted that the world population would be 8.4 billion by mid-2030. The population explosion has resulted in several environmental issues including that of food and shelter. There is also an alarming increase in the amount of waste generated every day.

10. **Arbitrary land – use policies:** Failure to execute land management policies can lead to land pollution. For example, mining leaves land resources unusable for habitation and cultivation. Exhaustive mining has resulted in the depletion of natural resources.

Check Your Progress - 2

1. Mention the different factors of Degradation of the Environment.

2. Match the following

A	B
1. CO_2	a. Deforestation
2. Cutting of trees	b. Vehicular Pollution
3. Mining	c. Global Warming
4. Smog	d. Desertification
5. Soil degradation	e. Particulate matter

3. What is Urban Heat Island?

1.3.3.3. Socio - Economic Impact of Degradation of Environment

One of the greatest challenges facing humanity is environmental Degradation including deforestation, desertification, pollution, and climate change. Environmental degradation increases the vulnerability of societies and contributes to the scarcity of resources. Climate change leads to an increase in the intensity and frequency of weather extremes such as heatwaves, floods, droughts, and tropical cyclones. People living in coastal areas are heavily hit by climate and Environmental Degradation. Environmental Degradation also leads to scarcity of resources such as water and farmable land.

Let us now see how the degradation of the environment affects human lives both socially and economically.

1. Impact on human health: Human health is heavily impacted by the degradation of the environment. Reduction in water quality is responsible for more than two million deaths and billions of people with the illness are reported annually across the globe. Similarly, a reduction in air quality is responsible for more than 3,00,000 deaths annually and a large number of chronic diseases all over the world. The toxic wastes and harmful chemicals from factories, agriculture, and automobiles cause illness and death in children and adults.

2. Poverty: In the majority of developing countries, poverty is attributed to poor crop harvests and a lack of quality natural resources that are needed to satisfy basic survival needs. Water shortages, climate change, and poor crop yields in developing countries are mainly due

to Environmental Degradation. Lack of access to adequate basic needs such as water and food directly leads to poverty.

3. Atmospheric Changes: Environmental Degradation can change some of the natural processes such as the water cycle and normal processes of animal and plant activities. Deforestation and mining destroy the natural land cover. These together with air, water and land pollution pose several atmospheric alteration threats. The alterations include global warming and climate change which can increase the risks of natural disasters. Depletion of the ozone layer increases the risk of skin cancer and eye diseases.

4. Loss of Biodiversity: Degradation of the environment has resulted in the destruction of wild forests and the damage of natural ecosystems. This has led to the mass extinction of species. This is because of human activities such as acidifying water systems, overexploitation of natural resources, overpopulation, and the destruction of natural systems necessary for the survival of different species. These human activities alter the natural process thereby destroying the natural ecosystems supporting biodiversity.

5. Loss for Tourism Industry: The deterioration of the environment can be a huge setback for the tourism industry.
Environmental damage in the form of loss of green cover, loss of biodiversity, increased air and water pollution can be a threat to tourism.

6. Economic impact: The huge cost that a country may have to spend due to Environmental Degradation can have a big economic impact in terms of restoration of green cover, cleaning up of landfills, and protection of endangered species.
The economic impact can also be in terms of the loss of the tourism industry.

We need to take action to stop the degradation of the environment and take care of the world that we live in by providing Environmental Education to the people. It helps them to have familiarity with their surroundings that will enable them to take care of environmental concerns thus making it more useful and protected for our children and other future generations.

Check Your Progress - 3

Fill in the blanks with appropriate words.

1. Toxic wastes and harmful chemicals cause ---------- and ---------- in children and adults.
2. Lack of access to adequate basic needs leads to ----------.
3. Deforestation and Mining destroy ----------.
4. Damage to natural ecosystems leads to the extinction of ----------.
5. Increased air and water pollution can be a threat to ----------.

1.3.3.4. Prevention of Degradation of Environment

You have already understood that Environmental Degradation is the deterioration of the environment through depletion of resources such as air, water, and soil, the destruction of ecosystems, habitat destruction, the extinction of wildlife, and pollution.

Our planet is the most important thing in our lives. Preventing Environmental Degradation is a movement that we should all take part in. Keeping our planet clean for future generations is one of the most important things we can do. Air, soil, and water are our most precious resources and we simply cannot afford to lose them. We would perish without these three resources.

The following measures can be taken for preventing Environmental Degradation.

1. Reducing our consumption of resources: Our natural resources are limited. Hence we should try to reduce the consumption of natural resources as far as possible.
This includes cutting down trees to make paper and other materials that we need as well as fossil fuels like petrol and diesel to fuel our vehicles. Our wildlife and flora rely on their natural environment and if we keep consuming all the natural resources we will be left with nothing.

2. Reusing resources and materials: Once a resource runs out, we will never be able to get that resource back. If people start reusing specific things, Environmental Degradation can be greatly reduced.

3. Recycling Resources: Recycling is the best way to slow down Environmental Degradation. If we want to save our planet recycling of resources is to be given utmost importance. This will reduce the rate of consumption of natural resources. For example, waste paper and plastic can be recycled effectively.

4. Using mass transportation: In urban areas, we commonly observe people using their vehicles like scooters and cars to go to their work place and to move from one place to another. This consumes a lot of fuel and results in air pollution.
This can be avoided by resorting to the use of mass transportation like buses and trains. People should also be encouraged to use bicycles especially when it comes to traveling short distances.

5. Giving back to the environment: The best possible way to help prevent Environmental Degradation is to give back to the environment. This can be done successfully by planting three trees for everyone that is cut down. Trees give us clean air to breathe and we cannot survive without them. Keeping our forests alive is not only important to our ecosystem but also the wildlife system. When the food chain is affected, we human beings are also affected.

6. Creating social awareness: It is the need of the hour to spread social awareness about the dangers of environmental pollution.
For this to happen Environmental Education should be made part and parcel of the curriculum at all levels of the education system.

Check Your Progress - 4
State whether the following statements are true or false.

1. Natural resources are unlimited.
2. Consumption of natural resources is to be reduced.
3. Waste paper and plastic can be recycled effectively.
4. Fuel consumption cannot be reduced by using mass transportation.
5. Planting trees is the best example of giving back to the environment.
6. Creating social awareness about environmental pollution is the need of the hour.

1.3.4. Let us Summarise

- Environmental Degradation is the deterioration of the environment through depletion of resources such as air, water, and soil, the destruction of ecosystems, and the extinction of wildlife. It is caused by the combination of increasing human population, increasing economic growth, and the application of resource depleting and polluting technology. Environmental Degradation is defined as "the reduction of the capacity of the environment to meet social and ecological objectives and needs". Degradation can be mainly grouped into (a) eco-system imbalance (b) deforestation (c) freshwater degradation (d) soil degradation (e) marine degradation (f) air pollution (g) ozone depletion (h) global warming and (i) solid and hazardous wastes.
- Environmental Degradation can be attributed to various human activities and some natural processes. Human activities that have contributed to Environmental Degradation are urbanization, overpopulation, deforestation, pollution, etc. It is important to identify the factors or the causes of Environmental Degradation and eliminate them one by one as early as possible. Some of the important factors of Degradation of the environment are (1) high quantity of exhaust gases (2) deforestation (3) mining (4) chemical effluents (5) transport (6) construction (7) secondary pollutants (8) agricultural policies (9) population explosion and (10) arbitrary land-use policies.
- Environmental Degradation increases the vulnerability of societies and contributes to the scarcity of resources. Degradation of the environment affects human lives both socially and economically. Human health is heavily impacted by the degradation of the Environment. Reduction of quality of air and water causes illness and deaths. Lack of access to adequate basic needs such as water and food leads to poverty.
- Environmental Degradation can change some of the natural processes such as the water cycle. Degradation of the environment has destroyed forests and damage natural ecosystems. Environmental Degradation also affects tourism.
- Preventing Environmental Degradation is a movement that we should all take part in. Air, soil, and water are the most precious resources. We would perish without these three resources. The following measures can be taken for preventing Environmental Degradation. (1) Reducing our consumption of resources (2) reusing resources and materials (3) recycling resources (4) using mass transportation (5) giving back to the environment and (6) creating social awareness.

1.3.5. Answers to 'Check Your Progress - 1, 2, 3 and 4

Check Your Progress - 1

I. 1. Environmental Degradation is the deterioration of the environment through depletion of resources such as air, water, and soil, the destruction of ecosystems, and the extinction of wildlife.

2. International Strategy for Disaster Reduction defines Environmental Degradation as " The reduction of the capacity of the environment to meet social and ecological objectives and needs".

Check Your Progress – 2

I. 1. High quantity of exhaust gases
2. Deforestation
3. Mining
4. Chemical effluents
5. Transport
6. Construction
7. Secondary pollutants
8. Agricultural policies
9. Population explosion
10. Arbitrary land-use policies

II. 1 - c
2 - a
3 - e
4 - b
5 – d

III. Urban Heat Island is an effect caused due to trapping of solar radiation by concrete and cement which trap heat extremely well.

Check Your Progress - 3

1. (a) Illness, death
2. Poverty
3. Natural land cover
4. Species
5. Tourism

Check Your Progress - 4

1. (1) False
2. True
3. True
4. False
5. True
6. True

1.3.6. Unit end Exercises

1. Bring out the meaning of Degradation of the Environment.
2. Explain the factors of Degradation of the Environment giving suitable examples.
3. Discuss the socio-economic impact of Degradation of the Environment.
4. Suggest measures to prevent the degradation of the environment.

1.3.7. References

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Block 1 : Environmental Education and Environment Hazards

Unit 4 : Environmental Hazards

Unit Structure

1.4.1. Learning Objectives

After completing this Unit, the student teachers will be able to

- Explain the meaning of Environmental Hazards;
- Mention the types of Environmental Hazards;
- Explain the causes of Environmental Hazards;
- Discuss the effects of Environmental Hazards; and
- Suggest measures for the prevention of Environmental Hazards.

1.4.2. Introduction

An Environmental Hazard is a threat posed by the natural or built environment to humans and the things that are valued in human society.

An Environmental Hazard becomes a disaster when the threat is realised and causes significant human loss. Death, injury, and psychological harm are considered to be more serious than economic or property loss.

Environmental Hazards are categorised as either natural or technological though multiple hazards may be linked to one another. Natural hazards include geologic events like earthquakes, landslides, and volcanic eruptions; hydrologic events like floods and drought; meteorological events such as tornadoes and hurricanes and biologic events like wildfires and diseases. Technological hazards arise from within human systems and are usually accidental in nature. They include industrial failures that release toxic materials into the environment, structural collapses of buildings and bridges, and transportation disasters like plane crashes and train accidents.

Disaster is an undesirable occurrence resulting from forces that are largely outside human control. It strikes quickly with little or no warning which causes or threatens serious disruption of life and property including death and injury to a large number of people.

Hazards and disasters are closely related or sometimes used as synonymous to each other. Hazards are a threat, while a disaster is an event. Disaster is a calamity or tragedy or a consequence of a hazard. Hazards are the processes that cause an accident or extreme event or danger whereas disaster is a sudden adverse or unfortunate extreme event that causes great damage to human beings as well as plants and animals. Disasters occur rapidly and indiscriminately. Thus, Environmental Hazards are the processes whereas environmental disasters are the results or responses of Environmental Hazards.

India is one of the most disaster-prone countries with all sorts of hazards being visited in some parts of the country or the other every year. Natural hazards in India are related to climate, water, and geological causes. Other hazards relate to chemical, industrial, nuclear, biological, and accidental disasters.

India has been affected by three major natural hazards namely earthquakes, cyclones, and floods from times immemorial. It is estimated that about 55% of India's land area is vulnerable to seismic, 8% to cyclonic, and 10% to flood hazards. Earthquakes of giant magnitudes 7.5 or more have occurred in the Andaman Islands, Kutch areas of Gujarat, Bihar, and North-Easters states. The East coast is liable to the occurrence of severe cyclones. The west coast is less severe in cyclone activity. There are numerous instances of disasters caused by floods in different parts of India. According to World Disaster Report, on average 5,000 people are killed and 60 million get affected and nearly one percent of existing houses are known to be damaged during the occurrence of these hazards every year in India. Reconstruction and rehabilitation cost greatly affect the economy of the country.

1.4.3. Learning Points and Learning Activities

1.4.3.1. Meaning of Environmental Hazards

An Environmental Hazard is a substance, a state, or an event that has the potential to threaten the surrounding natural environment or adversely affect people's health including pollution and natural disasters.

A hazard is an agent that has the potential to cause harm to a vulnerable target. The terms 'hazard' and 'risk' are often used interchangeably. However, they are two very distinct terms. A hazard is any agent that can cause harm or damage to humans, property, or the environment. Risk is defined as the probability that exposure to a hazard will lead to a negative consequence or a hazard poses no risk if there is no exposure to that hazard.

Kates defines Environmental Hazard as "the threat potential posed to man or nature by events originating in, or transmitted by, the natural or built environmental". This definition includes a broader range of hazards ranging from long term environmental deterioration such as acidification of soil and build-up of atmospheric carbon-di-oxide to communal and social hazards such as crime and terrorism.

Environmental Hazards usually have common characteristics including their tendency to be rapid onset events meaning they occur with a short warning time, they have a clear source of origin which is easily identified, the impact will be swift and losses suffered quickly during or shortly after the onset of the event.

Natural hazards may be defined as "extreme events that originate in the biosphere, hydrosphere, lithosphere or atmosphere" or "a potential threat to human and their welfare". Technological and man-made hazards include explosions, the release of toxic materials, structural collapses, and transportation, construction, and manufacturing accidents.

Check Your Progress - 1

1. What is an Environmental Hazard?
2. Differentiate between hazard and risk.
3. What are the characteristics of an Environmental Hazard?
4. Mention some of the man-made Environmental Hazards.

1.4.3.2. Types of Environmental Hazards

Every day we face several Environmental Hazards. These hazards can be classified into four categories namely physical, chemical, biological, and socio-cultural.

1. Physical hazards: These are physical processes that occur naturally in the environment. They include natural disaster events such as earthquakes, volcanoes, landslides, floods, droughts, and Tsunami or Pandemic diseases Covid-19 caused by Novel Corona Virus. Some physical hazards are ongoing like ultraviolet radiation. Ultraviolet radiation is considered a hazard because it damages DNA and can cause human health issues like skin cancer and cataracts.

2. Chemical hazards: These can be both natural and human-made chemicals in the environment. Some chemical hazards occur naturally in the environment like heavy metals like lead and mercury. Human-made chemical hazards include many of the synthetic chemicals we produce like disinfectants, pesticides, and plastics.

3. Biological Hazards: These come from ecological interactions between organisms. Some of the examples of biological hazards are viruses, bacterial infections, malaria, and tuberculosis. When these pathogens and diseases are transferred between organisms, it is called infectious disease. We suffer from these diseases and pathogens because we are being parasitized by another organism which is a natural process.

4. Socio-cultural hazards: These result from your location, socioeconomic status, occupation, and behavioural choices. For example, smoking is hazardous to health and it is a behavioural choice. If you live in a neighborhood with lots of crime, it is a hazard-based on your location. Similarly, your diet, exercise habits, and primary mode of transportation all influence your health and the health of the environment around you.

Check Your Progress - 2

I. Match the following

A	B
1. Physical hazard	a. Bacteria
2. Chemical hazard	b. Earthquake
3. Biological hazard	c. Location
4. Socio – Cultural hazard	d. Pesticides

II. Fill in the blanks with appropriate words.

a) A physical hazard is a ---------- process in the environment.
b) Chemical hazards can be both ---------- and ---------- chemicals in the environment.
c) Biological hazards occur because of ---------- between organisms in the environment.
d) Smoking is an example of ---------- hazard.

1.4.3.3. Causes of Environmental Hazards

There has been a constant debate on the topic of natural hazards and the role played by humans in the same. A lot of human practices, as well as rapidly growing developmental activities, have been blamed for the rise of these natural hazards like floods, droughts, landslides, forest fires, etc. The reality at present is that we are experiencing an increasing number of natural hazards. Hence, there is a need to keep a check on developmental activities so that we could have a sustained environment.

There are different types of natural hazards and depending upon different types of natural hazards, the causes are also different. For example, the causes of an earthquake cannot be the same as that of forest-fire. Natural hazards are caused due to different reasons like soil erosion, seismic activity, air pressure, and ocean currents, etc. A natural hazard is not a new phenomenon. These natural hazards have occurred since the earth began forming and continue to cause serious damage and loss of life all over the world. The root causes of most of the natural hazards that occur on earth can be attributed to the imbalance created in our environment. This imbalance may be in the form of soil pollution, air pollution, or water pollution.

Natural activities taking place in the earth's crust, as well as the surface, are the main causes of natural hazards. The seismic activity caused by earthquakes results in volcanoes. Tectonic movements in the earth's crust are responsible for earthquakes which are sometimes very dangerous and may lead to heavy loss of life and property.

The activity of the moon determines the ocean waves which can result in high tides during the full moon and sometimes these tidal waves can be really dangerous. The deadly December 2004 Tsunami also occurred on a full moon night. Tsunamis along the coasts of landmasses bordering the Indian Ocean killed over 2,30,000 people in fourteen countries and destroying coastal communities with waves up to 30 meters high.

Changing ocean currents are dangerous and they can result in changes in water temperature which could result in global food shortage by killing fish and ocean plant life. These changing ocean currents could also adversely affect the intensity as well as the frequency of storms. Tornadoes are also dangerous and are formed by the interaction of high- and low-pressure air. Flooding and high winds are caused by crashing together of low and high-pressure air.

Natural hazards have their root causes in the normal activities of the earth. However, during the past few decades, we have witnessed some rapid modernization and growth. Man's increased knowledge and technology have served to trigger some natural hazards. Mining and deforestation can lead to floods and erosion. Global warming which could affect the ocean currents has its roots in modern man over the use of fossil fuels. Earthquakes occurring as a result of tectonic movements inside the earth's crust can also be triggered by activities like drilling, bombing, mining, and construction.

Impact of Human Activities on Environmental Hazards

Today we are progressing at a rapid rate neglecting the harm that we are causing to our environment. Global warming as well as poor human management in the field of land and water resources have contributed to natural hazards. Humans have created a situation where natural hazards like earthquakes and tsunamis result in heavy losses in terms of human life and property.

Global warming is increasing the temperatures of Earth's oceans and atmosphere leading to more intense storms of all types including floods due to the melting of these oceans. There are a lot of constructions in flood-prone regions which have increased the likelihood that the towns and villages are affected by flash floods.

Rapidly growing industrialization has led to a lot of air and water pollution. Though there are environmental laws that the industries need to follow to treat the waste before disposing into the environment, most of the time industries neglect these laws for personal gain. Authorities need to take severe action against such industries.

There are many societies and groups of people who are working in the field of environmental awareness to make people aware of the harmful effects of the growing pollution and other practices that are harmful to our environment. Several NGOs have taken up the issue of pollution and global warming by taking out rallies and organizing various campaigns to save the environment. Such initiatives are to be appreciated and encouraged.

Check Your Progress - 3

I. Fill in the blanks with appropriate words

1. The root cause of most natural hazards is environmental ----------
2. Tectonic movements in the earth's crust are responsible for ----------
3. The activity of the moon determines the ocean ----------
4. Changing ocean currents can result in water changes ----------
5. The interaction of high- and low-pressure air can result in the formation of ----------
6. Overuse of fossil fuels is the main cause of ----------
7. The industrialization has led to pollution of ---------- and ----------

1.4.3.4. Effects of Environmental Hazards

Environmental Hazards such as cyclones, earthquakes, landslides, floods, wildfire, volcanic eruptions are increasing due to climate change. These natural hazards bring with them a host of issues including humanitarian crisis, public health issues, environmental and infrastructural problems, food scarcity, and emotional shocks.

1 Humanitarian Crisis: Climate change and accompanying natural hazards have created a large migrant population. These people are forced out of their homes by natural hazards like floods, landslides, earthquakes, etc. The area where they lived is no longer habitable for one reason or the other.
It is predicted that by the end of the century there will be 2 billion climate refugees and environmental migrants out of a projected population of 11 billion by 2100.

2. Public Health Issues: Natural hazards have resulted in health issues. Due to natural hazards, facilities for water and toilet hygiene are heavily damaged. Safe disposal of human waste becomes a public health hazard. During floods standing water can be a breeding ground for pathogenic bacteria and mosquitoes, survivors of natural hazards can be cut off from life-saving medications and be isolated from emergency health care services.

3. Environmental Problems: In march 2011, Tsunami following the earthquake in Japan caused Fukushima Daiichi nuclear disaster where radioactive material was released into the Pacific Ocean. This was the largest nuclear disaster since Chernobyl and it caused several issues in the ecosystem and surrounding waters spreading radio active material through ocean currents. Natural hazards like Tsunami and wildfire can cause wide-ranging and long-term consequences for ecosystems.

4. Infrastructural Damage: Natural hazards cause damage to both public and private infrastructure. In the wake of natural hazards, people can end up losing all of their assets with no opportunity for restitution. Natural hazards can have long-term consequences beyond the immediate loss of life and demolition of infrastructure. The area impacted by a natural hazard will show scars for years to come.

5. Food Scarcity: Natural hazards result often in food scarcity. Thousands of people around the world go hungry as a result of destroyed crops and loss of agricultural supplies whether it happens suddenly in a flood or gradually in a drought. As a result of this food, prices rise reducing people's purchasing power and increasing the risk of malnutrition. The impact of hunger following an earthquake or flood can be tremendous causing life-long damage to children's development.

6. Emotional shocks: Natural hazards can be particularly traumatic for young children. Confronted with scenes of destruction and the deaths of relatives and friends, many children develop Post-Traumatic Stress Disorder (PTSD), a serious psychological condition resulting from extreme trauma. Children suffering from PTSD can be prone to psychological damage and emotional distress.

Check Your Progress - 4

I. Fill in the blanks with appropriate words.

1. Migration of people from one region to another is mainly due to ----------
2. During floods standing water can be a breeding ground for ---------- and ---------
3. Radioactive material is released into the environment especially during ----------, ----------
4. Destruction of property during natural hazards is referred to as ----------, --------.
5. Destruction of crops during natural hazards leads to ----------, ----------.
6. PTSD stands for ----------, ----------, ----------, ----------.

1.4.3.5. Prevention of Environmental Hazards

Natural hazards are inevitable, even if we have the technology to predict hazards, we cannot stop them from occurring. The best that we can do is to stop the practices that are harmful to our environment and leading to Environmental Degradation. We should be prepared for a disaster with our disaster management plan. Disaster can lead to outbreaks of infectious diseases. Once a disaster strikes it leaves behind a lot of destruction and loss of life. In the case of disasters like floods, earthquakes, etc where a large number of people are displaced, there are a lot of deaths also. This is a time when emergency preparedness comes into effect giving first aid to the injured and providing rescue and relief operations.

The majority of deaths immediately after a natural disaster is directly associated with trauma and injuries. After a disaster strikes, there is a great risk of an epidemic and hence it is very important to control the causalities as well as is required to dispose of the dead animals and human bodies properly before an epidemic outbreak.

The risk factors for increased infectious disease transmission and outbreaks are mainly associated with the after-effects of the disasters. It is very important to deal with these problems which in turn can pose a greater threat. The after-effects include displacement of populations and environmental changes. Unplanned and overcrowded shelters, poor water and sanitation conditions, poor nutritional status, or insufficient personal hygiene may cause diarrhea and other water borne diseases. Hence it is very important to be prepared with a proper disaster management team that can take charge soon after a disaster strike.

Humans always had to deal with natural hazards whether through preparing for them or responding when a disaster occurs. One of the most important ways humans respond to natural hazards is by preparing for their occurrence. Technology has helped us to prepare, predict, and forecast future natural hazards.

1. **Hazard Assessment:** Scientists study natural hazards to determine the characteristics of various hazards. Hazard assessment generally determines the location and timing of past hazards, probable effects depending upon the magnitude of hazard, and organising the information into a usable form for policymakers.

2. **Risk Assessment:** It includes possible socio-economic effects. It covers locations of buildings and infrastructure in hazardous areas and potential exposure to natural hazards.

3. **Prediction:** In terms of natural hazards, predictions are made through various scientific observations. A common observation that could lead to a prediction is the identification of a precursor event. A precursor event is a smaller event that usually precedes a larger event such as small earthquakes around a volcano indicating a volcanic eruption.

4. **Forecasting:** The term forecast is usually used as a short-term prediction of the severity, location, and timing of weather-related events.

Check Your Progress - 5

I. State whether the following statements are true or false.

1. It is possible to stop natural hazards from occurring with the help of technology.
2. The disaster management plan is essential to deal effectively with any disaster.
3. The majority of deaths after a natural disaster is directly associated with trauma and injuries.
4. Natural disasters lead to the displacement of the population and environmental changes.
5. Technology cannot help us to predict and forecast future natural hazards.
6. Characteristics of various natural hazards can be studied scientifically.
7. Scientific observations can help us in predicting a natural hazard.

1.4.4. Let us Summarise

- An Environmental Hazard is any agent that can cause harm or damage to humans, property, or the environment. Environmental Hazards have specific characteristics. They include earthquakes, floods, tsunamis, droughts, etc. Man-made hazards include explosions, transportation, and construction accidents.
- Environmental Hazards can be classified into four categories namely physical, chemical, biological, and socio-cultural. Earthquakes, floods, landslides, and droughts are examples of physical hazards. Chemical hazards include pesticides and plastics. Viruses and bacteria are some examples of biological hazards. Socio-cultural hazards result from the location, socio-economic status, and occupation of an individual.
- There are different causes for different natural hazards. Natural hazards are caused due to soil erosion, seismic activity, air pressure, and ocean currents, etc. The root cause of all-natural hazards is the imbalance created in our environment. This imbalance may be in the form of soil pollution, water pollution, or air pollution. The industrialization has also led to Environmental Degradation.
- Environmental Hazards have contributed to public health, environmental, infrastructural, and humanitarian problems. They have also caused psychological problems of immense nature in human beings.
- We cannot stop natural hazards from occurring. But we can try our best to put an end to Environmental Degradation and at the same time take appropriate measures to reduce the impact of natural hazards on human society.

1.4.5. Answers to 'Check Your Progress - 1, 2, 3, 4 and 5'

Check Your Progress - 1

1. An Environmental Hazard is a substance, a state, or an event that has the potential to threaten the surrounding natural environment.
2. A hazard is any agent that can cause harm or damage to humans, property, or the environment. A risk is a probability that exposure to a hazard will lead to a negative consequence. A hazard may not pose any risk if there is no exposure to that hazard.
3. Environmental Hazard may occur with a short warning time, it has a clear source of origin, its impact will be swift and losses suffered quickly.
4. Examples of man-made Environmental Hazards are explosions, the release of toxic materials into the environment, transportation, construction, and manufacturing accidents.

Check Your Progress - 2

1. 1 – b 2 – d 3 – a 4 – c

1. (a) Natural
   (b) Natural, human-made
   (c) Interaction
   (d) Socio-cultural

Check Your Progress - 3

1. (a) Imbalance
   (b) Earthquakes
   (c) Waves
   (d) Temperature
   (e) Tornadoes
   (f) Global warming
   (g) Air, water

Check Your Progress - 4

1. (a) Climate change
   (b) Bacteria, mosquitoes
   (c) Nuclear disaster
   (d) Infrastructural damage
   (e) Food scarcity
   (f) Post-Traumatic Stress Disorder

Check Your Progress – 5

1. 1 – False 2 – True 3 – True 4 – True 5 – False 6 – True 7 – True

1.4.6. Unit end Exercises

1. Explain the meaning of Environmental Hazards.
2. Explain the different types of Environmental Hazards giving suitable examples.
3. Explain the causes of Environmental Hazards.
4. Discuss the effects of Environmental Hazards on human society.
5. Suggest measures for the prevention of Environmental Hazards.

1.4.7. References

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Block 1 : Environmental Education and Environment Hazards

Unit 5 : Environmental Pollution

Unit Structure

1.5.1. Learning Objectives

After completing this Unit, the student teachers will be able to

- Bring out the meaning of Environmental Pollution;
- Classify the types of Environmental Pollution;
- Explain the causes of Environmental Pollution;
- Discuss the effects of Environmental Pollution; and
- Suggest measures to prevent Environmental Pollution.

1.5.2. Introduction

Pollution is the effect of undesirable changes in our surroundings. These undesirable changes in the environment have harmful effects on plants, animals, and human beings. During the last few centuries, we have been contaminated with a variety of waste products sour air, water, and land on which life depends.

Environmental pollutants include solid, liquid, and gaseous substances produced due to human activity. The nature and concentration of a pollutant determine the severity of its detrimental effects on human health. For example, an average human being requires about 12 kg of air each day which is nearly 12 to 15 times greater than the amount of food we eat. So, even a small concentration of pollutants in the air becomes more significant in comparison to similar levels present in food. Pollutants that enter water can spread to distant places. Degradable pollutants can be rapidly broken down by natural processes; e.g., domestic sewage, discarded vegetables, etc. Slowly degradable pollutants remain in the environment for many years in an unchanged condition and take decades to degrade; e.g., DDT (pesticides). Non – degradable pollutants cannot be degraded by natural processes. Once they are released into the environment they are difficult to eradicate; e.g., toxic elements like lead or mercury and nuclear wastes.

There are many sources of pollution. Based on sources of pollution, pollution can be of two types namely natural and manmade. Natural sources of pollution include volcanic eruption (smoke, ash, gases, and dust), forest fires, floods, cyclones, etc. Manmade

sources of pollution include industries, agriculture, domestic sewage, automobiles, nuclear explosions, etc. Industries are the major sources of pollution. Industries discharge several pollutants such as gaseous matter, solid matter, wastewater that contains many chemical ingredients. Sources of urban pollution include sewage water, solid waste, gaseous exhaust, and liquid effluents. The use of chemical fertilizers, pesticides, and insecticides results in pollution of soil.

1.5.3. Learning Points and Learning Activities

1.5.3.1. Meaning of Environmental Pollution

Environmental Pollution is one of the most serious problems facing humanity and other life forms on our planet today. Environmental Pollution is the contamination of the physical and geological components of the earth/atmosphere system to such an extent that normal environmental processes are adversely affected. Any use of natural resources at a rate higher than nature's capacity to restore itself can result in pollution of air, water, and soil.

Environmental Pollution is a global problem and is common to both developed as well as developing countries. This has attracted the attention of human beings for their severe long–term consequences. The decline in environmental quality as a consequence of pollution is evidenced by a loss of vegetation, biological diversity, excessive amounts of harmful chemicals in the atmosphere and food grains, and growing risks of environmental accidents and threats to life support systems.

Pollution is viewed from different angles by different people but is commonly agreed to be the outcome of urban – industrial and technological revolution and speedy exploitation of natural resources, increased rate of exchange of matter and energy, and ever-increasing industrial wastes and urban effluents.

Holdgate (1979) defined Environmental Pollution as "the introduction by man, into the environment, of substances or energy liable to cause interference with legitimate uses of the environment".

Singh (1991) has defined pollution in a very simple manner, i.e., "disequilibrium condition from equilibrium condition in any system". This definition may be applied to all types of pollution ranging from physical to economic, political, social, and religious.

According to Natural Environmental Research Council (NERC), pollution is viewed as "the release of substance and energy as waste products by human activities which result in changes, usually harmful, within the natural environment".

Pollution is "any undesirable change in the physical, chemical or biological characteristics of air, water, and soil that may create a hazard or potential hazard to the health, safety or welfare of any living species".

The substances which cause pollution are known as pollutants. According to the Indian Environment (Protection) Act, 1986, a pollutant has been defined as "any solid, liquid or gaseous substance present in such concentration as may be or tend to be injurious to the environment". Pollutants can be classified into primary and secondary pollutants and biodegradable and non – biodegradable pollutants.

Check Your Progress - 1

1. What is Environmental Pollution?
2. Give any two definitions of Environmental Pollution.
3. What is a Pollutant?

1.5.3.2. Types of Environmental Pollution

Pollution refers to the addition of contaminating substances to the natural environment resulting in an adverse impact on the environment. Pollution can be of different types depending on the part of the environment that is getting polluted.

The word Pollution comes from the Latin word 'Polluere' that means contamination. Hence pollution is something that contaminates the environment. The presence of harmful substances in the air, land, and water, which can harm living beings and the environment is pollution. Pollution poses a threat to the sustainability of the environment.

Let us now try to understand the different types of Environmental Pollution.

1. **Air Pollution:** Air pollution refers to the release of pollutants like toxic gases, biological molecules, and particulate matter into the atmosphere. The pollutants can be derived from several sources including both natural processes and human activities. Volcanic eruptions, automobile, and industrial effluents, etc, are some examples of air pollution sources. Carbon monoxide, carbon dioxide, chlorofluorocarbons, etc, are some examples of air pollutants. Air pollution can be highly detrimental to the health and well–being of all life forms on earth.

2. **Water Pollution:** The contamination of water bodies like lakes, rivers, ponds, etc. by pollutants is called water pollution. Water pollution is one of the most harmful types of pollution. It can have extremely disastrous consequences for all living beings using contaminated water. A major volume of all the pollutants produced on land end up in water bodies. Toxic wastes released by industries, pathogens released in sewage, harmful chemicals present in agricultural land are some of the water pollutants. The contamination of water can lead to epidemics that can wipe out the population of an entire species. Thus water pollution has a highly adverse impact on the environment, society, and economy of a place.

3. **Soil Pollution:** Soil pollution occurs when the soil of an area is contaminated. The soil is essential to the growth of all plants including crops. Degradation in the soil quality results in lower yields and poor health of crops grown on such soil. Industrial and agricultural chemicals are the common pollutants contaminating the soil.

4. **Noise Pollution:** When the environment is filled with unnecessary or unpleasant sounds that are harmful to human beings, animals, and plants, it is called noise pollution. Transport vehicles, machinery, industries, loud music, etc. are some of the most common sources of noise pollution. Noise pollution can give rise to chronic diseases like cardiovascular diseases. It can also severely affect the psychological health of people.

5. **Radioactive Pollution:** When radioactive substances are present in areas where their presence is undesirable, it results in radioactive pollution. Such substances are highly toxic to all life forms on earth. Radioactive substances trigger mutations in the genetic

material of living organisms leading to different types of cancer. Exposure to such toxins can also adversely impact the different systems of the body.

6. **Thermal Pollution:** An induced change in the temperature of large volumes of water causes thermal pollution. This type of pollution leads to the degradation of water quality as the warm water does not provide ideal living conditions for aquatic flora and fauna. Higher temperatures also alter the composition of dissolved elements in the water. The flora and fauna living in the area can be killed by this abrupt change in the water temperature.

7. **Plastic Pollution:** Plastic pollution is caused by plastic accumulation in the environment. Plastic which is a non – biodegradable substance is extremely harmful to all life forms on earth. Every year, thousands of animals die due to plastic pollution. The ingestion of plastics kills these animals. Most of the plastic waste generated in the world ends up in the oceans where they cause great harm to the marine ecosystem.

8. **Light Pollution:** Recently another kind of pollution known as Light Pollution has been identified. In big cities, artificial light sources such as advertisement boards and other light sources that emit bright light have polluted the serene moon light during nights. It is disrupting ecosystems and spoiling the aesthetic environment. It is adversely affecting human health and psychology and disrupting ecosystems. Astronomers have said that it has become difficult to watch celestial bodies clearly during the night in big cities due to this Light Pollution.

Check Your Progress - 2

1. Mention the different types of pollution.

2. Match the following

A	B
1. Air Pollution	a. Toxic wastes released by industries.
2. Water Pollution	b. Unpleasant sound produced by vehicles, machinery and industries.
3. Soil Pollution	c.Volcanic eruptions, automobile and industrial effluents.
4. Noise Pollution	d. Chemicals used for agriculture.
5. Light Pollution	e. Excessive light during nights in big cities during night

1.5.3.3. Causes, Effects and Prevention of Environmental Pollution

1. Air Pollution

Air is the most vital constituent of the environment for the sustenance of life on earth. In pure air, the proportion of different constituents like oxygen, nitrogen, and other gases is fixed and definite. Air is polluted when its natural composition is disturbed either by natural or by man-made sources.

Causes of Air Pollution

Sulphur dioxide is emitted from the combustion of fossil fuels like coal and petroleum. Carbon monoxide is produced due to the incomplete burning of fossil fuels.

1. Nitrogen oxides are produced mainly by automobiles, aircraft, thermal power stations, and factories.
2. Carbon dioxide is largely released into the atmosphere by the burning of fossil fuels. It is also emitted by volcanic eruptions.
3. Ammonia is a common by-product of agriculture related activities. The use of insecticides, pesticides, and fertilizers in agricultural activities emit harmful chemicals into the air.
4. Industries release a large amount of carbon monoxide, hydrocarbons, organic compounds, and chemicals into the air depleting the quality of air.
5. During the mining process dust and chemicals are released into the air causing air pollution.
6. Chlorofluro carbons are emitted from industries, refrigerators, air conditioners, cosmetic goods, etc.

Effects of Air Pollution

1. Toxic gases like sulphur dioxide and carbon monoxide affect the respiratory system and cause bronchitis, asthma, and lung cancer. Sudden leakage of toxic gases from chemical and gas plants causes loss of life like we have seen in the case of the Bhopal(Madhya Pradesh) gas tragedy and recently in Vishakapattanam in Andhra Pradesh in India.
2. Air pollution severely affects the weather and climatic conditions of a region. Air pollutants have an impact on humidity, clouds, and rainfall.
3. Global warming is caused due to the increase in the concentration of certain gases like carbon dioxide, nitrogen oxides, and methane, and chlorofluro carbons in the air.
4. Harmful gases like nitrogen oxides and sulphur oxides released into the atmosphere during the burning of fossil fuels combine with water droplets. Then they fall on the ground in the form of acid rain.
5. Ozone exists in the earth's stratosphere and is responsible for protecting humans from harmful ultraviolet rays. Earth's ozone layer is depleting due to the presence of chlorofluro carbons and hydro chlorofluro carbons in the atmosphere.
6. Toxic chemicals present in the air can force wildlife species to move to a new place and change their habitat. The toxic pollutants deposited over the surface of the water can also affect sea animals.

Prevention of Air Pollution:

1. People must be encouraged to use more and more public modes of transportation to reduce pollution.
2. Gaseous pollutants can be removed by spraying water, filtration, or absorption.
3. The burning of fossil fuels is to be reduced as far as possible.
4. Engines of automobiles are to be redesigned to reduce the emission of toxic gases. Emission test for vehicles is to be made compulsory.
5. The industrial areas should be located at a certain safe distance from the residential areas.
6. There should be a green belt around townships, industrial areas, and villages.
7. Steps should be taken to prevent forest fires. It is also important to check deforestation.
8. The height of smoke chimneys should be high enough to dilute the smoke.

9. Electrical energy is to be efficiently used because a large amount of fossil fuels is used to produce electricity.
10. The use of alternate sources of energy like solar and wind energy must be encouraged.

2. Water Pollution

Water is the essential element that makes life on earth possible. Without water, there would be no life. 71% of the earth's surface is covered by water. About 97% of the total water available on earth is found in the oceans and is too salty for drinking or irrigation. The remaining 3% is freshwater. Water has a self-purifying capacity during the water cycle. But it gets polluted when undesirable substances are added by man to water beyond the tolerance level.

Causes of Water Pollution

1. Natural sources of water pollution are soil erosion, landslides, volcanic eruptions, and the decomposition of plants and animals. The brown and dirty water is the result of mud mixed in the water due to soil erosion.
2. Urban sources of water pollution include domestic effluents and sewage water. Sometimes sewage water flows into nearby rivers, tanks, or lakes.
3. Industrial sources of water pollution include the effluents generated from industries such as paper, chemicals and petrochemicals, oil refineries, metal works, distilleries, textiles, etc.
4. Agricultural sources of water pollution include excessive use of fertilizers, pesticides, and insecticides.
5. When the acid rain falls it contaminates water bodies including streams, rivers, and lakes.
6. Thermal Power Plants discharge large quantities of heated water into nearby rivers, lakes, or ponds and cause thermal pollution of water.
7. The oil spill in the sea causes pollution of seawater. If there is an accident or leakage of oil spreads on the water surface and cause serious problem to marine animals.

Effects of Water Pollution

1. Consumption of highly contaminated water can cause injury to the heart and kidneys.
2. Polluted water is greatly responsible for several water-borne diseases like cholera, typhoid, diarrhea, dysentery, etc.
3. Toxins within the water can harm aquatic organisms breaking a link in the food chain.
4. The use of polluted water from rivers, lakes, and ponds for irrigation affects food quality.
5. Highly polluted water decreases the fertility of the soil and also kills useful microorganisms.
6. Polluted water obstructs the process of photosynthesis which affects the growth of vegetation.
7. Polluted water changes the physical and chemical nature of water.

Birds that get into oil-contaminated water die from exposure to cold water.

Prevention of Water Pollution

1. Drinking water sources must be kept clean.
2. Provision must be made to establish a sewage treatment plant.
3. Industries should not be allowed to discharge their effluents into the water bodies without treatment.

4. There should be a ban on the disposal of dead bodies into water bodies.
5. The use of pesticides in agriculture is to be minimized.
6. The use of plastic bags is to be strictly banned.
7. Awareness is to be created among people regarding water pollution. They need to be educated about water-borne diseases.

3. Soil Pollution

Soil pollution has become a major challenge that we need to overcome for establishing a healthy environment. Soil is the home for a large part of microscopic and macroscopic living organisms. Soil pollution refers to anything that causes contamination of soil and degrades the soil quality. Soil contamination or soil pollution can occur either because of human activities or because of natural processes. However, mostly it is due to human activities.

Causes of Soil Pollution

1. Human activities have led to acidification of soil and contamination due to the disposal of industrial waste like heavy metals, toxic chemicals, dumping oil, etc.
2. Lack of crop rotation and intensive farming gradually decreases the quality of soil causing degradation of land.
3. Disposal of plastics, cans, electrical goods like batteries harms the soil due to the presence of harmful chemicals.
4. The use of chemical fertilizers, inorganic fertilizers, pesticides will decrease the fertility of the soil and alter the structure of soil.
5. The storage of waste products may leak into groundwater.
6. Garbage that cannot be recycled is disposed of off carelessly leading to pollution of land. Some of this waste can take thousands of years to decompose.
7. Acid rain makes the soil acidic which is harmful to crops.
8. Biological agents like pathogenic organisms are also responsible for soil contamination.

Effects of Soil Pollution

1. Soil pollutants can cause cancer, skin diseases, and central nervous system disorders in human beings. For example, a high concentration of lead or mercury in the soil can affect the functioning of kidneys and liver.
2. Crops and plants grown on polluted soils can accumulate poison and become unfit for human consumption.
3. Soil pollution contributes to air pollution by emitting toxic particles and foul gases into the atmosphere. It can also lead to water pollution if toxic chemicals and materials reach the groundwater.
4. When soil is contaminated with poisonous materials and chemicals, it cannot support plant life.
5. The fertility of the soil decreases once the soil is contaminated with chemicals and heavy metals or degraded due to human activities such as mining.
6. Acidification diminished soil fertility and the death of soil organisms in the soil can lead to changes in soil structure.
7. The level of pesticide residues like DDT in fruits, milk, eggs, vegetables beyond the permissible levels is responsible for causing diseases like cancer, sterility, and even death.

Prevention of Soil Pollution

1. It should be mandatory for industrial units not to dump their wastes onto the land. As far as possible the waste products should be recycled or used to make useful products.
2. Materials like paper, glass, metal scraps, and some types of plastics can be recycled.
3. Domestic and urban garbage wastes should be properly managed by municipal corporations.
4. Animal wastes and agricultural wastes can be utilized as manure and for the production of biogas.
5. Biological methods of pest control can reduce the use of pesticides to minimise soil pollution.
6. Use a dustbin to throw the garbage at home as well as in public places.
7. Plant more and more plants to prevent soil erosion.
8. The general public should be given information about the ill effects of soil pollution.

4. Noise Pollution

Every day we hear different kinds of sounds. Some of them are pleasant but others irritate. Imagine a world without sound. It would be very difficult to live in such a world. Sound is a medium for communication. We share our thoughts, feelings, and information with others using sound. Noise Pollution may not seem as harmful as the contamination of air or water. But it is a pollution problem that affects human health and can contribute to a general deterioration of environmental quality.

Noise is not a substance that can accumulate in the environment like other pollutants. Sound is measured in a unit called 'decibel' (dB).

Causes of Noise Pollution

1. Various industries such as iron and steel, automobiles, power plants, textiles, petroleum, fertilizers, etc. involve different operations that produce noise.
2. Household gadgets like T.V., radio, music systems, coolers, washing machines, food processors generate noise.
3. Surface transport is one of the major sources of noise pollution in big cities. The horns from cars, buses, trucks, bikes, and two-wheelers cause a lot of noise.
4. Festivals and religious activities where public address systems are used often generate a lot of noise.
5. Construction activities where machinery is used also contribute to noise pollution.
6. Market places, malls, fairs, and exhibitions also contribute remarkably to noise pollution.

Effects of Noise Pollution

1. The most direct harmful effect of excessive noise is physical damage to the ear and temporary or permanent hearing loss.
2. Excessive sound levels can cause harmful effects on the circulatory system by raising blood pressure and altering pulse rates.
3. Noise Pollution can affect the biological functioning of the body and result in anxiety, insomnia, hypertension and giddiness, loss of physical control, etc.
4. Chronic noise may also lead to abortions and congenital defects.
5. Noise Pollution can cause psychological effects such as irritability, stress, lack of concentration, and mental fatigue.
6. Severe Noise interferes with normal auditory communication and hence increases the rate of accidents especially in industries.
7. Excessive Noise can have adverse effects on domestic animals also.

Prevention of Noise Pollution

1. Factories that mainly produce noise should be established away from residential areas.
2. Airports should be located at least 20 kilometers away from residential areas.
3. Vehicles are to be properly maintained. There should be a restriction on high sound horns.
4. Advanced technology silencer must be used. The use of horns near public places like hospitals and educational institutions should be banned.
5. The use of sound amplifiers of high power should be banned in religious, social, and political events.
6. Planting green trees along the roadside reduce the intensity of noise pollution.
7. Construction of soundproof rooms for noisy machines in industries must be encouraged.
8. The use of earplugs can bring down loud noises to a manageable level.

5. Radioactive Pollution

Radioactive pollution is the physical pollution of living organisms and their environment as a result of the release of radioactive substances into the environment during nuclear explosions and testing of nuclear weapons, nuclear weapon production, mining of radioactive ores, handling and disposal of radioactive waste, and accidents at nuclear power plants. Nuclear tests are carried out to determine the effectiveness, yield, and explosive capability of nuclear weapons. The destruction caused by the radioactive materials is because of the emissions of hazardous ionizing radiation like beta or alpha particles, gamma rays, or neurons in the environment where they exist.

Causes of Radioactive Pollution

1. Nuclear is considered to be the most potent source of energy due to its high latent power. Nuclear accidents in nuclear energy generation plants like Fukushima Daiichi nuclear disaster, Chernobyl disaster left many dead and even many more affected by the radiation released.
2. The use of nuclear missiles and atomic bombs during wars causes radioactive pollution.
3. Radioisotopes are used to make detectors and in industrial activities. Isotopes such as uranium have high concentrations of radiation in them.
4. Mining involves the excavation of mineral ores. For example, radium, uranium, thorium, plutonium are highly radioactive materials.
5. Chemotherapy, a cancer treatment uses radiation to prevent further growth of cancer cells. Scientists have been exposed to radiation leading to their deaths or complications.
6. Cosmic rays that come from outer space to our planet with intense radiation cause radioactive pollution. For example, Gamma rays are said to have the highest level of radiation.

Effects of Radioactive Pollution

1. Radiation has adverse effects when it comes to genetics. It leads to damage of DNA strands leading to a genetic breakup. The resulting mutation makes one highly susceptible to cancer.
2. Radiation causes diseases such as cancer, leukemia, anemia, hemorrhage and premature aging, and premature deaths. Leukemia, for example, is caused by radiation in the bone marrow.

3. Radioactive substances in the soil react together with the various nutrients leading to the destruction of these nutrients rendering soil infertile and highly toxic.
4. Radiation distorts the cells present in living organisms leading to permanent damage of the various organs and organ systems.
5. Burns, red lesions, and sores are caused by radiation which can lead to skin cancer.

Prevention of Radioactive Pollution

1. Proper methods are to be used for disposing of radioactive waste. For example, it should be stored in heavy and thick concrete containers.
2. It is necessary for any material with radioactive content to be labeled and the necessary precautions advised on the content of the label.
3. There should be a banning of nuclear tests which contribute greatly to the overall presence of radioactive substances.
4. We need to focus on alternative and environmentally friendly energy sources namely solar, hydroelectric, and wind power.
5. Radioactive materials are to be stored in radiation-proof containers to ensure no leakage during handling.

Check Your Progress - 3

I. Fill in the blanks with appropriate words.

1. Carbon dioxide is largely released into the atmosphere by burning of ---------- ---------
2. During the mining process ---------- and ---------- are released into the air.
3. Without water, there would be no ---------- on earth.
4. Thermal power plants discharge ---------- into nearby water bodies.
5. Soil is the home for a large part of ---------- and ---------- living organisms.
6. When soil is contaminated, its ---------- decreases.
7. Sound is a medium for ----------.
8. Sound is measured in a unit called ----------.
9. Nuclear missiles and atomic bombs cause ---------- pollution.
10. Chemotherapy uses radiation to prevent the growth of ---------- cells.

II. State whether the following statements are true or false.

1. Air pollutants have an impact on humidity, clouds, and rainfall.
2. The ozone layer is responsible for protecting human beings from harmful ultraviolet rays.
3. 71% of the earth's surface is covered by land.
4. The use of pesticides in agriculture is to be encouraged.
5. Crop rotation and lack of intensive farming increase the quality of the soil.
6. Acid rain makes the soil fertile.
7. Excessive noise can lead to temporary or permanent hearing loss.
8. Airports should be located very close to residential areas.
9. Gamma rays have the highest level of radiation.
10. Radiation can cause cancer in human beings.

1.5.4. Let us Summarise

- Environmental Pollution is the contamination of the physical and biological components of the earth system to such an extent that normal environmental processes are adversely affected. The substances which cause pollution are known as

Pollutants. Pollutants can be classified into biodegradable and non – biodegradable pollutants.

- Pollution can be of different types depending on the part of the environment that is getting polluted. Some of the important types of pollution are air pollution, water pollution, soil pollution, noise pollution, radioactive pollution, thermal pollution, plastic pollution, and light pollution. All these types of pollution pose a threat to the sustainability of the environment.
- Air is the most vital constituent of the environment for the sustenance of life on earth. Air is polluted when its natural composition is disturbed by natural and human activities. Automobiles, industries, mining, volcanic eruptions are the main sources of air pollution. Air pollution has resulted in global warming, acid rain, ozone depletion, and health problems.
- Water is an essential element, without water there would be no life. Water gets polluted when undesirable substances are added to it. Natural sources of water pollution are soil erosion, landslides, and the decomposition of plants and animals. Consumption of contaminated water can cause several diseases like cholera, typhoid, dysentery, etc.
- Soil is the home for a large part of microscopic and macroscopic living organisms. Soil pollution refers to the contamination of soil and degradation of soil quality. Industrial wastes, disposal of waste materials, use of pesticides are some of the causes of soil pollution. The fertility of the soil decreases due to soil pollution. Soil pollution can also lead to water and air pollution.
- Noise pollution affects human health. Noise is not a substance that can accumulate in the environment like other pollutants. Industries, surface transport, construction activities, religious activities contribute to noise pollution. Excessive noise can result in damage to the ear and hearing loss. It can also lead to health problems.
- Radioactive pollution occurs as a result of the release of radioactive substances into the environment during nuclear explosions and the testing of nuclear weapons. Radiation causes cancer, leukemia, premature aging, and premature deaths. It also causes skin cancer.
- Light Pollution disturbs the ecosystem and adversely affects the health of human beings and animals at night. It also disturbs the serene atmosphere at night.

1.5.5. Answers to 'Check Your Progress - 1, 2 and 3'

Check Your Progress - 1

1. Environmental Pollution is the contamination of the physical and biological components of the earth system to such an extent that normal environmental processes are adversely affected.
2. Refer section 1.5.3.1
3. Any substance which causes pollution is known as a pollutant.

Check Your Progress - 2

1. The different types of pollution are air pollution, water pollution, soil pollution, noise pollution, radioactive pollution, thermal pollution, plastic pollution, and light pollution.

1 - c
2 - a
3 - d
4 - b
5 - e

Check Your Progress - 3

1. Fossil fuels
2. Dust, chemicals
3. Life
4. Heated water
5. Microscopic, Macroscopic
6. Fertility
7. Communication
8. Decibel
9. Radioactive
10. Cancer

2.

1.	True	6.	False
2.	True	7.	True
3.	False	8.	False
4.	False	9.	True
5.	True	10.	True

1.5.6. Unit end Exercises

1. Explain the meaning of Environmental Pollution.
2. Explain the types of Environmental Pollution.
3. Explain the causes of Environmental Pollution with suitable examples.
4. Discuss the effects of Environmental Pollution giving suitable examples.
5. Suggest measures to prevent Environmental Pollution.

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Block 1 : Environmental Education and Environment Hazards

Unit 6 : Environmental Management and Protection

Unit Structure

1.6.1. Learning Objectives

After completing this Unit, the student teachers will be able to

- Justify the need for Management of Environment;
- List the objectives of Environmental Management;
- List the characteristics of Environmental Management;
- Explain Environmental Resources Management; and
- Suggest measures for the protection of the environment.

1.6.2. Introduction

Environmental Management is concerned with the understanding of the structure and function of the earth system. It is also concerned with the description and monitoring of environmental changes, predicting future changes, and attempts to maximize human benefit and to minimize Environmental Degradation due to human activities. Environmental Management also pertains to the process of decision making about the use of natural resources. It is more concerned with the management of human activities and their impact on the environment than with the management of the natural environment itself.

Environmental managers attempt deliberately to increase the process of development, attempt to ensure that critical environmental limits are not exceeded, work to reduce and mitigate environmental issues and they are concerned with increasing the adaptability of human societies in the face of environmental change, variability, unpredictability, and hazards. From this point of view, Environmental Management may be defined as the system that anticipates and avoids or solves environmental and resource conservation issues. From another point of view, Environmental Management may be defined as a process concerned with human-environment interactions that seek to identify

- What are environmentally desirable outcomes?
- What are the physical, economic, social, cultural, political, and technological constraints to achieving those outcomes?
- What are the most feasible options for achieving those outcomes?

From another point of view, Environmental Management is concerned with meeting and improving provision for human needs and demands on a sustainable basis with minimal damage to natural habitats and ecosystems. Thus the concept of Environmental Management is closely related to another important concept that of sustainable development.

The components of Environmental Management are based on five fundamental aspects. They are:

1. Environmental perception and public awareness include (a) sources of environmental perception and public awareness (b) level of environmental perception (c) the role of environmental perception in environmental planning and management.
2. Environment Education and training to be given at school, college, and university levels by professionals.
3. Resource management includes (a) classification of natural resources (b) survey and evaluation of ecological resources (c) preservation of resources (d) conservation of resources.
4. Control of Environmental Degradation and pollution includes (a) adopting suitable preventive mechanisms to reduce natural hazards and disasters (b) regeneration of the degraded environment.
5. Environmental impact assessment includes (a) appraisal of existing environmental conditions (b) appraisal of existing and proposed production methods (c) probable impacts of existing and proposed project (d) review of technology and required improvement.
6. Educating the general public about the urgent need for conservation and preservation of the environment.

1.6.3. Learning Points and Learning Activities

1.6.3.1. Need for Management of Environment

Environmental Management is required for development without destruction or overuse of natural resources and to reduce pollution and degradation of nature. Considering the welfare of future generations, proper decisions regarding the use of the environment are necessary.

Environmental Management is essential for the following reasons.

1. **For use of resources:** You are aware that resources are limited. If these resources are not properly used, they will get exhausted very soon. For appropriate and reasonable use of resources management of the environment is necessary.

2. **To overcome the environment and ecology crisis:** Proper management of the environment is necessary because the present development has reached a point where the environment and ecology are in crucial crisis. If the same continues, it will have a disastrous effect on the environment. The whole earth will be destroyed.

3. **For sustainable development:** Environmental Management is required for development without destruction or overuse of natural resources and to reduce pollution and degradation of nature.

4. **For economic need and values:** Environmental Management is required to give new directions to our economic needs and values and to maintain at the same time a clean environment.

5. **To reduce disasters:** Proper Environmental Management reduces the risk of disasters like floods, forest fires, earthquakes, desertification, transport accidents, global warming, etc. Appropriate measures are to be taken to avoid man-made disasters.

6. **To decide the limiting line between development and environment:** Environmental Management is essential to draw a line of limit between development and environment. For example, if we find that some of our developmental activities are responsible for global warming or depletion of the ozone layer, then we must have control over such activities. Further we may adopt the policy of afforestation.

Check Your Progress - 1

I. State whether the following statements are true or false.

1. Natural resources are limited.
2. The present rate of development will have no adverse effect on the environment.
3. Sustainable development refers to development without the destruction of natural resources.
4. Economic needs can be fulfilled without causing damage to the environment.
5. We have no control over man-made disasters.
6. Development without causing harm to the environment is not possible.

1.6.3.2. Objectives and Characteristics of Environmental Management

Environmental Management is the process of allocating natural and man-made resources to make optimum use of the environment in satisfying not only the present basic human needs but of the future generations also. This management implies an element of conscious choice from a variety of alternative proposals and such a choice involves a purposeful commitment to recognised and desired objectives.

Environmental Management involves environmental planning, conservation of resources, environmental status evaluation, and environmental legislation and administration. It is a field of study dedicated to understanding human-environment interactions and the application of science and common – sense to solving environmental problems.

The main objectives of Environmental Management are

1. To prevent and solve environmental problems.
2. To establish limits in respect of the use of natural resources.
3. To develop Environmental Research Institutions and Monitoring Systems.
4. To warn about environmental threats.
5. To suggest measures for resource conservation.
6. To develop strategies for the improvement of quality of life.
7. To suggest long – term and short – term policies for sustainable development.

8. To identify new technologies for sustainable development.
9. To provide every person with opportunities to acquire the knowledge, values, attitudes, and skills needed to protect and improve the environment.
10. To create new patterns of behaviour of individuals, groups, and society towards the environment.

Characteristics of Environmental Management

During the last three decades, much awareness has been developed regarding environmental protection and quality of life. New terminologies like clean technology, environmental auditing, environment-friendly products, environmental impact assessment, and environmental resource conservation have come into existence. All these aspects have been converged when the wider concept of Environmental Management has been emerged and also accepted as a tool for sustainable development.

Time has now come when our policymakers, as well as a society, should aim to protect, conserve and regulate the development in such a way that it will not create any adverse effect on the ecosystem and the needs of the people can also be fulfilled. Throughout the world, particularly in developing countries, there is an urgent need for the management of the total environment.

The Characteristic features of Environmental Management are:

1. It deals with a world affected by humans.
2. It supports sustainable development.
3. It demands a multidisciplinary approach.
4. It has to integrate different development viewpoints.
5. It concerns with short – term and long – term planning as well as from local to the global scale.
6. It seeks to integrate natural and social science, policy-making, and planning.

Thus, Environmental Management is an approach that integrates ecology, policymaking, planning, and social development.

Check Your Progress – 2

I. Fill in the blanks with appropriate words.

1. Environmental Management is a process of allocating ---------- and --------- resources for optimum use of the environment.
2. Environmental Management is a field of study about the understanding of -------- interactions.
3. Sustainable development involves ---------- and ---------- policies.
4. Environmental Management is a ---------- for sustainable development.
5. Environmental Management demands ---------- approach.

1.6.3.3. Environmental Resources Management

Environmental Resource Management is the management of the interaction and impact of human societies on the environment. Environmental Resources Management aims to ensure that ecosystem services are protected and maintained for future human generations. It tries to identify factors affected by conflicts that arise between meeting needs and protecting resources. It is thus linked to environmental protection, sustainability, and integrated landscape management.

Environmental Resource Management can be viewed from a variety of perspectives. It involves the management of all components of the biophysical environment, both living (biotic) and non-living (abiotic), and the relationships among all living species and their habitats. The environment also involves the relationships of the human environment such as the social, cultural, and economic environment with the biophysical environment. The essential aspects of Environmental Resource Management are ethical, economic, social, and technological. Environmental Resource Management covers many areas in science including geography, biology, social sciences, political sciences, ecology, physics, chemistry, sociology, psychology, and physiology.

Environmental Resource Management strategies are driven by the conceptions of human-nature relationships. Ethical aspects involve the cultural and social issues relating to the environment. Broadly speaking two schools of thought exist in environmental ethics. They are Anthropocentrism and Eco-centrism. Both these influence Environmental Resource Management styles. Anthropocentrism looks at nature as existing solely for the benefit of humans and as a commodity to use for the good of humanity and to improve human quality of life. Anthropocentric Environmental Resource Management is therefore not the conservation of the environment solely for the environment's sake but rather the conservation of the environment for human's sake. This view advocates that natural resources must be judiciously used without harming them. Eco-centrism believes in the intrinsic value of nature. It maintains that human beings can use the ecosystem to live and allow the eco-system to flourish on their own. Thus the eco-system has an intrinsic value of its own The economy functions within and is dependent upon goods and services provided by natural ecosystems. With the prevalence of environmental problems, many economists accept the notion that "if environmental sustainability must co-exist for economic sustainability, then the overall system must permit the identification of an equilibrium between the environment and the economy".

A common scientific concept and impetus behind Environmental Resource Management are carrying capacity. Carrying capacity refers to the maximum number of organisms a particular resource can sustain. It is also argued that western scientific knowledge is often insufficient to deal with the complexity of the interplay of variables in Environmental Resource Management. Now there is a shift in Environmental Resource Management approaches to incorporate different knowledge systems including traditional knowledge reflected in approaches such as community-based natural resource management.

The stakeholders of Environmental Resources Management include the public sector, private sector, and civil society. In Environmental Resource Management the public sector is responsible for administering natural resource management and implementing Environmental Protection Legislation. It also provides professional judgment through skilled technicians on behalf of the public. The private sector's traditional role in Environmental Resource Management is that of the recovery of natural resources. Environmental Managers from the private sector also need skills to manage collaboration within a dynamic social and political environment. Civil society includes community-based organizations and non-government organizations. Civil society members can exercise their legal rights against the implementation of resource management plans. Public participation can be an effective strategy to invoke a sense of social responsibility towards natural resources.

Check Your Progress - 3

I. Fill in the blanks with appropriate words.

1. The biophysical environment includes ---------- and --------- components.
2. The essential aspects of Environmental Resource Management are ----------, ----------, ----------, and ----------.
3. The two schools of thought that exist in environmental ethics are ---------- and ------.
4. Anthropocentric Environmental Resource Management emphasizes the conservation of the environment for the sake of ----------.
5. The economy is dependent upon ---------- and ---------- provided by natural ecosystems.
6. Carrying capacity refers to the maximum number of ---------- that a particular resource can sustain.
7. The stakeholders of Environmental Resources Management include ---------- --------- and ----------.
8. Civil Society members can exercise their ---------- ---------- against the implementation of resource management plans.

1.6.3.4. Protection of Environment

Environmental Protection is the practice of protecting the natural environment by individuals, organizations, and governments. Its objectives are to conserve natural resources and the existing natural environment and to repair damage caused to the environment.

Due to the pressure of consumption, population growth, and technology, the biophysical environment is being degraded. This has been recognised and governments have begun placing restraints on activities that cause Environmental Degradation. Since the 1960s environmental movements have created more awareness of the various environmental problems.

Environmental Protection can be defined as the prevention of unwanted changes to ecosystems and their constituent parts. This includes (a) the protection of ecosystems and their constituent parts from changes associated with human activities and (b) the prevention of unwanted natural changes to ecosystems and their constituent parts.

An important issue is whether Environmental Protection relates to the preservation, conservation, or both. Preservation refers to the protection of an ecosystem or natural environment from change while conservation is generally associated with the sustainable use of natural resources. The objective of conservation is to ensure the maintenance of a stock of renewable resources that are being exploited for human purposes rather than the protection of the natural environment from any anthropogenic modifications. Measures that are put in place to prevent over-exploitation of natural resources do constitute Environmental Protection.

The need for protecting the environment has become a basic living need. Today, when we look at our surroundings, we see buildings, vehicles, multiplexes, etc. Human needs are limitless and when it comes to urbanisation, they are never satisfied. We as humans compromise nature according to our convenience. But we often forget about the role that the environment plays in our lives. The green environment that we live in consists of air, water,

soil, trees, sunlight, etc. Everything that the environment consists of is important to us. There are many reasons which affect the environment. For example, deforestation, pollution, and overpopulation have affected our environment to a greater extent.

We may not all be environmentalists, but there are simple measures that we can take to reduce the consumption of resources to avoid depletion. The following measures can be adopted to protect the environment.

1. **Plant trees:** Trees may take a long time to grow. But they serve future generations. Plants not only provide shade but also absorb carbon-di-oxide reducing pollution.

2. **Conserve water:** Water conservation is vital since we cannot survive without water. Avoid using a shower for a bath. Turn off the tap while brushing your teeth. Leakage of water is to be avoided.

3. **Limit car use:** The use of the car is to be limited because they emit a lot of carbon-di-oxide. An alternate way is using public transport. Carpooling is also useful to reduce gas emissions.

4. **Minimize food wastage:** Wasting food results in wastage of energy and water used to prepare the food. Research shows that annually food that gets lost globally is sufficient to feed almost a billion hungry people across the world.

5. **Switch off:** Turn off lights, computer, television, etc. when they are not in use. This helps in saving a lot of electrical energy. Also, consider using LED bulbs to save electricity.

6. **Using second – hand products:** New products need resources for their manufacturing and production. Most of these productions use natural resources. Thus you can protect the environment by choosing second–hand products.

7. **Reuse and recycle:** Use an eco-friendly water bottle instead of bottled water or take your reusable bag to the grocery store. Reusing and recycling can reduce pollution.

8. **Go paperless:** Select paperless as the mode of communication. This is to be implemented in all government offices.

9. **Buy local products:** If possible buy local products. This saves all the pollution incurred by transporting goods from long distance.

10. **Work from home:** If your employer permits you to work from home, it helps in the reduction of pollution and also saves money.

Check Your Progress - 4

I. State whether the following statements are true or false.

1. Environmental Protection refers to the protection of the natural environment.
2. Population growth is responsible for the degradation of the biophysical environment.
3. Environmental Protection involves both preservation and conservation.
4. Human needs are limited.

5. Trees absorb carbon-di-oxide and thereby reduce pollution.
6. A shower bath helps us in conserving water.
7. We cannot store electricity and hence we can waste electricity.
8. Use of second – hand products should be encouraged.
9. Reusing and recycling can reduce pollution.
10. Products need to be transported to faraway places.

1.6.4. Let us Summarise

- Environmental Management is required for development without destruction or overuse of natural resources and to reduce pollution and degradation of nature. It is also essential for the appropriate use of resources, to overcome the environmental crisis, for sustainable development, to reduce disasters, and to decide the limiting line between development and environment.
- Environmental Management involves environmental planning, conservation of resources, environmental status evaluation, and environmental legislation and administration. It is a field of study dedicated to understanding human-environment interactions and the application of science in solving environmental problems. It is an approach that integrates ecology, policymaking, planning, and social development.
- Environmental Resource Management is the management of the interaction and impact of human societies on the environment. It involves the management of all components of the biophysical environment, both living (biotic) and non – living (abiotic), and the relationships among all living species. The essential aspects of Environmental Resource Management are ethical, economic, social, and technological.
- Environmental Protection can be defined as the prevention of unwanted changes to ecosystems and their constituent parts. Measures that are put in place to prevent over-exploitation of natural resources do constitute Environmental Protection. We can take simple measures to reduce the consumption of resources to avoid depletion. They include planting trees, conserving water, minimizing food wastage, switching off electrical appliances when they are not in use, reusing and recycling wherever possible, etc.

1.6.5. Answers to 'Check Your Progress – 1, 2, 3 and 4'

Check Your Progress - 1

I
1. True
2. False
3. True
4. True
5. False
6. False

Check Your Progress - 2

I
1. Natural, man - made
2. Human - environment
3. Long – term, short – term
4. Tool
5. Multidisciplinary

Check Your Progress - 3

I.
(a) Living, non-living
(b) Ethical, economical, social, technological
(c) Anthropocentrism, eco-centrism
(d) Humans
(e) Goods, services
(f) Organisms
(g) Public sector, private sector, civil society
(h) Legal rights.

Check Your Progress - 4

I.

1.	True	6.	False
2.	True	7.	False
3.	True	8.	True
4.	False	9.	True
5.	True	10.	False

1.6.6. Unit end Exercises

1. What is Environmental Management?
2. Justify the need for Management of the Environment.
3. What are the objectives of Environmental Management?
4. List the characteristics of Environmental Management.
5. Explain Environmental Resources Management.
6. Suggest measures for the Protection of Environment.

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Block 2 : India and Environmental Issues and Policies

Unit 1 : Major Environmental Problems in India

Unit Structure

2.1.1. Learning Objectives

After completing this Unit, the student teachers will be able to

- Explain the major environmental problems in India;
- Describe the problems related to Environmental Pollution;
- Explain the problems related to unequal distribution of Industrialization; and
- Explain the problems related to Urbanization.

2.1.2. Introduction

The term environment has been derived from the French word "Environia" which means to surround. It refers to both abiotic (physical or non-living) and biotic (living) environment. Environment and the organisms are two dynamic and complex components of nature. Environment regulates the life of organisms including human beings. Human beings interact with the environment more vigorously than other living beings. Ordinarily, environment refers to the materials and forces that surround the living organism.

As we know that Earth is one of the most beautiful planets of the solar system that supports life and hence is home to numerous species. But today, our planet is suffering from several complicated situations among which environmental issues are the most important and dangerous ones. Because of the increasing population and the irresponsible behavior of humans, the environmental conditions are becoming worse day by day. If the environmental issues are not taken care of in time may end up with the destruction of our planet.

The biggest problem that presents the environment today is one that has to do with the damage that man has been causing to it in recent centuries. In this sense, we must say that the environment may present changes or natural disturbances that have to do with the physical space or even the actions of different plant or animal species (for example when generating the phenomenon known as the plague). However, there has not been more significant changes to the environment than those that the human being has generated with his industrial, productive, and economic activities: deforestation, pollution, urbanization, unequal distribution of Industrialization, the use of elements or chemical products and, ultimately, climate change, are some of the results that this alteration of the environment generates, this

affects all the living beings that inhabit the environment. The list of environmental problems has grown to a great extent in the past few years. It has become very important to get these problems fixed before it is too late.

In the last 100 years, the planet has gone through dramatic and detrimental environmental changes due to industrialization and urbanization. Population growth and modern living standards have increased energy demand, driving widespread environmental degradation as we still rely on fossil fuel to meet the vast majority of energy needs. These environmental issues are a global problem that every country is responsible for addressing, and it is our responsibility to find out what we can do to reduce the impact and make changes for greater sustainability.

2.1.3. Learning Points and Learning Activities

2.1.3.1. Major Environmental Problems in India

The rapid economic development has undoubtedly changed the lives of millions of Indians but there is no element of doubt that it has also polluted the environment in which more than a billion Indians live. Rapid economic growth is indeed the only recourse available to pull out the millions of Indians from the quagmire of poverty but while pushing for the growth; it is necessary to ensure that this growth is sustainable and doesn't harm the air we inhale, the food we eat and the water we drink. While the urban areas are characterized by the deteriorating air quality and rivers polluted with disposal of untreated sewage and industrial waste, rural areas, and other hinterlands are also not immune to the pollution. In rural areas too, the quality of land is degrading with the high use of chemical fertilizers and pesticides. Near extinction of vultures from the country is an extreme example of what chemical drugs can do to the flora and fauna around us.

According to a study by the World Bank, environmental degradation costs India around USD80 billion per year which amounts to around 5.7% of the GDP. An ecological survey of 178 countries ranked India at 155 and the bottom among BRIC nations. Survey also found that out of the world's 20 most polluted cities, 13 are in India. The biggest problems in India highlighted by the World Bank report are - air pollution, the degradation of croplands, pastures, and forests, and poor water supply and sanitation. The United Nations International Strategy for Disaster Reduction defines environmental degradation as "the reduction of the capacity of the environment to meet social and ecological objectives, and needs".

From pollution and deforestation to global warming and habitat loss, our environment's health is looking increasingly grim as the years go by—but all is not yet lost. We can still turn things around if we make a serious commitment to changing our habits and investing in sustainability. In this unit, we shall concentrate on Environmental Pollution (Air pollution, Water pollution, Noise pollution, and Soil pollution), unequal distribution of industrialization, and urbanization which are some of the major environmental problems in India.

2.1.3.1.1. Environmental Pollution

Environmental pollution is defined as "the contamination of the physical and biological components of the earth/atmosphere system to such an extent that normal environmental processes are adversely affected."

Pollutants can be naturally occurring substances or energies, but they are considered contaminants when above natural levels. Any use of natural resources at a rate higher than nature's capacity to restore itself can result in pollution of air, water, and land.

Environmental pollution is one of the major problems that affect biodiversity, ecosystems, and human health worldwide by contaminating soil and water.

There can be so many causes of environmental pollution including fossil fuel emissions from power plants, pollution from vehicles, high quantity of exhaust gases, chemical effluents, pollutants, and soil erosion. Besides, ruinous and ineffective agricultural policies can also lead to environmental pollution.

Air pollution, poor management of waste, growing water scarcity, falling groundwater tables, water pollution, preservation and quality of forests, biodiversity loss, and land/soil degradation are some of the major environmental issues India faces today. Let us discuss these environmental problems in detail in the following sections.

a. Air Pollution

Air pollution is a mixture of solid particles and gases in the air. Vehicle emissions, chemicals from factories, dust, pollen, and mild spores may be suspended as particles. Ozone-a gas is a major part of air pollution in cities. When ozone forms air pollution, it's also called smog. Some air pollutants are poisonous.

Air pollutants are Particle Pollution (particulate matter), Ground-level ozone, Carbon monoxide, Sulfur oxides, Nitrogen oxides, Lead, etc. These pollutants can have a terrible impact on health.

Air pollution in India is a serious health issue. Of the most polluted cities in the world, 21 out of 30 were in India in 2019. As per a study based on 2016 data, at least 140 million people in India breathe air that is 10 times or more over the WHO safe limit and 13 of the world's 20 cities with the highest annual levels of air pollution are in India. 51% of pollution is caused by industrial pollution, 27% by vehicles, 17% by crop burning, and 5% by Diwali fireworks. Air pollution contributes to the premature deaths of 2 million Indians every year. Emissions come from vehicles and industry, whereas in rural areas, much of the pollution stems from biomass burning for cooking and keeping warm. In autumn and winter months, large scale crop residue burning in agriculture fields – a cheaper alternative to mechanical tilling – is a major source of smoke, smog, and particulate pollution. India has a low per capita emission of greenhouse gases but the country as a whole is the third-largest greenhouse gas producer after China and the United States.

The Air (Prevention and Control of Pollution) Act was passed in 1981 to regulate air pollution but has failed to reduce pollution because of poor enforcement of the rules.

In 2015, the Government of India, together with IIT Kanpur launched the National Air Quality Index. In 2019, India launched 'The National Clean Air Programme' with a tentative national target of 20%-30% reduction in PM2.5 and PM10 concentrations by 2024, considering 2017 as the base year for comparison. It will be rolled out in 102 cities that are considered to have air quality worse than the National Ambient Air Quality Standards. There are other initiatives such as a 1,600-kilometre-long and 5-kilometer-wide The Great Green Wall of Aravalli green ecological corridor along with Aravalli range from Gujarat to Delhi

which will also connect to Shivalik hill range with the planting of 1.35 billion (135 crores) new native trees over 10 years to combat the pollution. In December 2019, IIT Bombay, in partnership with the McKelvey School of Engineering of Washington University in St. Louis, launched the Aerosol and Air Quality Research Facility to study air pollution in India

Greenhouse Effect

The greenhouse effect is the problem caused by increased quantities of gases such as carbon dioxide in the air. These gases trap the heat from the sun and cause a gradual rise in the temperature of the Earth's atmosphere.

The greenhouse effect is the problem caused by increased quantities of gases such as carbon dioxide in the air. These gases trap the heat from the sun and cause a gradual rise in the temperature of the Earth's atmosphere.

An effect occurring in greenhouses in which radiant heat from the sun passes through the glass warming the contents, the radiant heat from inside being trapped by the glass the application of this effect to a planet's atmosphere; carbon dioxide and some other gases in the planet's atmosphere can absorb the infrared radiation emitted by the planet's surface as a result of exposure to solar radiation, thus increasing the mean temperature of the planet.

India was the third-largest emitter of carbon dioxide in 2017 at 6.82% share of CO2 emissions, after China (27.21%) and the United States (14.58%). According to a report by the Global Carbon Project, "after low growth during 2014 to 2016, fossil CO2 emissions have now risen two years in a row, with a 1.6 percent rise percent and a projected 2.7 percent rise in 2018, reaching a record high of 37.1 (plus or minus 2) billion tonnes of CO2. The peak in global CO2 emissions is not yet in sight." About 65 percent of India's carbon dioxide emissions in 2009 were from heating, domestic uses, and the power sector. About 9 percent of India's emissions were from transportation (cars, trains, two-wheelers, airplanes, others). India's coal-fired, oil-fired, and natural gas-fired thermal power plants are inefficient and offer significant potential for CO2 emission reduction through better technology. Compared to the average emissions from coal-fired, oil-fired, and natural gas-fired thermal power plants in European Union (EU-27) countries, India's thermal power plants emit 50 to 120 percent more CO2 per kWh produced. This is in significant part to inefficient thermal power plants installed in India before its economic liberalization in the 1990s.

Acid Rain

Acid rain is a broad term that includes any form of precipitation with acidic components, such as sulfuric or nitric acid that fall to the ground from the atmosphere in wet or dry forms. This can include rain, snow, fog, hail, or even dust that is acidic.

Acid rain is caused by a chemical reaction that begins when compounds like sulfur dioxide and nitrogen oxides are released into the air gases released by the burning of fossil fuel. These substances can rise very high into the atmosphere, where they mix and react with water, oxygen, and other chemicals to form more acidic pollutants, known as acid rain.

Acid rain is rain or any other form of precipitation that is unusually acidic, meaning that it has elevated levels of hydrogen ions (low pH). It can have harmful effects on plants, aquatic animals, and infrastructure. Acid rain has been shown to have adverse impacts on forests, freshwaters, and soils, killing insect and aquatic life-forms, causing the paint to peel,

corrosion of steel structures such as bridges, and weathering of stone buildings and statues as well as having impacts on human health.

Normal, clean rain has a pH value of between 5.0 and 5.5, which is slightly acidic. However, when rain combines with sulfur dioxide or nitrogen oxides—produced from power plants and automobiles - the rain becomes much more acidic. Typical acid rain has a pH value of 4.0.

When an acid deposition is washed into lakes and streams, it can cause some to turn acidic.

Acid rain has been shown to have adverse impacts on forests, freshwaters, and soils, killing insect and aquatic life-forms as well as causing damage to buildings and having impacts on human health.

Not all fish, shellfish, or the insects that they eat can tolerate the same amount of acid; for example, frogs can tolerate water that is more acidic (i.e., has a lower pH) than trout.

Both the lower pH and higher aluminium concentrations in surface water that occur as a result of acid rain can cause damage to fish and other aquatic animals. At pH, lower than 5 most fish eggs will not hatch and lower pH can kill adult fish. As lakes and rivers become more acidic biodiversity is reduced. Acid rain has eliminated insect life and some fish species, including the brook trout in some lakes, streams, and creeks in geographically sensitive areas. However, the extent to which acid rain contributes directly or indirectly via runoff from the catchment to the lake and river acidity (i.e., depending on characteristics of the surrounding watershed) is variable. Lakes hosted by silicate basement rocks are more acidic than lakes within limestone or other basement rocks with a carbonate composition (i.e. marble) due to buffering effects by carbonate minerals, even with the same amount of acid rain.

Soil biology and chemistry can be seriously damaged by acid rain. Some microbes are unable to tolerate changes to low pH and are killed. The enzymes of these microbes are denatured (changed in shape so they no longer function) by the acid. The hydronium ions of acid rain also mobilize toxins, such as aluminum, and leach away essential nutrients and minerals such as magnesium.

Global Warming

Global warming is the mainly human-caused rise of the average temperature of the Earth's climate system and has been demonstrated by direct temperature measurements and by measurements of various effects of the warming.

The effects of global warming on South Asia include steady sea level rise, increased cyclonic activity, and changes in ambient temperature and precipitation patterns. Increased landslides and flooding are projected to have an impact on states such as Assam. Ongoing sea level rises have already submerged several low-lying islands in the Sundarbans, displacing thousands of people. The first among the countries to be affected by severe climate change in Bangladesh. Its sea level, temperature, and evaporation are increasing, and the changes in precipitation and cross-boundary river flows are already beginning to cause drainage congestion. There is a reduction in freshwater availability, disturbance of morphological processes, and a higher intensity of flooding. Regarding local temperature rises, the IPCC

figure projected for the mean annual increase in temperature by the end of the century in South Asia is 3.3 °C with the min-max range as 2.7 – 4.7 °C. The mean value for Tibet would be higher with a mean increase of 3.8 °C and min-max figures of 2.6 and 6.1 °C respectively which implies harsher warming conditions for the Himalayan watersheds. India's GDP could decline by up to 9%, due to shifting growing seasons for major crops such as rice, production of which could fall by 40%. Around seven million people are projected to be displaced due to, among other factors, submersion of parts of Mumbai and Chennai, if global temperatures were to rise by a mere 2 °C (3.6 °F).

Rise in Sea Level

The corresponding sea-level rise at the end of the 21st Century relative to the end of the 20th Century ranges from 0.18 to 0.59 m (excluding any rapid dynamical changes in ice flows in the future) More recent analysis of several semi-empirical models predict a sea-level rise of about 1 meter by the year 2100. Ongoing sea level rises have already submerged several low-lying islands in the Sundarbans, displacing thousands of people. The temperature rises on the Tibetan Plateau, which is causing Himalayan glaciers to retreat. It has been predicted that the historical city of Thatta and Badin, in Sindh, Pakistan would have been swallowed by the sea by 2025, as the sea is already encroaching 80 acres of land here, every day.

In October 2019 a study was published in the journal Nature Communications, saying that the number of people who will be impacted by a sea-level rise during 21 century is 3 times higher than that was previously thought. By the year 2050, 150 million will be under the water line during high tide and 300 million will live in zones with flooding every year. By the year 2100, those numbers differ sharply depending on the emission scenario. In a low emission scenario, 140 million will be underwater during high tide and 280 million will have flooding each year. In the high emission scenario, the numbers arrive at 540 million and 640 million respectively.

Coastal Erosion

Coastal erosion is the loss or displacement of land, or the long-term removal of sediment and rocks along the coastline due to the action of waves, currents, tides, wind-driven water, waterborne ice, or other impacts of storms. The landward retreat of the shoreline can measure and describe over a temporal scale of tides, seasons, and other short-term cyclic processes. Coastal erosion may be caused by hydraulic action, abrasion, impact, and corrosion by wind and water, and other forces, natural or unnatural.

On non-rocky coasts, coastal erosion results in rock formations in areas where the coastline contains rock layers or fracture zones with varying resistance to erosion. Softer areas become eroded much faster than harder ones, which typically result in landforms such as tunnels, bridges, columns, and pillars. Over time the coast generally evens out. The softer areas fill up with sediment eroded from hard areas, and rock formations are eroded. Also, abrasion commonly happens in areas where there are strong winds, loose sand, and soft rocks. The blowing of millions of sharp sand grains creates a sandblasting effect. This effect helps to erode, smooth and polish rocks. The definition of abrasion is grinding and wearing away of rock surfaces through the mechanical action of other rock or sand particles.

Coastal Erosion in India

Coastal Erosion is the process of wearing away of the land by the sea due to corrosion, abrasion, hydraulic action, attrition, and corrosion/solution. India has a long peninsular region and due to developmental activities are often carried out without properly understanding the coastal dynamics, leading to long-term damage, particularly to local communities. It came into the light when one of the biodiversity rich uninhabited islands parts of Lakshadweep has disappeared due to coastal erosion and another four such islands in the Lakshadweep Sea are shrinking fast.

The 89% of Andaman and Nicobar Islands shoreline eroded by the Bay of Bengal. The shoreline of Tamil Nadu facing the process of accretion (a gradual deposition by the water of mud, sand to form dry land), which causes 62% of its coast to gain land. Goa has the highest percentage (52%) of stable shoreline.

Reason for Coastal Erosion: Wave Energy, Climate Change, Strong littoral drift, Construction dams in catchment areas, Sand and coral mining and dredging.

b. Water Pollution

Water pollution is the contamination of water bodies, usually as a result of human activities. Water bodies include for example lakes, rivers, oceans, aquifers, and groundwater. Water pollution results when contaminants are introduced into the natural environment.

Virtually all types of water pollution are harmful to the health of humans and animals. Water pollution may not damage our health immediately but can be harmful after long term exposure. ... Industrial waste often contains many toxic compounds that damage the health of aquatic animals and those who eat them.

Releasing inadequately treated wastewater into natural water bodies can lead to the degradation of aquatic ecosystems. In turn, this can lead to public health problems for people living downstream. They may use the same polluted river water for drinking or bathing or irrigation. Water pollution is the leading worldwide cause of death and disease, e.g., due to water-borne diseases.

Water pollution can be classified as surface water or groundwater pollution. Marine pollution and nutrient pollution are subsets of water pollution. Sources of water pollution are either point sources or non-point sources. Point sources have one identifiable cause of the pollution, such as a storm drain or a wastewater treatment plant. Non-point sources are more diffuse, such as agricultural runoff. Pollution is the result of the cumulative effect over time. All plants and organisms living in or being exposed to polluted water bodies can be impacted. The effects can damage individual species and impact the natural biological communities they are part of.

The causes of water pollution include a wide range of chemicals and pathogens as well as physical parameters. Contaminants may include organic and inorganic substances. Elevated temperatures can also lead to polluted water. A common cause of thermal pollution is the use of water as a coolant by power plants and industrial manufacturers. Elevated water temperatures decrease oxygen levels, which can kill fish and alter food chain composition, reduce species biodiversity, and foster invasion by new thermophilic species.

Water pollution is measured by analysing water samples. Physical, chemical, and biological tests can be conducted. Control of water pollution requires appropriate infrastructure and management plans. The infrastructure may include wastewater treatment plants. Sewage treatment plants and industrial wastewater treatment plants are usually required to protect water bodies from untreated wastewater. Agricultural wastewater treatment for farms and erosion control at construction sites can also help prevent water pollution. Nature-based solutions are another approach to prevent water pollution.[6] Effective control of urban runoff includes reducing speed and quantity of flow. In the United States, best management practices for water pollution include approaches to reduce the quantity of water and improve water quality

Radioactive waste is any pollution that emits radiation beyond what is naturally released by the environment. It's generated by uranium mining, nuclear power plants, and the production and testing of military weapons, as well as by universities and hospitals that use radioactive materials for research and medicine. Radioactive waste can persist in the environment for thousands of years, making disposal a major challenge. Consider the decommissioned Hanford nuclear weapons production site in Washington, where the clean-up of 56 million gallons of radioactive waste is expected to cost more than $100 billion and last through 2060. Accidentally released or improperly disposed of contaminants threaten groundwater, surface water, and marine resources.

c. Soil Pollution

Soil pollution is defined as the presence of toxic chemicals (pollutants or contaminants) in soil, in high enough concentrations to pose a risk to human health and/or the ecosystem.

Soils provide plants with essential minerals and nutrients. Soils provide air for gaseous exchange between roots and atmosphere. Soils protect plants from erosion and another destructive physical, biological and chemical activity. Soils hold water (moisture) and maintain adequate aeration.

Soil contamination or soil pollution as part of land degradation is caused by the presence of xenobiotics (human-made) chemicals or other alteration in the natural soil environment. It is typically caused by industrial activity, agricultural chemicals, or improper disposal of waste. The most common chemicals involved are petroleum hydrocarbons, polynuclear aromatic hydrocarbons (such as naphthalene and benzo(a)pyrene), solvents, pesticides, lead, and other heavy metals. Contamination is correlated with the degree of industrialization and intensity of chemical substances. The concern over soil contamination stems primarily from health risks, from direct contact with the contaminated soil, vapours from the contaminants, or secondary contamination of water supplies within and underlying the soil. Mapping of contaminated soil sites and the resulting clean-ups are time-consuming and expensive tasks, requiring extensive amounts of geology, hydrology, chemistry, computer modelling skills, and GIS in Environmental Contamination, as well as an appreciation of the history of industrial chemistry.

In March 2009, the issue of Uranium poisoning in Punjab attracted press coverage. It was alleged to be caused by fly ash ponds of thermal power stations, which reportedly lead to severe birth defects in children in the Faridkot and Bhatinda districts of Punjab. The news reports claimed the uranium levels were more than 60 times the maximum safe limit. In 2012, the Government of India confirmed that the groundwater in the Malwa belt of Punjab has

uranium metal that is 50% above the trace limits set by the United Nations' World Health Organization (WHO). Scientific studies, based on over 1000 samples from various sampling points, could not trace the source to fly ash and any sources from thermal power plants or industry as originally alleged. The study also revealed that the uranium concentration in groundwater of Malwa district is not 60 times the WHO limits, but only 50% above the WHO limit in 3 locations. This highest concentration found in samples was less than those found naturally in groundwaters currently used for human purposes elsewhere, such as Finland. Research is underway to identify natural or other sources for uranium.

Soil pollution can also cause a neuromuscular blockage as well as depression of the central nervous system, headaches, nausea, fatigue, eye irritation, and skin rash. Soil does not need to be highly contaminated to be harmful to humans.

d. Noise Pollution

Noise pollution, unwanted or excessive sound can have deleterious effects on human health and environmental quality. Noise pollution is commonly generated inside many industrial facilities and some other workplaces, but it also comes from the highway, railway, and airplane traffic and outdoor construction activities.

Sound waves are vibrations of air molecules carried from a noise source to the ear. Sound is typically described in terms of the loudness (amplitude) and the pitch (frequency) of the wave. Loudness (also called sound pressure level, or SPL) is measured in logarithmic units called decibels (dB). The normal human ear can detect sounds that range between 0 dB (hearing threshold) and about 140 dB, with sounds between 120dB and 140 dB causing pain (pain threshold). The ambient SPL in a library is about 35 dB, while that inside a moving bus or subway train is roughly 85 dB; building construction activities can generate SPLs as high as 105 dB at the source. SPLs decrease with distance from the source.

Noise pollution, also known as environmental noise or sound pollution, is the propagation of noise with a harmful impact on the activity of human or animal life. The source of outdoor noise worldwide is mainly caused by machines, transport, and propagation systems. Poor urban planning may give rise to noise disintegration or pollution, side-by-side industrial and residential buildings can result in noise pollution in the residential areas. Some of the main sources of noise in residential areas include loud music, transportation (traffic, rail, airplanes, etc.), lawn care maintenance, construction, electrical generators, explosions, and people. Documented problems associated with urban environment noise go back as far as ancient Rome. Noise is measured in Decibel (dB). Noise pollution associated with household electricity generators is an emerging environmental degradation in many developing nations. The average noise level of 97.60 dB obtained exceeded the WHO value of 50 dB allowed for residential areas. Research suggests that noise pollution is the highest in low-income and racial minority neighbourhoods.

High noise levels can contribute to cardiovascular effects in humans and an increased incidence of coronary artery disease. In animals, noise can increase the risk of death by altering predator or prey detection and avoidance, interfere with reproduction and navigation, and contribute to permanent hearing loss. While the elderly may have cardiac problems due to noise, according to the World Health Organization, children are especially vulnerable to noise, and the effects that noise has on children may be permanent. Noise poses a serious threat to a child's physical and psychological health, and may negatively interfere with a child's learning and behavior

Noise pollution affects health and behavior. Unwanted sound (noise) can damage physiological health. Noise pollution is associated with several health conditions, including cardiovascular disorders, hypertension, high-stress levels, tinnitus, hearing loss, sleep disturbances, and other harmful and disturbing effects. According to a 2019 review of the existing literature, noise pollution was associated with faster cognitive decline.

Noise-induced hearing loss can be caused by prolonged exposure to noise levels above 85 A-weighted decibels. High levels of environmental noise contribute to hearing loss. Noise exposure in the workplace can also contribute to noise-induced hearing loss and other health issues.

Noise pollution can have negative effects on adults and children on the autistic spectrum. Those with Autism Spectrum Disorder (ASD) can have hyperacusis, which is an abnormal sensitivity to sound. People with ASD who experience hyperacusis may have unpleasant emotions, such as fear and anxiety, and uncomfortable physical sensations in noisy environments with loud sounds.

Noise pollution is a major problem in India. The Government of India has rules and regulations against firecrackers and loudspeakers, but enforcement is extremely lax. Awaaz Foundation is a non-governmental organization in India working to control noise pollution from various sources through advocacy, public interest litigation, awareness, and educational campaigns since 2003. Despite increased enforcement and stringency of laws now being practiced in urban areas, rural areas are still affected. The Supreme Court of India had banned the playing of music on loudspeakers after 10 pm. In 2015, The National Green Tribunal directed authorities in Delhi to ensure strict adherence to guidelines on noise pollution, saying noise is more than just a nuisance as it can produce serious psychological stress. However, implementation of the law continues to remain poor.

Check Your Progress - 1

Choose the correct response

1. In 2012, the Government of India confirmed that the groundwater in the Malwa belt of Punjab has uranium metal that is
    a. 50% above the trace limits set by UNESCO
    b. 50% above the trace limits set by WHO
    c. 30% below the trace limits set by WHO
    d. 30% below the trace limits set by UNESCO

2. Acid rain has harmful effects on plants, aquatic animals, and infrastructure due to
    a. Low levels of Nitrogen ions (high pH)
    b. Elevated levels of hydrogen ions (low pH)
    c. Elevated levels of hydrogen ions (high pH)
    d. Elevated levels of hydrogen ions (low pH)

3. Fill in the Blanks
    a. Sound Pressure Level or SPL is measured in logarithmic units called _____
    b. The Supreme Court of India had banned the playing of music on loudspeakers after _____

2.1.3.1.2. Uneven Distribution of Industrialization

Industrialization is the period of social and economic change that transforms a human group from an agricultural society into an industrial society. This involves an extensive re-organization of an economy for manufacturing.

The distribution of industries in India is highly uneven. For example, Mumbai, Bangalore, Delhi, etc in these cities have overpopulation, Overcrowded trains and roads, pollution, poor sanitation, problems of slums, and high crime rate.

Industrialization contributes to negative environmental externalities, such as pollution, increased greenhouse gas emission, and global warming.

a. Exploitation of Natural Resources

The exploitation of natural resources is the use of natural resources for economic growth, sometimes with a negative connotation of accompanying environmental degradation.

Consequences of exploitation of resources: Natural resources are not limitless, and the following consequences can arise from the careless and excessive consumption of these resources: Deforestation, Desertification, Extinction of species, Forced migration, Soil erosion, Oil depletion, Ozone depletion, Greenhouse gas increase, Extreme energy, Water pollution, Natural hazard/Natural disaster, Metals and minerals depletion.

b. Heavily Polluted Rivers

The river Yamuna, the reason for Delhi's existence, has suffered heavily from pollution. At its point of exit from city limits, the DO level is only 1.3 mg/l. Similarly, coliform counts jump from 8,500 per 100 ml at the entry to 329,312/100 ml at exit (for DO 5 mg/litre is the norm, and for coliforms 500/100 ml). In 2007, roughly half of the entire city's raw sewage went straight into the river. 55% of the city's 15 million people are connected to the city's sewer system and its treatment plants, but because of corrosion and clogging in the system, many of the treatment plants do not run at full capacity. Waste from 1,500 unplanned neighborhoods runs straight into the river.

Underground hydrological resources are a substantial supplemental source of water in Delhi, especially in the affluent sections of the city. In the residential plots called the 'farmhouses', almost every household draws from this resource. Though water-storing rocks, i.e. aquifers, are renewed as surface rain-water percolates down, they are not inexhaustible. Delhi's aquifers stand in danger of depletion on account of excessive use. Furthermore, rampant construction activity has contaminated them with cement, paints, varnishes, and other construction materials; leaky, poorly constructed, and maintained sewage lines have added to the contamination. This is an irremediable loss, as aquifers, once polluted, cannot be decontaminated; they have no exposure to air and sunlight or micro-organisms that clear-up chemical or biological pollutants.

2.1.3.1.3. Urbanization

Urbanization refers to the increasing number of people that live in urban areas. It predominantly results in the physical growth of urban areas, be it horizontal or vertical.

Urbanization refers to the population shift from rural areas to urban areas, the decrease in the proportion of people living in rural areas, and how each society adapts to this change.

Urbanization affects the physical environment through the impacts of the number of people, their activities, and the increased demands on resources. Urbanization has negative consequences on health mainly due to pollution and overcrowded living conditions. It can also put added pressure on food supply systems.

It is predominantly the process by which towns and cities are formed and become larger as more people begin living and working in central areas.

As the Industrial Revolution was a shift from the agrarian society, people migrated from villages in search of jobs to places where factories were established. This shifting of rural people led to urbanization and an increase in the population of towns. The concentration of labour in factories has increased urbanization and the size of settlements, to serve and house the factory workers.

a. Improper Waste Management

Waste (or wastes) is unwanted or unusable materials. Waste is any substance that is discarded after primary use or is worthless, defective, and of no use.

Improper waste disposal is the disposal of waste in a way that has negative consequences for the environment. Examples include littering, hazardous waste that is dumped into the ground, and not recycling items that should be recycled.

Examples include municipal solid waste (household trash/refuse), hazardous waste, wastewater (such as sewage, which contains bodily wastes (feces and urine) and surface runoff), radioactive waste, and others.

Sources of waste can be broadly classified into four types: Industrial, Commercial, Domestic, and Agricultural.

Industrial Waste (plastic, glass, etc).Commercial wastes (plastic, paper, etc).Domestic Waste(leaves, vegetable peels, excreta, etc.) Agricultural Waste (cattle waste, weed, husk, etc.) They are Biodegradable and Non-biodegradable waste.

Recycling of Waste

Recycling of waste product is very important as this process helps in processing waste or used products into useful or new products. Recycling helps in controlling air, water, and land pollution. It also uses less energy. Several items can be recycled like paper, plastic, glass, etc. Recycling helps in conserving natural resources and also helps in conserving energy. Recycling helps in protecting the environment as it helps in reducing air, water, and soil pollution.

Decomposition of Biodegradable Waste Biodegradable waste can be decomposed and converted into the organic matter with the help of different processes.

Chemical wastes are wastes that are made from harmful chemicals which are mostly produced in large factories. Chemical wastes may or may not be hazardous. Hazardous chemical waste can be solid, liquid, or gaseous and will show hazardous characteristics like toxicity, corrosivity, ignitability, and reactivity.

b. Deforestation

Deforestation is the permanent removal of trees to make room for something besides the forest. This can include clearing the land for agriculture or grazing or using the timber for fuel, construction, or manufacturing. Forests cover more than 30% of the Earth's land surface, according to the World Wildlife Fund.

Deforestation in India is the widespread destruction of major forests in India. It is mainly caused by environmental degradation by stakeholders such as farmers, ranchers, loggers, and plantation corporations. In 2009, India ranked 10th worldwide in the amount of forest loss, where world annual deforestation is estimated as 13.7 million hectares (34×106 acres) a year.

Causes and Consequences of Deforestation in India!

Deforestation is one of the major causes of environmental degradation which is affected by agents like small farmers, ranchers, loggers, and plantation companies. There is a broad consensus that the expansion of cropped areas and pastures is a major source of deforestation.

The term 'deforestation' describes the complete long term removal of tree cover. The loss of forest cover influences the climate and contributes to a loss of biodiversity. The economic activity is adversely affected by siltation, flooding, soil degradation, and reduced timber supplies. Thus, in turn, threatens the livelihood of people.

Causes for Deforestation

1. **Agriculture:** Conversion of forests to agricultural land to feed the growing needs of people. An estimated 300 million people are living as shifting cultivators who practice slash and burn agriculture and clear forests for shifting cultivation. In India, we have this practice in the northeast and to some extent in Andhra Pradesh, Bihar, and M.P. which contribute to nearly half of the forest clearing annually.
2. **Commercial logging:** (Which supplies the world market with woods such as meranti, teak, mahogany, and ebony) destroys trees as well as opening up the forest for agriculture. Cutting of trees for firewood and building material, the heavy lopping of foliage for fodder and heavy grazing of saplings by domestic animals like goals.
3. **Mining:** This causes environmental impacts like erosion, the formation of sinkholes, loss of biodiversity, and contamination of soil, groundwater, and surface water by chemicals from mining processes. In some cases, additional forest logging is done in the vicinity of mines to increase the available room for the storage of the created debris and soil.
4. **Increase in population:** The needs also increase and utilize forest resources. To meet the demands of a rapidly growing population, agricultural lands and settlements are created permanently by clearing forests.
5. **Urbanization and industrialization:** Since Industrialization and Urbanization needs land to grow, so a major amount of forest lands are cut to promote Industrialization and Urbanization. This creates a harmful effect on the environment and forest ecological balance.
6. **Construction of dam reservoirs:** For building big dams, large scale devastation of forests takes place which breaks the natural ecological balance of the region. Floods, droughts, and landslides become more prevalent in such areas. Forests are the repositories of invaluable gifts of nature in the form of biodiversity and by destroying these we are going to lose these species even before knowing them. These species

could be having marvelous economic or medicinal value. These storehouses of species that have evolved over millions of years get lost due to deforestation in a single stroke.

7. **Forest fires:** They may be natural or manmade, and cause huge forest loss.
8. **Overgrazing:** Overgrazing occurs when plants are exposed to intensive grazing for extended periods, or without sufficient recovery periods. It can be caused by either livestock in poorly managed agricultural applications, or by overpopulations of native or non-native wild animals.

Consequences of Deforestation

1. **Food problems:** Nonsuitability of deforested area for conservation. Most of the area that has undergone deforestation is unsuitable for long-term agricultural use such as ranching and farming. Once deprived of their forest cover, the lands rapidly degrade in quality, losing their fertility and arability.
2. **Exposing soil to heat and rain:** Heavy rainfall and high sunlight quickly damage the topsoil in clearings of the tropical rain forests. In such circumstances, the forest will take much longer to regenerate and the land will not be suitable for agricultural use for quite some time.
3. **Flooding:** Deforestation can result in watersheds that are no longer able to sustain and regulate water flows from rivers to streams. Trees are highly effective in absorbing water quantities, keeping the amount of water in watersheds to a manageable level. The forest also serves as cover against erosion. Once they are gone, too much water can result in downstream flooding, many of which have caused disasters in many parts of the world.
4. **Loss of biodiversity:** This is probably the most serious consequence of Deforestation. It means the destruction and extinction of many plants and animal species, many of un-home remain unknown and whose benefits will be left undiscovered.
5. **Displacement of indigenous communities:** Some indigenous people's way of life and survival are threatened by the loss of forests. Fewer trees result in a secure future for forest workers.
6. **Climate change:** Deforestation can cause the climate to become extreme in nature. It increases CO2 concentration in the atmosphere and contributes to global warming.
7. **Economic loss:** The occurrence and strength of floods and droughts affecting the economy. It also leads to the loss of future markets for ecotourism. The value of a forest is often higher when it is left standing than it could be worth when it is harvested.
8. **Health issues:** The stress of environmental change may make some species more susceptible to the effect of insects, pollution, and diseases.
9. **Soil erosion:** It is the displacement of the upper layer of soil; it is one form of soil degradation. This natural process is caused by the dynamic activity of erosive agents, that is, water, ice (glaciers), snow, air (wind), plants, animals, and humans.

Following these agents, erosion is sometimes divided into water erosion, glacial erosion, snow erosion, wind (aeolian) erosion, zoogenic erosion, and anthropogenic erosion.

Soil erosion may be a slow process that continues relatively unnoticed, or it may occur at an alarming rate causing a serious loss of topsoil. The loss of soil from farmland may be reflected in reduced crop production potential, lower surface water quality, and damaged drainage networks. Soil erosion could also cause sinkholes.

Human activities have increased by 10–50 times the rate at which erosion is occurring globally. Excessive (or accelerated) erosion causes both "on-site" and "off-site" problems. On-site impacts include decreases in agricultural productivity and (on natural landscapes) ecological collapse, both because of loss of the nutrient-rich upper soil layers. In some cases, the eventual result is desertification. Off-site effects include sedimentation of waterways and eutrophication of water bodies, as well as sediment-related damage to roads and houses. Water and wind erosion are the two primary causes of land degradation; combined, they are responsible for about 84% of the global extent of degraded land, making excessive erosion one of the most significant environmental problems worldwide.

Intensive agriculture, deforestation, roads, anthropogenic climate change, and urban sprawl are amongst the most significant human activities regarding their effect on stimulating erosion. However, many prevention and remediation practices can curtail or limit the erosion of vulnerable soils.

c. Growing Water Scarcity

Water scarcity in India is due to both natural and human-made causes. The main factors that are contributed to water issues include poor management of resources, lack of government attention, and man-made waste.

Water scarcity is the lack of sufficient available water resources to meet the demands of water usage within a region. Water scarcity is the lack of freshwater resources to meet water demand. It affects every continent and was listed in 2019 by the World Economic Forum as one of the largest global risks in terms of potential impact over the next decade.

d. Groundwater Depletion

Groundwater is the water present beneath Earth's surface in soil pore spaces and the fractures of rock formations. A unit of rock or an unconsolidated deposit is called an aquifer when it can yield a usable quantity of water. Groundwater, which is found in aquifers below the surface of the earth, is one of the nation's most important natural resources. Groundwater provides drinking water for a large portion of the nation's population, supplies business and industries, and is used extensively for irrigation.

Water seeping down from the land surface adds to the groundwater and is called recharge water. ... Heavy rains or melting snow may increase recharge and cause the water table to rise. An extended period of dry weather may decrease recharge and cause the water table to fall.

Pumping water out of the ground faster than it is replenished over the long-term causes similar problems. The volume of groundwater in storage is decreasing in many areas of the United States in response to pumping. Groundwater depletion is primarily caused by sustained groundwater pumping. ... Increased pumping costs.

Reasons for Depletion

- Increased demand for water for domestic, industrial, and agricultural needs and limited surface water resources lead to the over-exploitation of groundwater resources.
- Limited storage facilities are owing to the hard rock terrain, along with the added disadvantage of lack of rainfall, especially in central Indian states.

- Green Revolution enabled water-intensive crops to be grown in drought-prone/ water deficit regions, leading to over-extraction of groundwater.
- Frequent pumping of water from the ground without waiting for its replenishment leads to quick depletion.
- Subsidies on electricity and high MSP for water-intensive crops are also leading reasons for depletion.
- Water contamination as in the case of pollution by landfills, septic tanks, leaky underground gas tanks, and from overuse of fertilizers and pesticides leads to damage and depletion of groundwater resources.
- Inadequate regulation of groundwater laws encourages the exhaustion of groundwater resources without any penalty.
- Deforestation, unscientific methods of agriculture, chemical effluents from industries, lack of sanitation also lead to pollution of groundwater, making it unusable.

Some possible Solutions

- There should be restrictions to cut off the access to groundwater in areas identified as "critical" and "dark zones", where the water table is overused or very low.
- There is a need to treat water as a common resource rather than private property to prevent its overexploitation
- Problems and issues such as waterlogging, salinity, agricultural toxins, and industrial effluents, all need to be properly looked into.
- Research and scientific evaluations should be done before forming any policy.
- Water depletion can be controlled by reducing electricity subsidies.
- Another way of efficiently using groundwater is by encouraging farmers to adopt micro-irrigation techniques such as drip irrigation and micro-sprinklers. The government has initiated schemes like the DRIP programme, more drop per crop, KrishiSinchai Yojana to ensure economical water use practices in agriculture.
- The bottom-up approach by empowering the local community to become active participants in managing groundwater.
- Creating regulatory options at the community level such as panchayat is also one of the feasible solutions.
- Traditional methods of water conservation should be encouraged to minimize the depletion of water resources.
- Technology should be used extensively for determining the relationship between surface hydrological units and hydrological units below the ground, identification of groundwater recharge areas, mapping of groundwater, etc.
- Artificial recharge of tube wells, water reuse, afforestation, scientific methods of agriculture should also be done.
- Imparting key hydrogeological skills to non-profits and rural practitioners to improve decentralized water management in India.

e. Extinction of Plant And Animal Species

Extinction of a particular animal or plant species occurs when there are no more individuals of that species alive anywhere in the world - the species has died out. ... Endangered animals and plants are at risk of extinction - there are so few of them that they might soon be wiped out altogether.

Species disappear because of changes to the earth that are caused either by nature or by the actions of people. Sometimes a natural event, like a volcano erupting, can kill an entire species. Other times, extinction will happen slowly as nature changes our world. But if the

upper estimate of species numbers is true - that 100 million different species are co-existing with us on our planet - then between 10,000 and 100,000 species are becoming extinct each year. Implementation of the law continues to remain poor.

Check Your Progress - 2

Choose the correct response

1. The percentage of Earth's land surface covered by Forests is
    1. Less than 30%
    2. More than 30%
    3. Exactly 30%
    4. None of the above

2. The following is not the consequence of Deforestation
    1. Climate change
    2. Flooding
    3. Urbanization
    4. Loss of biodiversity

3. Classify the following Sources of waste as Industrial, Commercial, Domestic, and Agricultural.
   (Plastic, glass, cattle waste, weed, husk, paper, leaves, vegetable peels, excreta)

2.1.4. Let us Summarise

- Major Environmental Problems in India as highlighted by the World Bank report are - air pollution, the degradation of croplands, pastures, and forests, and poor water supply and sanitation.
- Air pollution in India is a serious health issue. Of the most polluted cities in the world, 21 out of 30 were in India in 2019. As per a study based on 2016 data, at least 140 million people in India breathe air that is 10 times or more over the WHO safe limit and 13 of the world's 20 cities with the highest annual levels of air pollution are in India.
- The greenhouse effect is the problem caused by increased quantities of gases such as carbon dioxide in the air. These gases trap the heat from the sun and cause a gradual rise in the temperature of the Earth's atmosphere. About 65 percent of India's carbon dioxide emissions in 2009 were from heating, domestic uses, and the power sector.
- Acid rain has been shown to have adverse impacts on forests, freshwaters, and soils, killing insect and aquatic life-forms as well as causing damage to buildings and having impacts on human health.
- The effects of global warming on South Asia include steady sea level rise, increased cyclonic activity, and changes in ambient temperature and precipitation patterns. Increased landslides and flooding are projected to have an impact on states such as Assam.
- Reason for Coastal Erosion: Wave Energy, Climate Change, Strong littoral drift, Construction dams in catchment areas, Sand and coral mining and dredging.
- Elevated water temperatures decrease oxygen levels, which can kill fish and alter food chain composition, reduce species biodiversity, and foster invasion by new thermophilic species.
- Industrialization contributes to negative environmental externalities, such as pollution, increased greenhouse gas emission, and global warming.

- Improper waste disposal is the disposal of waste in a way that has negative consequences for the environment.
- Deforestation in India is the widespread destruction of major forests in India. It is mainly caused by environmental degradation by stakeholders such as farmers, ranchers, loggers, and plantation corporations.
- Species disappear because of changes to the earth that are caused either by nature or by the actions of people.

2.1.5. Answers to 'Check Your Progress - 1 and 2'

Check Your Progress - 1

1. b)
2. d)
3. a) decibels (dB)
   b) 10pm

Check Your Progress - 2

1. b)
2. c)
3. Industrial Waste: plastic, glass.
   Commercial wastes: **plastic**, paper.
   Domestic Waste: leaves, vegetable peels, excreta.
   Agricultural Waste: cattle waste, weed, husk.

2.1.6. Unit end Exercises

- Explain the major environmental problems in India
- Describe the problems related to air pollution
- Explain the problems related to water pollution
- Explain the problems related to noise pollution
- Describe the problems related to soil pollution
- Explain the problems related to the unequal distribution of Industrialization
- Explain the problems related to Urbanization
- Explain the Deforestation
- Explain the coastal erosion

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Block 2 : India and Environmental Issues and Policies

Unit 2 : Environmental Protection and Polices in India

Unit Structure

2.2.1. Learning Objectives

After completing this Unit, the student teachers will be able to

- Explain the Environmental protection and policy in India;
- Describe the Major environment policies and legislations in India;
- Describe the Policies to protect the environment in India; and
- Explain the Legislations and Rules for the protection of the environment in India.

2.2.2. Introduction

In the previous unit, you have learnt the Major Environmental problems in India, by now you have realised the intensity of the problems and the need for taking suitable measures to tackle these problems before it's too late. Globally several attempts have been made by many countries to address environmental problems and issues. In 1972, representatives of 113 world governments assembled in Stockholm to participate in the United Nations Conference on Human Environment. The Stockholm conference proclaimed that:

"The protection and improvement of the human environment is a major issue which affects the well-being of people and economic development throughout the world and all governments and people must exert common effort for the preservation and improvement of the human environment, for the benefit of all people and their posterity."

Many countries have therefore introduced control mechanisms to deter and punish the enterprises violating the environment. They have enacted special criminal laws or amended their penal codes by creating new criminal laws to prosecute the most flagrant offenders through the criminal prosecution system. The Japanese law for the punishment of crimes relating to environmental pollution was the first such step. Penal codes of the Federal Republic of Germany, German Democratic Republic (as it then was), Hungary, Portugal, Spain, and Brazil, soon followed. Countries that do not legally distinguish between regulatory offenses and crimes, such as Canada and the United States, have created new regulations related to crimes dealing with flagrant violations and provided stiff punishment with fines and prison sentences to violators.

India was the first country to impose a constitutional obligation on the State and citizens to protect and improve the environment as one of the primary duties. Article 48A of the Indian Constitution provides:

"The state shall endeavour to protect and improve the environment and to safeguard forests and wildlife of the country."

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

So it is evident that the Constitution of India has provisions to make environmental legislations. The central, state, and the concurrent lists of subjects on which Parliament and State Legislatures are empowered to legislate span: noise control, land improvement, irrigation, town planning, slum clearance, housing schemes, pest control, smoke control, water pollution, forests, wildlife, recreation, etc.

Consequently, laws have been enacted on some of the subjects, such as:
The Factories Act, 1948
The Insecticides Act, 1968
The Water (Prevention and Control of Pollution) Act, 1974
The Air (Prevention and Control of Pollution) Act, 1981
The Forest (Conservation) Act, 1980
The Wildlife (Protection) Act, 1972, and
The Environment (Protection) Act, 1986.
In the following section, we will study some of these environmental laws and also the numerous judgments made by the High Courts and the Supreme Court of India about environmental protection.

2.2.3. Learning Points And Learning Activities

2.2.3.1. Environmental Protection and Policy in India

The main environmental problems in India relate to air and water pollution; degradation of common property resources; threat to bio-diversity; solid waste disposal and sanitation. Increasing deforestation, industrialization, urbanization, transportation, and input-intensive agriculture. Poverty presents special problems for a heavily populated country with limited resources. Noxious and toxic substances like Sulphur dioxide contaminate water, oxides of nitrogen, and suspended particulate matter are serious air pollutants in industrial regions and cities.

Environmental protection can be defined as the prevention of unwanted changes to ecosystems and their constituent parts. Environmental protection is the practice of protecting the natural environment by individuals, organizations, and governments. Its objectives are to conserve natural resources and the existing natural environment and, where possible, to repair damage and reverse trends.

Environmental Policies: The environmental policy is a set of rules and regulations, laws, and policies made up by the government or organization regarding environmental issues. Environmental policy can include laws and policies addressing water and air pollution, chemical and oil spills, smog, drinking water quality, land conservation and management, and

wildlife protection, such as the protection of endangered species. Environmental Policies are the total of the values to which a person or a group of persons or institutions social, legal, and governmental – consider as important in their relationships with one another. Environmental policies have to be formulated in the credibility of social morals and values.

Let us know more about Environmental Policies in India. The goals of the Environmental Policies may be formulated in several ways – to protect human health, ensure the viability of wildlife, preservation of historic monuments, stopping further degradation of the environment, etc. The policy is the overall environmental intention and direction forming the backbone and skeletal framework, from which all other environmental components are hung including environmental management systems, audits, assessments, and reports.

Major Environment Policies and Legislations in India

The Ministry of Environment & Forests is the nodal agency in the administrative structure of the Central Government, for the planning, promotion, co-ordination and overseeing the implementation of environmental and forestry programmes. The Ministry is also the Nodal agency in the country for the United Nations Environment Programme (UNEP). The principal activities undertaken by the Ministry of Environment and Forests consist of conservation and survey of flora, fauna, forests, and Wildlife, prevention and control of pollution, afforestation and regeneration of degraded areas, and protection of the environment, in the framework of legislation. The main tools utilized for this include surveys, impact assessment, control of pollution, regeneration programmes, support to organizations, research to solve solutions and training to augment the requisite manpower, collection, and dissemination of environmental information, and creation of environmental awareness among all sectors of the country's population.

The Central Pollution Control Board (CPCB), a statutory organisation, was constituted in September 1974 under the Water (Prevention and Control of Pollution) Act, 1974. Further, CPCB was entrusted with the powers and functions under the Air (Prevention and Control of Pollution) Act, 1981. It serves as a field formation and also provides technical services to the Ministry of Environment and Forests of the provisions of the Environment (Protection) Act, 1986. Principal Functions of the CPCB, as spelt out in the Water (Prevention and Control of Pollution) Act, 1974, and the Air (Prevention and Control of Pollution) Act, 1981, are as follows;

i. to promote cleanliness of streams and wells in different areas of the States by prevention, control, and abatement of water pollution, and
ii. to improve the quality of air and to prevent, control, or abate air pollution in the country.

2.2.3.2. Policies to Protect Environment in India

a. Environment Protection Act, 1986

- **The Environment (Protection) Act, 1986** authorizes the central government to protect and improve environmental quality, control and reduce pollution from all sources, and prohibit or restrict the setting and /or operation of any industrial facility on environmental grounds. The Environment (Protection) Act was enacted in 1986 to provide for the protection and improvement of the environment. It empowers the Central Government to establish authorities charged with the mandate of preventing

environmental pollution in all its forms and to tackle specific environmental problems that are peculiar to different parts of the country. The Act was last amended in 1991.

- The Environment (Protection) Rules lay down procedures for setting standards of emission or discharge of environmental pollutants.
- The objective of Hazardous Waste (Management and Handling) Rules, 1989 is to control the generation, collection, treatment, import, storage, and handling of hazardous waste.
- The Manufacture, Storage, and Import of Hazardous Rules define the terms used in this context and sets up an authority to inspect, once a year, the industrial activity connected with hazardous chemicals and isolated storage facilities.
- The Manufacture, Use, Import, Export, and Storage of hazardous Micro-organisms/ Genetically Engineered Organisms or Cells Rules,1989 were introduced to protect the environment, nature, and health, in connection with the application of gene technology and micro-organisms.

b. National Conservation Strategy and Policy Statement on Environment and Development, 1992

The National Conservation Strategy and the Policy Statement on Environment and Development are in response to the need for laying down the guidelines that will help to weave environmental considerations into the fabric of our national life and our development process. It is an expression of India's commitment to reorienting policies and action in unison with the environmental perspective.

It talks about the nature and dimensions of the environmental problems, actions taken in response to the problems, and lists out priorities and strategies for action. It also views development policies from environmental perspectives and the support policies and systems required.

c. Policy Statement for the Abatement of Pollution, 1992

The commitment of the Government to abatement of pollution for preventing deterioration of the environment is stated here. The policy elements seek to shift emphasis from defining objectives for each problem area towards actual implementation, but the focus is on the long term because pollution particularly affects the poor. The complexities are considerable given the number of industries, organisations, and government bodies involved. To achieve the objectives maximum use will be made of a mix of instruments in the form of legislation and regulation, fiscal incentives, voluntary agreements, educational programmes, and information campaigns. The emphasis will be on the increased use of regulations and an increase in the development and application of financial incentives.

There is an increasing trend in environmental pollution. Water is polluted by four kinds of substances: traditional organic waste, waste generated from industrial processes, chemical agents for fertilizers, and pesticides for crop protection and silt from degraded catchments. While it is estimated that three-fourths by volume of the wastewater generated is from municipal sources, industrial waste, though small in volume, contributes over one-half of the total pollutant load, and the major portion of this is coming from large and medium industries. For class-I cities of the country, less than five percent of the total wastewater generated is collected and less than one-fourth of this is treated.

Future directions and objectives

- It is not enough for the Government to notify laws that are to be complied with. A positive attitude on the part of everyone in society is essential for the prevention of pollution and wide consultation has been held with those who will ultimately implement the policy.
- A comprehensive approach is taken to integrate environmental and economic aspects in development planning; stress is laid on preventive aspects for pollution abatement and promotion of technological inputs to reduce industrial pollutants, and through reliance upon public cooperation in securing a clean environment to respond to the coming challenges.
- The objective is to integrate environmental considerations into decision making at all levels.

To achieve this, steps have to be taken to prevent pollution at the source; encourage, develop and apply the best available practicable technical solutions; ensure that the polluter pays for the pollution and control arrangements; focus protection on heavily polluted areas and river stretches, and involve the public in decision making.

d. National Environment Policy, 2006

National Environment Policy (NEP) - Ministry of Environment and Forests (2006) A document that emphasizes conservation, prevention of degradation, and equity of natural resources. It argues that environmental degradation often leads to poverty and poor health outcomes among populations.

As the process of Economic Development hastens in the economy, the demand for natural resources also increases. It becomes critical that natural resources should be used judiciously so that these resources are not exploited for short term gain but used without harming the interest of future generations. Environmental factors are estimated as being responsible in some cases for nearly 20% of the burden of disease in India. The National Environment Policy (NEP), 2006 was an effort towards India's commitment to a clean environment and making a positive contribution to international efforts.

Features of National Environment Policy, 2006

- The dominant theme of this policy is that while conservation of environmental resources is necessary to secure livelihoods and well-being of all, the most secure basis for conservation is to ensure that people dependent on particular resources obtain better livelihoods from the fact of conservation than from degradation of the resource
- The policy also seeks to stimulate partnerships of different stakeholders, i.e. public agencies, local communities, academic and scientific institutions, the investment community, and international development partners, in harnessing their respective resources and strengths for environmental management
- The involvement of Panchayati Raj Institutions and urban local bodies has been highlighted.
- It also seeks to revisit the Coastal Regulation Zone notifications to approach coastal environmental regulation more holistic and, thereby, ensure protection to coastal ecological systems, waters, and the vulnerability of some coastal areas to extreme natural events and potential sea-level rise.
- Environmental Impact Assessment will continue to be the principal methodology for the appraisal and review of new projects.

- To achieve sustainable development, environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it.

Objectives of National Environment Policy, 2006

- To protect and conserve critical ecological systems and resources
- To ensure equitable access to environmental resources and quality for all sections of society, and in particular, to ensure that poor communities, which are most dependent on environmental resources for their livelihoods, are assured secure access to these resources
- To ensure judicious use of environmental resources to meet the needs and aspirations of the present and future generations
- To integrate environmental concerns into policies, plans, programmes, and projects for economic and social development.
- To ensure efficient use of environmental resources in the sense of reduction in their use per unit of economic output, to minimize adverse environmental impacts.
- To apply the principles of good governance (transparency, rationality, accountability, reduction in time and costs, participation, and regulatory independence) to the management and regulation of the use of environmental resources.
- To ensure higher resource flows, comprising finance, technology, management skills, traditional knowledge, and social capital, for environmental conservation through mutually beneficial multi-stakeholder partnerships between local communities, public agencies, the academic and research community, investors, and multilateral and bilateral development partners.

e. Vision Statement on Environment and Health

The purpose of the vision document was to evolve a strategy of health-risk reduction arising from environmental pollution that would help the implementing agencies to revise the environmental and industry specific actions. Ministry of Environment and Forests (MEF) had constituted a Committee on Environment and Health in July 1999 and the report was submitted in May 2000. The Report of the "Committee on Environment and Health" brought out issues requiring the attention of various stakeholders. The "Conference on Environmental Health" organized by the Ministry of Environment and Forests in November 2002 also brought out thrust areas and action points that need to be implemented for the protection of public health.

The environment in which we live greatly influences our health. The household, workplace, outdoor and indoor environments may pose risks to health in several different ways. The poor quality of air which we may breathe, the contaminated water we may drink, and the surroundings in which we live, determine our quality of life. While genetic factors may also be responsible for causing diseases but the environmental factors play a much more active role in contracting various diseases. The key purpose of this Vision Statement on Environment and Human Health is to evolve a strategy for health risk reduction. It also offers a comprehensive approach to environmental health management plans, which would be a systematic approach to estimate the burden of disease and injury due to different environmental pollutants. Therefore, the activities and programmes required to be taken up for the protection of public health due to environmental pollution are also given in this statement in the form of a road map.

Check Your Progress - 1

Choose the correct alternative

1. The first country to impose a constitutional obligation on the State and citizens to protect and improve the environment as one of the primary duties is
    a. Germany
    b. Canada
    c. India
    d. United States of America

2. The policy effort towards India's commitment to a clean environment and making a positive contribution to international efforts was in
    a. Environment Protection Act, 1986
    b. Policy Statement for the Abatement of Pollution, 1992
    c. National Environment Policy, 2006
    d. Vision Statement on Environment and Health

2.2.3.3. Legislations and Rules for the Protection of Environment in India

a. Water Pollution Acts

The Water (Prevention and Control of Pollution) Act, 1974, amended 1988

- This was enacted to provide for the prevention and control of water pollution, and the maintaining or restoring of wholesomeness of water in the country. The Central and State Pollution Control Boards have been constituted under sections 3 and 4 of the Act respectively. The Act was amended in 1978 and 1988 to clarify certain ambiguities and to vest more powers in Pollution Control Board. Salient items and obligations on the part of industries and local bodies are:
- To obtain prior consent to establish an industry for new discharge U/S 25 of the Act. This is mandatory for every industry/local body discharging any domestic sewage or trade effluent into water, stream, well, sewer, or on land. For this purpose, a consent application has to be filed with State Pollution Control Board (SPCB) in form XIII complete in all respects along with the prescribed consent fee.
- Once after obtaining the consent to establish and installing all facilities as communicated by the industry, the industry shall apply for consent to operate U/S 25 of the Act for which same form XIII has to be used.
- Similar provisions of application and grant of consent exist for industries discharging the trade/effluent waste before the enactment of the Act [U/S 26 of the Act].

The Water (Prevention and Control of Pollution) Cess Act, 1977, amended 1992 and 2003.

This was enacted to provide for the levy and collection of a cess on water consumed by persons operating and carrying on certain types of industrial activities. This cess is collected to augment the resources of the Central Board and the State Boards for the prevention and control of water pollution constituted under the Water (Prevention and Control of Pollution) Act, 1974. The Act was last amended in 2003.

Rules

1. The Water (Prevention and Control of Pollution) Rules, 1975
2. The Water (Prevention and Control of Pollution) Cess Rules, 1978
3. Central Board for the Prevention and Control of Water Pollution (Procedure for Transaction of Business) Rules, 1975 amended 1976

b. Air Pollution Act

The Air (Prevention and Control of Pollution) Act 1981, amended 1987

This is an Act to provide for the prevention, control, and abatement of air pollution in the country to preserve the quality of air. Central and State Boards constituted under sections 3 and 4 of Water (Prevention and Control Pollution) Act, 1974 were deemed also as Central and State Boards for Prevention and Control of Air Pollution. The salient features of the Act are:

- The Act applies to the whole of India.
- U/S 19 of the Act, the State Gov. in consultation with SPCB is vested with the power to declare Air Pollution Control Area in which provisions of the Act shall be applicable. Presently entire Uttar Pradesh has been declared a pollution control area.
- As per provisions in Sec. 21 (1) & (2), no person can establish or operate any industrial plant without the previous consent of the State Pollution Control Board. Every application for consent shall be made in Form-I and shall be accompanied by the prescribed fee.
- Within a period of four months after the receipt of the application, the Board shall complete the formalities to either grant or refuse consent. During the course of the processing consent application, the Board may seek any information about the industry after giving notice in Form II.
- U/S 22, 22 (A) operating any industrial plant to cause emission of any air pollutant above the standard laid down by state Board is liable for litigation by the board.
- Besides providing consultation to State Government for declaring or restricting area as Air Pollution Control Area, State Board is vested powers of entry and inspection, the power to take samples, the power to give direction, etc.: State Board may issue any direction to any person or authority.

Rules

1. The Air (Prevention and Control of Pollution) (Union Territories) Rules, 1983
2. The Air (Prevention and Control of Pollution) Rules, 1982.

c. Environment Protection Act

The Environment (Protection) Act, 1986, amended 1991

Against the backdrop of the United Nations Conference on the Human Environment held at Stockholm in June 1972, in which India was a participant, the Central Government enacted legislation, 'The Environment (Protection) Act, 1986', with an objective for protection and improvement of the environment and matters connected therewith. As per this Act, the Central Government shall have the power to take all such measures to protect and improve the quality of the environment and to prevent environmental pollution. Further, the Central Government shall have the power to give directions in writing to any person or officer or any authority for any of the purposes of the Act, including the power to direct the closure, prohibition, or regulation of any industry, operation, or process. No person carrying on an industry, operation, or process shall discharge or emit any environmental pollutant above standards prescribed by the Government. Further, persons handling hazardous substances shall comply with the procedural safeguards as may be prescribed by the authorities. As per the Act where the discharge of any environmental pollutant above prescribed standard occurs or is apprehended to occur due to any accidental or other unforeseen act or event, the person responsible for such discharge shall be bound to prevent or mitigate the pollutant so caused as well as intimate the fact of such occurrence to the

concerned authorities. The Central Government or any other officer empowered by the Central Government shall have the powers to take the samples of air, water, soil, or any other substances from any factory, premises, etc., for analysis. To protect and improve the quality of the environment and preventing and abetting environmental pollution, standards of emission or discharge of environmental pollutants from the industries, operations, or processes are specified in Schedules 1 to 1V of the Environment (Protection) Rules.

Rules

- The Environment (Protection) Rules, 1986

d. Wildlife Act

The Wildlife (Protection) Act, 1972, amended 1993, 2002 and 2006

This was enacted to effectively protect the wildlife of this country and to control poaching, smuggling, and illegal trade in wildlife and its derivatives. The Act was amended in January 2003 and punishment and the penalty for offenses under the Act have been made more stringent. It provides a powerful legal framework for the prohibition of hunting, protection, and management of wildlife habitats, the establishment of protected areas, regulation and control of trade in parts and products derived from wildlife, etc. Specifically, it provides for the creation of a network of Protected Areas consisting of National Parks, Wildlife Sanctuaries, Tiger Reserves, Conservation Reserves, and Community Reserves. No wild mammal, bird, amphibian, reptile, fish, crustacean, insects, or coelenterates listed in four Schedules of the Act can be hunted either within or outside protected areas. On conviction, the penalty for hunting is imprisonment for a period ranging from a minimum of three to a maximum of seven years with fines not less than 10,000 rupees. It prohibits the destruction or diversion of wildlife and its habitat by any method unless it is for improvement or better management and this is decided by the state government in consultation with the National and State Boards for Wildlife. The 2006 amendment introduced a new chapter (IV B) for the establishment of the National Tiger Conservation Authority and notification of Tiger Reserves. The Wildlife Crime Control Bureau (WCCB) was constituted vide the 2006 amendment to monitor and control the illegal trade in wildlife products. The act provides for investigation and prosecution of offenses in a court of law by authorized officers of the forest department and police officers.

Rules

- Recognition of Zoo Rules, 2009
- The National Board for Wild Life Rules, 2003
- The Declaration of Wild Life Stock Rules, 2003
- The Wildlife (Specified Plant Stock Declaration) Central Rules, 1995
- The Wildlife (Specified Plants – Conditions for Possession by Licensee) Rules, 1995
- The Wildlife (Protection) Rules, 1995
- Recognition of Zoo Rules, 1992
- The Wildlife (Protection) Licensing (Additional Matters for Consideration) Rules, 1983
- The Wildlife (Stock Declaration) Central Rules, 1973
- The Wildlife (Transaction and Taxidermy) Rules, 1973

e. Forest Conservation Acts

i. The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006

The Act seeks to recognize and vest the forest rights and occupation in forest land in forest-dwelling Scheduled Tribes and other traditional forest dwellers who have been residing in such forests for generations but whose rights could not be recorded. The Act was notified for operation with effect from 31.12.2007. The Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Rules, 2008 for implementing the provisions of the Act were notified on 1.1.2008. The Ministry of Tribal Affairs is to ensure that the intended benefits of this welfare legislation flow to the eligible forest dwellers, has also issued comprehensive guidelines to the State/UT Governments on 12.7.2012 for better implementation of the Act.

ii. Forest (Conservation) Act, 1980, amended 1988

To check rapid deforestation due to forestlands being released by state governments for agriculture, industry, and other development projects (allowed under the Indian Forest Act) the central government enacted the Forest Conservation Act in 1980 with an amendment in 1988. The Act made the prior approval of the federal government necessary for de-reservation of reserved forests, logging, and for use of forestland for non-forest purposes. This powerful legislation has, to a large extent, curtailed the indiscriminate logging and release of forestland for non-forestry purposes by state governments.

iii. The Indian Forest Act, 1927

The main objective of the Indian Forest Act (1927) was to secure exclusive state control over forests to meet the demand for timber. Most of these untitled lands had traditionally belonged to the forest-dwelling communities. The Act defined state ownership regulated its use and appropriated the power to substitute or extinguish customary rights. The Act facilitates three categories of forests, namely reserved forests, Village forests, and protected forests. Reserved forests are the most protected within these categories. No rights can be acquired in reserved forests except by succession or under a grant or contract with the government. Felling trees, grazing cattle, removing forest products, quarrying, fishing, and hunting are punishable with a fine or imprisonment. Although the Indian Forest Act is a federal act, many states have enacted similar forest acts but with some modifications.

Rules

- Forest (Conservation) Rules, 2003.
- Forest (Conservation) Rules, 1981, amended in 1992.

f. Biodiversity Act

Biological Diversity Act, 2002

The Convention on Biological Diversity (CBD) was inspired by the world community's growing commitment to sustainable development. It represented a step forward in the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of benefits arising from the use of genetic resources. In pursuance of the Convention on Biological Diversity (CBD), to which it was a signatory, India enacted the Biological Diversity Act in 2002 following a widespread consultative process over a period of eight years. The Biological Diversity Rules were notified thereafter in 2004. The Act gives effect to the provisions of the CBD. It also addresses access to biological resources and

associated traditional knowledge to ensure equitable sharing of benefits arising out of their use to the country and its people. It included provisions like the prohibition on the transfer of Indian genetic material outside the country without specific approval of the Indian Government; prohibition on anyone claiming an Intellectual Property Right (IPR), such as a patent, over biodiversity or related knowledge, without the permission of the Indian Government; regulation of the collection and use of biodiversity by Indian nationals while exempting local communities from such restrictions; measures for sharing the benefits from the use of biodiversity, including the transfer of technology, monetary returns; measures for sharing the benefits from the use of biodiversity, including the transfer of technology, monetary returns; Setting up of Biodiversity Management Committees (BMC) at local, village and urban levels, State Biodiversity Boards (SBB) at the state level, and a National Biodiversity Authority (NBA), etc.

Rules

- Biological Diversity Rules, 2004

National Green Tribunal

In 1995, the Central Government established the National Environment Tribunal (through the National Environment Tribunal Act 1995) to provide for strict liability for damage arising out of accidents caused by the handling of hazardous substances.

2011 is distinctive for the establishment of the National Green Tribunal (NGT) by the Ministry of Environment and Forests (MoEF). The MoEF was galvanized by the Supreme Court in this direction. Created to focus on environmental issues, the law constituting the NGT received presidential assent in June 2010 but was only enforced by October 18 that year, through a Central Government notification. The coming into force of the NGT Act implied an automatic repeal of two existing laws: the National Environment Tribunal Act 1995, and the National Environment Appellate Authority Act, 1997, and, therefore, the closure of the National Environment Appellate Authority (NEAA) - a quasi-judicial body empowered to hear appeals against the environmental approvals granted (or not) to projects. All the cases pending before the NEAA were to be heard by the NGT.

National Green Tribunal Act, 2010 (No. 19 of 2010)

The National Green Tribunal has been established on 18.10.2010 under the National Green Tribunal Act 2010 for effective and expeditious disposal of cases relating to environmental protection and conservation of forests and other natural resources including enforcement of any legal right relating to the environment and giving relief and compensation for damages to persons and property and matters connected therewith or incidental thereto. It is a specialized body equipped with the necessary expertise to handle environmental disputes involving multi-disciplinary issues. The Tribunal shall not be bound by the procedure laid down under the Code of Civil Procedure, 1908, but shall be guided by principles of natural justice. The Tribunal's dedicated jurisdiction in environmental matters shall provide speedy environmental justice and help reduce the burden of litigation in the higher courts. The Tribunal is mandated to make and endeavour for disposal of applications or appeals finally within 6 months of the filing of the same. Initially, the NGT is proposed to be set up at five places of sittings and will follow a circuit procedure for making itself more accessible. New Delhi is the Principal Place of Sitting of the Tribunal and Bhopal, Pune, Kolkata, and Chennai shall be the other 4 places of sitting of the Tribunal.

h. Animal Welfare Act
The Prevention of Cruelty to Animals Act, 1960

This was enacted in 1960 to prevent the infliction of unnecessary pain or suffering on animals and to amend the laws relating to the prevention of cruelty to animals. After the enactment of this Act, the Animal Board of India was formed for the promotion of animal welfare.

Rules

- Breeding of and Experiments on Animals (Control and Supervision) Amendment Rules, 2006. Reconstitution of Committee for Control and Supervision of Experiments on Animals (CPCSEA).
- Breeding of and Experiments on Animals (Control and Supervision) Amendment Rules, 2005.
- The Animal Birth Control (Dogs) Rules, 2001.
- The Performing Animals (Registration) Rules, 2001.
- The Performing Animals (Registration) Amendment Rules, 2001.
- The Prevention of Cruelty to Animals (Establishment and Regulation of Societies for Prevention of Cruelty to Animals) Rules, 2001.
- The Prevention of Cruelty to Animals (Slaughter House) Rules, 2001.
- The Prevention of Cruelty to Animals (Transport of Animals on Foot) Rules, 2001.
- The Breeding of and Experiments on Animals (Control and Supervision) Amendment Rules, 2001.
- The Breeding of and Experiments on Animals (Control and Supervision) Rules.
- The Experiments on Animals (controls and Supervision) (Amendment) Rules, 1998.
- The Prevention of Cruelty (Capture of Animals) Rules, 1972.
- The Prevention of Cruelty to Animals (Registration of Cattle Premises) Rules, 1978.
- The Transport of Animals Rules, 1978.
- The Transport of Animals (Amendment) Rules, 2001.
- The Prevention of Cruelty to Animals (Application of Fines) Rules, 1978.
- The Performing Animals Rules, 1973.
- The Prevention of Cruelty to Animals (Licensing of Farriers) Rules, 1965.
- The Prevention of Cruelty to Draught and Pack Animals Rules, 1965, amended 1968.

i. Hazardous Wastes Management Regulations

Hazardous waste means any waste which, because of any of its physical, chemical, reactive, toxic, flammable, explosive, or corrosive characteristics, causes danger or is likely to cause danger to health or environment, whether alone or when in contact with other wastes or substances.

There are several legislations that directly or indirectly deal with hazardous waste management. The relevant legislations are the Factories Act, 1948, the Public Liability Insurance Act, 1991, the National Environment Tribunal Act, 1995, and rules and notifications under the Environmental Act. Some of the rules dealing with hazardous waste management are discussed below:

- **Hazardous Wastes (Management, Handling and Transboundary) Rules, 2008**, brought out a guide for manufacture, storage, and import of hazardous chemicals and management of hazardous wastes.

- **Biomedical Waste (Management and Handling) Rules, 1998**, were formulated along parallel lines, for proper disposal, segregation, transport, etc, of infectious wastes.
- **Municipal Solid Wastes (Management and Handling) Rules, 2000**, aim at enabling municipalities to dispose of municipal solid waste scientifically.

Because of the short-comings and overlapping of some categories causing inconvenience in implementation of the Biomedical Waste (Management and Handling) Rules, 1998 as well as the Municipal Solid Wastes (Management and Handling) Rules, 2000, the Ministry of Environment, Forest and Climate Change has formulated the draft Bio-Medical Waste (Management & Handling) Rules, 2015 (Draft BMW Rules) and the draft Solid Waste Management Rules, 2015 (Draft SWM Rules) and sought comments on the draft Rules.

The Draft BMW Rules are to replace the Biomedical Waste (Management and Handling) Rules, 1998, and the Draft SWM Rules are to replace the Municipal Solid Waste (Management and Handling) Rules, 2000. The objective of the Draft BMW Rules is to enable the prescribed authorities to implement the rules more effectively, thereby, reducing the bio-medical waste generation and also for its proper treatment and disposal and to ensure environmentally sound management of these wastes, and the Draft SWM Rules aim at dealing with the management of solid waste including it segregation at source, transportation of waste, treatment and final disposal.

· **E-Waste (Management and Handling) Rules, 2011** have been notified on May 1, 2011, and came into effect from May 1, 2012, with the primary objective to reduce the use of hazardous substances in electrical and electronic equipment by specifying the threshold for use of hazardous material and to channelize the e-waste generated in the country for environmentally sound recycling. The Rules apply to every producer, consumer or bulk consumer, collection centre, dismantler, and recycler of e-waste involved in the manufacture, sale, purchase, and processing of electrical and electronic equipment or components as detailed in the Rules.

· **Batteries (Management & Handling) Rules, 2001** deal with the proper and effective management and handling of lead-acid battery waste. The Act requires all manufacturers, assemblers, re-conditioners, importers, dealers, auctioneers, bulk consumers, consumers, involved in the manufacture, processing, sale, purchase, and use of batteries or components thereof, to comply with the provisions of Batteries (Management & Handling) Rules, 2001.

Check Your Progress - 2

Choose the correct response

1. The National Green Tribunal Act was formed in the year
    1. 2011
    2. 1996
    3. 2010
    4. None of the above

2. The Wildlife (Protection) Act was formulated in
    1. 2010
    2. 1972
    3. 2001
    4. None of the above

2.2.4. Let us Summarise

- The main environmental problems in India relate to air and water pollution; degradation of common property resources; threat to bio-diversity; solid waste disposal and sanitation. Increasing deforestation, industrialization, urbanization, transportation, and input-intensive agriculture. Poverty presents special problems for a heavily populated country with limited resources. Noxious and toxic substances like Sulphur dioxide contaminate water, oxides of nitrogen, and suspended particulate matter are serious air pollutants in industrial regions and cities.
- Environmental policy can include laws and policies addressing water and air pollution, chemical and oil spills, smog, drinking water quality, land conservation and management, and wildlife protection, such as the protection of endangered species.
- The principal activities undertaken by the Ministry of Environment and Forests consist of conservation & survey of flora, fauna, forests and Wildlife, prevention & control of pollution, afforestation and regeneration of degraded areas, and protection of the environment, in the framework of legislation.
- The Environment (Protection) Act was enacted in 1986 to provide for the protection and improvement of the environment.
- The National Conservation Strategy and the Policy Statement on Environment and Development 1992 are in response to the need for laying down the guidelines that will help to weave environmental considerations into the fabric of our national life and our development process.
- The commitment of the Government on abatement of pollution 1992 for preventing deterioration of the environment.
- National Environment Policy (NEP) 2006 emphasizes conservation, prevention of degradation, and equity of natural resources
- The Water (Prevention and Control of Pollution) Act, 1974, amended 1988 was enacted to provide for the prevention and control of water pollution, and the maintaining or restoring of wholesomeness of water in the country.
- The Water (Prevention and Control of Pollution) Cess Act, 1977, amended 1992 and 2003 was enacted to provide for the levy and collection of a cess on water consumed by persons operating and carrying on certain types of industrial activities.
- The Air (Prevention and Control of Pollution) Act 1981, amended 1987 is an Act to provide for the prevention, control, and abatement of air pollution in the country to preserve the quality of air
- The Environment (Protection) Act, 1986', with an objective for protection and improvement of the environment and matters connected therewith.
- he Wildlife (Protection) Act, 1972, amended 1993, 2002, and 2006 was enacted to effectively protect the wildlife of this country and to control poaching, smuggling, and illegal trade in wildlife and its derivatives.
- The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 seeks to recognize and vest the forest rights and occupation in forest land in forest-dwelling Scheduled Tribes and other traditional forest dwellers who have been residing in such forests for generations but whose rights could not be recorded.
- Forest (Conservation) Act, 1980, amended 1988the Act made the prior approval of the federal government necessary for de-reservation of reserved forests, logging, and for use of forestland for non-forest purposes.
- The Indian Forest Act, 1927, the main objective was to secure exclusive state control over forests to meet the demand for timber.

- Biological Diversity Act, 2002the Convention on Biological Diversity (CBD) was inspired by the world community's growing commitment to sustainable development.
- The National Environment Tribunal Act 1995 to provide for strict liability for damage arising out of accidents caused by the handling of hazardous substances.
- The National Green Tribunal Act 2010 for effective and expeditious disposal of cases relating to environmental protection and conservation of forests and other natural resources.
- The Prevention of Cruelty to Animals Act was enacted in 1960 to prevent the infliction of unnecessary pain or suffering on animals and to amend the laws relating to the prevention of cruelty to animals.

- **Hazardous Wastes Management Regulations:**
  - ✓ **Hazardous Wastes (Management, Handling and Transboundary) Rules, 2008,** brought out a guide for manufacture, storage, and import of hazardous chemicals and management of hazardous wastes.
  - ✓ **Biomedical Waste (Management and Handling) Rules, 1998,** were formulated along parallel lines, for proper disposal, segregation, transport, etc, of infectious wastes.
  - ✓ **Municipal Solid Wastes (Management and Handling) Rules, 2000,** aim at enabling municipalities to dispose of municipal solid waste scientifically.
  - ✓ **E-Waste (Management and Handling) Rules, 2011** with the primary objective to reduce the use of hazardous substances in electrical and electronic equipment by specifying the threshold for use of hazardous material and to channelize the e-waste generated in the country for environmentally sound recycling.
  - ✓ **Batteries (Management & Handling) Rules, 2001** deal with the proper and effective management and handling of lead-acid battery waste.

2.2.5. Answers to 'Check Your Progress - 1 and 2'

Check Your Progress -1

1. c)
2. c)

Check Your Progress - 2

1. c)
2. b)

2.2.6. Unit end Exercises

- Explain the Environmental protection and policy in India.
- Describe the Major environment policies and legislations in India.
- Describe the Policies to protect the environment in India.
- Explain the Legislations and Rules for the protection of the environment in India.

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Block 2 : India and Environmental Issues and Policies

Unit 3 : Need and Objectives of Conservation

Unit Structure

2.3.1. Learning Objectives

After completing this Unit, the student teachers will be able to

- Explain the meaning of Environmental Conservation;
- Discuss the Need for Conservation;
- Enumerate the Objectives of Conservation; and
- Explain the Principles of Conservation.

2.3.2. Introduction

In the previous unit, you have learnt about Environmental protection and policy in India. In this unit let us learn the meaning, need, objectives, and principles of Environmental Conservation. Conservation refers to the preservation or efficient use of resources. Longman dictionary defines conservation as "the protection of natural things such as animals, plants, forests, etc., to prevent them from being spoiled or destroyed". Human beings have a great responsibility to conserve the environment. Why do we need to Conserve the Environment? What are the Objectives and Principles of Environmental Conservation? Let us learn this in detail in this unit.

2.3.3. Learning Points and Learning Activities

2.3.3.1. Environmental Conservation

Concept of Conservation

Merriam-Webster Dictionary defines Conservation as;

- the protection of animals, plants, and natural resources
- the careful use of natural resources (such as trees, oil, etc.) to prevent them from being lost or wasted
- the things that are done to keep works of art or things of historical importance in good condition

So, Conservation means the wise management of resources to provide a continuous supply for a long time into the future. This implies the continuous renewal of a resource and recovering, recycling, or reusing the products. Conservation of a natural area means its maintenance in a natural state for enjoyment or study to understand and appreciate the complexities of ecological laws.

Conservation may also be defined as the achievement of the highest sustainable quality of living for mankind by the rational utilization of the environment, protection of nature to enrich the life of man, and the control or elimination of environmental pollution in its many manifestations. Conservation advocates practices that will perpetuate the resources of the earth on which man depends or in whose continued existence he takes an interest. Conservation derives its tenets from the knowledge of ecology, the science concerned with the interrelationship between living things and their environment. *Conservation of ecology*, maintaining the delicate balance of an ecosystem or set of wildlife to ensure population numbers of threatened or endangered species. There is much to do when it comes to rebuilding and protecting what's left of natural resources and the biodiversity within our ecosystems.

Thus, Conservation is a broad concept that involves not only scientific but ethical, moral, economic, and political aspects as well. Conservation deals with judicious development and the manner of use of natural resources of all kinds.

Environmental Conservation

Environmental conservation is an umbrella term that defines anything we do to protect our planet and conserve its natural resources so that every living thing can have an improved quality of life.

Environmental conservation is the practice of us humans to save the environment from collapsing, such as loss of species, ecosystems due to pollution, and human activities. This helps both trees and animals since some of us are dependent on them to survive. Its objectives are to conserve natural resources and the existing natural environment and, where possible, to repair damage and reverse trends.

2.3.3.2. Need for Conservation

Conservationists have a vision that development is necessary for a better future, but only when the changes occur in ways that are not wasteful. Biological data demonstrates that wildlife species are vanishing faster than ever before in Earth's history, while the average global temperature is dangerously rising. The glaciers are melting, extreme weather events are becoming more common and if necessary, steps are not taken immediately to conserve the environment, humans and other species on earth are at high risk due to an unprecedented climate change which may threaten the very existence of life. Although the planet's climate is known to go through cycles and to change dramatically in the past as well, the climate change we are already witnessing is primarily a result of human activities. It is seen that scientific progress has enabled human beings to harness natural resources of nature for their wellbeing. Thus, environmental conservation is the need of the hour.

Why do we need conservation? The following are the reasons for the urgent need for Conservation….

- World population is increasing at an alarming rate
- World resources (air, water, soil, life forms, etc.) are being used up at an increasing rate due- to increase in population
- Pollution is increasing with the passage of time and damage caused by human activities is sometimes irreversible
- Solar energy, wind energy, etc. are considered under reversible resources but because of increasing population, urbanization, industrialization, these resources are not enough for human activities.

The need for Environmental Conservation

- To conserve the natural resources.
- To maintain clean, pollution-free air, water, and land.
- To maintain balance in nature.
- To solve natural and artificial problems.
- To protect and conserve biodiversity.
- To give the quality of life and sustainable future to the next generations.
- **To protect wildlife:** The most obvious reason for conservation is to protect wildlife and promote biodiversity. Protecting wildlife and preserving it for future generations and we can maintain a healthy and functional ecosystem.
- Some species cannot survive outside of their natural habitat without human intervention such as in zoos and aquariums. So, the destruction of their natural habitats poses a real threat to their survival. Furthermore, species that migrate and inhabit more than one natural habitat are also vulnerable. So, the preservation of these habitats helps to prevent the entire ecosystem from being harmed.
- As more and more species face extinction, the work being done to protect the wildlife that calls this planet home is becoming more and more important.
- **To protect the earth:** It's no secret that the future of our planet desperately needs to be safeguarded, with climate change already wreaking havoc on our natural environment. To preserve the earth for future generations, we not only need to reduce the amount of harm that human activities have on the environment but support the natural world as much as we can.
- Nature itself is our biggest tool in the fight against global warming, and through conservation work, we can fully utilise nature's contribution to the mitigation action that is needed to avoid a catastrophic increase in temperature.
- Everything from tropical forests to our coastline has a part to play in the fight against climate change, as well as protecting our communities. So, it's important to do all that we can to protect them.
- **For human health:** One big reason for conservation work that is talked about a little less often is the impact that it has on human health. Both in terms of preventing the emergence of new diseases and the production of medicines that we rely upon. Having wild habitats for animals serves as a barrier. It prevents emerging infectious diseases from jumping from animals to humans. Previously undisturbed habitats have been cleared to make way for humans and agriculture. This has brought wild and domestic animals together and helped to facilitate the jump of diseases to humans.

Need for Conservation of Natural Resources

A resource is any natural or artificial substance or energy that can be used for the benefit of mankind. Natural resources are those which exist in the environment naturally, that is, they are not created by humans. They are soil, water, sunlight, wind, plants, coal, etc.

Natural resources are classified further into exhaustible and inexhaustible resources. Exhaustible resources are those which are limited and will be exhausted with continuous usage, for example, coal, natural gas, etc. whereas inexhaustible resources are those which cannot be depleted by human consumption, for example, wind power and water power, etc.

As the population of the world is increasing at an alarming rate, the consumption of natural resources is also increasing. Hence, these resources should be conserved to maintain ecological balance and save them for future generations. The proper management of a resource to prevent its destruction or exploitation is called conservation.

Nature provides us with all the essentials for our daily needs. Due to overpopulation and human negligence we started to over-exploit our resources. If this continues, there will no resources left for our future generation. The needs to conserve the resources are

- To support life by supporting ecological balance
- To ensure that the future generations will be able to access the resources
- To preserve the biodiversity
- To make sure the human race survives.

The Need for Conserving Biodiversity

Environmental conservation doesn't just mean protecting cute animals on the other side of the world. It is essential to our survival. Conserving biodiversity is necessary and is important for Agriculture, fishing, and our climate.

1. Importance to agriculture

Agriculture depends on the environment and we depend on agriculture. This is obvious in countries where the economies depend on agriculture but apply to all. A country's wealth might come from something else but its population needs to eat. Conserving the environment and preventing soil erosion, desertification, and flooding is essential. Unsustainable farming techniques not only impact natural ecosystems but also ultimately make farming itself impossible.

2. Importance to fishing

While much of our food comes from agriculture, the oceans are also an essential source. Communities worldwide depend upon seafood. Marine conservation is vital to protect human food supplies as well as marine animals. Looking after the seas doesn't just mean saving big, glamorous animals from extinction, important as this is. At the moment serious conservation issues are affecting the oceans, including overfishing and pollution. The complex, interlinked ecosystems need conserving in our self-interest. You might not be interested in saving the whale, but saving the human might strike a chord.

3. Importance to climate

Human activities impact the climate, and this affects all life. Droughts, floods, and extremes of heat and cold are caused by global warming, which is almost certainly linked to greenhouse gas emissions. Some countries are already experiencing disastrous effects, while in others it is just, for the moment, inconvenient. There are other, more local, climate

changes also caused by not treating the environment with respect. For example, rainfall is affected by deforestation. Conservation of natural environments should be done not just for their own sake, but also for that of the world as a whole.

Need for Wildlife Conservation

1. Value as a genetic reservoir: Plants and animals possess undiscovered or undeveloped traits that are very important for the survival of a particular species. When all the genes of all the individual members in a given population are added together, a gene pool is created which is representative of that species.
2. It is important to preserve all gene pools as they might prove useful to us in the future. In any case, we do not know enough about interspecies relationships and ecosystem balance and its stability to allow any gene pool to get eroded or obliterated. Large gene pools are also important to agriculturists. All domestic crops and livestock have originated from native plants and animals. All those native species are still needed to provide the new genetic characteristics that we need to help solve our present and future food production problems. If steps are not taken to preserve endangered species then these gene pools will be swept away.
3. Value in maintaining ecosystem stability: As you know, the ecosystem includes abiotic factors like temperature, humidity, etc., and biotic factors like plants and animals. The ecosystems maintain a delicate balance of nature. Each species interacts with other species and plays a role in the transfer of energy and materials within and between ecosystems, hence each one, in its way, contributes to the stability of ecosystems. The function of a species whether plant or animal is very critical to ecosystem stability. As you know, the plants occupy the base of food webs, so the extinction of a single plant species may lead to the extinction of animal species dependent on that particular plant species. A species, lost here and there may be of little consequence for overall ecosystem stability, but in the long run, the cumulative effect of such losses may someday threaten our existence. If we think that each species by itself is dispensable, then bit by bit we will destroy the rich biological world in which we live.
4. Economic value: In our daily life, we use many things that are products of wildlife. Many plants have medicinal value, for example, we get, penicillin from Penicillium, quinine from Cinchona, morphine from the opium poppy. A chemical derived from the skeletons of shrimps, crabs, and lobsters may serve as preventive medicine against fungal infection.

   Important plant and animal genes are needed to improve domestic crops and livestock. Many genetic reservoirs located in the tropics and subtropics are the source of virtually all the common valuable plants and animals. They provide genetic material needed in the continual battle to improve plant and animal resistance. The loss of these centres could have a global impact on food supplies. Fish is a source of income to fishing lodges and sporting goods stores. Wildlife is a source of income for the recreation and tourism industry. The most popular tourist attractions are national and state parks and forests. Although the economic value of a given species may not be apparent, we cannot assert that a species has no economic value.

5. Aesthetic value: Aesthetic value of a species also promotes its preservation. For example, the taste of wild berries, the refreshing fragrance of wildflowers, and the softness of a bed of moss have no monetary value, but still, their aesthetic value compels us to preserve them.

6. Inherent value: Each species has a right to exist. So, if a species exists, then it has a fundamental right to continue to exist without being driven to extinction by human activities. The inherent value of a species cannot be measured merely by the extent to which human beings can get along without it.

Check Your Progress - 1

Choose the correct alternative

1. Environmental conservation is to protect and conserve _____
    1. Aesthetic values
    2. Natural resources
    3. Urbanization
    4. Industrialization

2. The most obvious reason for conservation is to _____
    1. protect wildlife and promote biodiversity
    2. protect microorganisms and promote socialisation
    3. protect the inherent value and promote digitalization
    4. None of the above

2.3.3.3. Objectives of Conservation

The following are the Objectives of Conservation

1. **To conserve the natural environment:** The natural environment encompasses all living and non-living things occurring naturally. Environment plays an important role in the healthy living of human beings. It matters because it is the only home that humans have, and it provides air, food, and other needs. Humanity's entire life support system depends on the well-being of all the environmental factors.
2. **To conserve natural resources:** Natural resources are resources that exist without the actions of humankind. This includes water (seas and freshwater), land, soils, rocks, forests (vegetation), animals (including fish), fossil fuels, and minerals. They are called Natural Resources and are the basis of life on earth. Natural Resources are important for the development of any country. For example, to generate energy, one needs fossil fuels; and for industrial development, we require mineral resources. ... Natural resources are getting scarce with the increasing population, so it is essential to conserve them.
3. **Protecting species from extinction:** The conservation of endangered species is important for humans as well. A well-balanced ecosystem purifies the environment, giving us clean air to breathe, a healthy water system to support diverse marine life, and arable land for agricultural production. ... When ecosystems fail, our health is at risk.
4. **Conserving, maintaining, and restoring habitats:** Habitat conservation is a management practice that seeks to conserve, protect, and restore habitats and prevent species extinction, fragmentation, or reduction in range. When we conserve and protect the natural habitat of wildlife species, we enrich our planet. To do so, we must keep the animals in their natural place. Conservation of natural habitats will also be beneficial for humans since it helps keep the essential watersheds intact and ensuring clean, freshwater.

5. **Preventing deforestation:** Keeping forests intact also helps prevent floods, increases the groundwater level and drought by regulating regional rainfall. And because many indigenous and forest peoples rely on tropical forests for their livelihoods, investments in reducing deforestation provide them with the resources they need for sustainable development without deforestation.
6. **Halting species extinction:** Humans can cause the extinction of a species through overharvesting, pollution, habitat destruction, the introduction of invasive species (such as new predators and food competitors), overhunting, and other influences. Explosive, unsustainable human population growth is an essential cause of the extinction crisis.
7. **Mitigating climate change:** Climate Change Mitigation refers to efforts to reduce or prevent the emission of greenhouse gases, either by reducing sources of these gases (for example, the burning of fossil fuels for electricity, heat, or transport) or enhancing the "sinks" that accumulate and store these gases, causes overall warming of the planet that is having impacts around the globe. Global greenhouse gas emissions need to drop by 55% by 2030, according to the UN. Right now, total emissions hover around 53.5 gigatons of equivalent carbon dioxide.
8. **Enhancing ecosystem services:** Ecosystem services are grouped into four broad categories: provisioning, such as the production of food and water; regulating, such as the control of climate and disease; supporting, such as nutrient cycles and oxygen production; and cultural, such as spiritual and recreational benefits. Ecosystem services are the benefits to people from nature. These benefits include food, water purification, carbon sequestration, soil stabilization, recreation, cultural values, among others.
9. **Protecting biological diversity:** The Convention on Biological Diversity is an international, multilateral environmental treaty whose three main objectives are to conserve biological diversity, promote the sustainable use of its components, and ensure the fair and equitable sharing of benefits arising from the use of genetic resources.
10. **Maintain environmental balance:** Ecological balance is a term used to describe the equilibrium between living organisms such as human being, plants, and animals as well as their environment. ... Therefore, this balance is very important because it ensures the survival, existence, and stability of the environment.
11. **To reduce pollution:** Reducing pollutants in the air is important for human health and the environment. Poor air quality has harmful effects on human health, particularly the respiratory and cardiovascular systems. Pollutants can also damage plants and buildings, and smoke or haze can reduce visibility.
12. **To maintain ecological balance:** Ecological balance is a term used to describe the equilibrium between living organisms such as human being, plants, and animals as well as their environment. ... Therefore, this balance is very important because it ensures the survival, existence, and stability of the environment.
13. **To utilize natural resources sustainably:** Sustainability is important for many reasons including Environmental Quality - To have healthy communities, we need clean air, natural resources, and a nontoxic environment.
14. **To save these natural resources for the future generation:** We need to conserve our Natural Resources because it is the main source of our daily needs. We need to conserve it because they are limited only. And if these resources are abused and harmed, we will have a short quantity of sources for food and living. ... Remember our future generation will need also our Natural Resources.

15. **Wildlife management:** More than management it Is the conservation of wildlife that is the need of the hour. The endangered species must be protected. This is done legally by the implementation of laws and policies. For example the Wild Life (Protection) Act, 1972.
16. **Reducing overfishing:** Overfishing is the removal of a species of fish from a body of water at a rate that the species cannot replenish in time, resulting in those species either becoming depleted or very under populated in that given area. NRDC works to end overfishing, rebuild depleted fisheries, and promote the long-term sustainability of fisheries through firm catch limits based on scientific evidence.
17. **Retain and improve open space resources that provide significant ecological and environmental benefits:** Open space is any open piece of land that is undeveloped and is accessible to the public. Open space can include Green space (land that is partly or completely covered with grass, trees, shrubs, or other vegetation). An open space reserve (also called open space preserve, open space reservation, and green space) is an area of protected or conserved land or water on which development is indefinitely set aside.
18. **Preserve and maintain environmentally sensitive areas:** Eco-Sensitive Zones (SEZs) or Ecologically Fragile Areas (EFAs) are areas in India notified by the Ministry of Environment, Forests, and Climate Change (MEFCC), Government of India around Protected areas, National Parks and Wildlife Sanctuaries.

2.3.3.4. Principles of Conservation

Conservation is achieved through certain principles adopted in favour of a natural resource to increase its longevity and improve usage patterns. Some such principles are as follows:

1. Rational use of the resources is one of the concepts in the conservation of natural resources in an essentially undisturbed condition because they are of scientific interest, have aesthetic appeal or have recreational value. Preservation also serves an ecological purpose by maintaining the function of the total environment, for example, protection of forests assures a sustained yield of water into urban reservoirs, and protection of estuaries perpetuates ocean fishery. But rational use is not just preservation. It also implies the direct use of resources for their commodity or recreational value. Thus, harvesting of forest crops, livestock grazing of grassland, catching fish, and hunting wild animals can be considered a legitimate part of the rational use of natural resources, if they are carried out in such a way that the resource is perpetuated and not endangered.
2. The concept of sustained yield is involved in these activities. This means cropping the annual surplus of individuals so as not to endanger the breeding stock of game animals or fish. Similarly, tree cutting or grazing of grass should remove only the annual increment and no more.
3. Restoration is another important aspect of conservation. It is a widely familiar conservation measure that is essentially the correction of past careless activities that have impaired the productivity of the resource base. Deforested areas and mined and barren lands can be revegetated with some effort. Depleted animal and plant populations can recover if they are accorded protection. This measure is familiar in modem soil and water conservation practices applied to agricultural land. Restoration is possible, however, only as long as species are protected and genetic diversity of life is maintained. When species become extinct, the restoration of past conditions becomes impossible.

4. Protection of natural resources from commercial exploitation to prolong their use for recreation, watershed protection, and scientific study. This is the concept underlying the establishment and protection of parks and reserves of many kinds.
5. Reutilisation is the reuse of waste materials, as in the use of industrial water after it has been purified and cooled. The same process becomes recycling if the waste material requires minor treatment before it can be reused, as in the use of scrap iron in steel manufacture.
6. Substitution, an important conservation measure, has two aspects: (i) the use of a common resource instead of a rare one when it is for the same purpose, (ii) the use of a renewable rather than a non-renewable resource when conditions permit.
7. Allocation concerns the strategy of use--the best use of a resource. For many resources and their products, the market price decides as to the use a resource is put, but under certain instances, general welfare may dictate otherwise. The allocation of resources may be controlled by the government through the use of quotas, rationing, and outright permits.
8. Integration in resource management is a conservation measure because it maximizes over some time, the sum of goods and services that can be had from a resource, or a resource complex such as a river valley. This is preferable to maximize certain benefits from a single resource at the expense of other benefits or other resources. Integration is a central objective of planning.

Check Your Progress - 2

1. Which of the following is not the Objective of Conservation?
    1. Protecting biological diversity maintains environmental balance
    2. To reduce pollution
    3. Increasing overfishing

2. Which of the following is not the principle of conservation
    a. Reutilisation
    b. Restoration
    c. Misuse of the resources
    d. Protection of natural resources

2.3.4. Let us Summarise

- Conservation means the wise management of resources to provide a continuous supply for a long time into the future. This implies the continuous renewal of a resource and recovering, recycling, or reusing the products.

- Environmental conservation is the practice of us humans to save the environment from collapsing, such as loss of species, ecosystems due to pollution and human activities. Its objectives are to conserve natural resources and the existing natural environment and, where possible, to repair damage and reverse trends.

- Need of Environmental Conservation:
    - ✓ To conserve the natural resources.
    - ✓ To maintain clean, pollution-free air, water, and land.
    - ✓ To maintain balance in nature.
    - ✓ To solve natural and artificial problems.
    - ✓ To protect and conserve biodiversity.

- ✓ To give the quality of life and sustainable future to the next generations.
- ✓ To protect wildlife
- ✓ To protect the earth
- ✓ To support life by supporting ecological balance
- ✓ To ensure that the future generations will be able to access the resources
- ✓ To preserve the biodiversity
- ✓ To make sure the human race survives.

- Objectives of Conservation
  - ✓ To conserve the natural environment
  - ✓ To conserve natural resources
  - ✓ Protecting species from extinction
  - ✓ Conserving, maintaining, and restoring habitats
  - ✓ Preventing deforestation
  - ✓ Halting species extinction
  - ✓ Mitigating climate change
  - ✓ Enhancing ecosystem services
  - ✓ Protecting biological diversity resources.
  - ✓ Maintain environmental balance
  - ✓ To reduce pollution
  - ✓ To maintain ecological balance
  - ✓ To utilize natural resources in a sustainable way
  - ✓ To save these natural resources for the future generation
  - ✓ Wildlife management
  - ✓ Reducing overfishing
  - ✓ Retain and improve open space resources that provide significant ecological and environmental benefits
  - ✓ Preserve and maintain environmentally sensitive areas

- Principles of conservation
  - ✓ Rational use of the resources is one of the concepts in the conservation of natural resources in an essentially undisturbed condition because they are of scientific interest, have aesthetic appeal or have recreational value.
  - ✓ The concept of sustained yield means cropping the annual surplus of individuals so as not to endanger the breeding stock of game animals or fish.
  - ✓ Restoration is a widely familiar conservation measure that is essentially the correction of past careless activities that have impaired the productivity of the resource base.
  - ✓ Protection of natural resources from commercial exploitation to prolong their use for recreation, watershed protection, and scientific study.
  - ✓ Reutilisation is the reuse of waste materials, as in the use of industrial water after it has been purified and cooled.
  - ✓ Substitution, an important conservation measure, has two aspects: (i) the use of a common resource instead of a rare one when it is for the same purpose, (ii) the use of a renewable rather than a non-renewable resource when conditions permit.
  - ✓ Allocation concerns the strategy of use--the best use of a resource. For many resources and their products, the market price decides as to the use a resource is put, but under certain instances, general welfare may dictate otherwise.

- ✓ Integration in resource management is a conservation measure because it maximizes over some time, the sum of goods and services that can be had from a resource, or a resource complex such as a river valley.

2.3.5. Answers to 'Check Your Progress - 1 and 2'

Check Your Progress - 1

1. b)
2. a)

Check Your Progress - 2

1. d)
2. c)

2.3.6. Unit end Exercises

1. Define "Conservation".
2. Why is there a strong need for environmental conservation? Give two reasons.
3. What are the important aims of conservation?

2.3.7. References

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Block 2 : India and Environmental Issues and Policies

Unit 4 : Environmental Conservation Measures taken in India

Unit Structure

2.4.1. Learning Objectives

After completing this Unit, the student teachers will be able to

- Explain the Environmental Conservation measures taken in India;
- Describe the legislations for Environmental Conservation;
- Explain the Schemes for Environmental Conservation; and
- Explain the Wildlife conservation initiatives by the Indian government.

2.4.2. Introduction

In the previous unit, you have learnt about the need, objectives, and principles of Environmental Conservation. It is not enough if we have a lot of knowledge about Environmental Conservation. There is a need to have appropriate legislation in the form of laws and rules to conserve our environment. In this unit let us learn about the Environmental legislation related to Environmental Conservation in India, which is a collection of many laws and regulations aimed at protecting the environment from harmful actions.

2.4.3. Learning Points and Learning Activities

2.4.3.1. Legislations for Environmental Conservation

2.4.3.1.1. Environmental laws

Environmental law is a collective term encompassing aspects of the law that protect the environment. A related but distinct set of regulatory regimes, now strongly influenced by environmental legal principles, focus on the management of specific natural resources, such as forests, minerals, or fisheries. Other areas, such as environmental impact assessment, may not fit neatly into either category but are nonetheless important components of environmental law.

In India, Environmental law is governed by the Environment Protection Act, 1986. This act is enforced by the Central Pollution Control Board and the numerous State Pollution Control Boards. Apart from this, there is also individual legislation specifically enacted for the protection of Water, Air, Wildlife, etc. Such legislation includes:

- The Water (Prevention and Control of Pollution) Act, 1974
- The Water (Prevention and Control of Pollution) Cess Act, 1977
- The Forest (Conservation) Act, 1980
- The Air (Prevention and Control of Pollution) Act, 1981
- Air (Prevention and Control of Pollution) (Union Territories) Rules, 1983
- The Biological Diversity Act, 2002 and the Wild Life Protection Act, 1972
- Batteries (Management and Handling) Rules, 2001
- Recycled Plastics, Plastics Manufacture, and Usage Rules, 1999
- The National Green Tribunal established under the National Green Tribunal Act of 2010 has jurisdiction over all environmental cases dealing with a substantial environmental question and acts covered under the Water (Prevention and Control of Pollution) Act, 1974.
- Water (Prevention and Control of Pollution) Cess Rules, 1978
- Ganga Action Plan, 1986
- The Forest (Conservation) Act, 1980
- Wildlife Protection Act, 1972
- The Public Liability Insurance Act, 1991 and the Biological Diversity Act, 2002.
- Basel Convention on Control of Transboundary Movements on Hazardous Wastes and Their Disposal, 1989 and Its Protocols
- Hazardous Wastes (Management and Handling) Amendment Rules, 2003

1. Pollution Control Laws

a. Environmental Assessment (EA) is the assessment of the environmental consequences (positive-negative) of a plan, policy, program, or actual projects before the decision to move forward with the proposed action. In this context, the term "environmental impact assessment" (EIA) is usually used when applied to actual projects by individuals or companies, and the term "strategic environmental assessment" (SEA) applies to policies, plans, and programmes most often proposed by organs of state. It is a tool of environmental management forming a part of project approval and decision-making. Environmental assessments may be governed by rules of administrative procedure regarding public participation and documentation of decision making and may be subject to judicial review.

b. The purpose of the assessment is to ensure that decision-makers consider the environmental impacts when deciding whether or not to proceed with a project. The International Association for Impact Assessment (IAIA) defines an environmental impact assessment as "the process of identifying, predicting, evaluating and mitigating the biophysical, social, and other relevant effects of development proposals before major decisions being taken and commitments made". EIAs are unique in that they do not require adherence to a predetermined environmental outcome, but rather they require decision-makers to account for environmental values in their decisions and to justify those decisions in light of detailed environmental studies and public comments on the potential environmental impacts.

c. The Ministry of Environment, Forests and Climate Change (MoEFCC) of India has been in a great effort in Environmental Impact Assessment in India. The main laws in action are the Indian Wildlife (Protection) Act (1972), the Water Act (1974), the Air (Prevention and Control of Pollution) Act (1981) and the Environment (Protection) Act (1986), and Biological Diversity Act (2002). The responsible body for this is the Central Pollution Control Board.

- Air quality laws govern the emission of air pollutants into the atmosphere. A specialized subset of air quality laws regulates the quality of air inside buildings. Air quality laws are often designed specifically to protect human health by limiting or eliminating airborne pollutant concentrations. Other initiatives are designed to address broader ecological problems, such as limitations on chemicals that affect the ozone layer, and emissions trading programs to address acid rain or climate change. Regulatory efforts include identifying and categorizing air pollutants, setting limits on acceptable emissions levels, and dictating necessary or appropriate mitigation technologies.
- Water quality laws govern the release of pollutants into water resources, including surface water, groundwater, and stored drinking water. Some water quality laws, such as drinking water regulations, may be designed solely regarding human health. Many others, including restrictions on the alteration of the chemical, physical, radiological, and biological characteristics of water resources, may also reflect efforts to protect aquatic ecosystems more broadly. Regulatory efforts may include identifying and categorizing water pollutants, dictating acceptable pollutant concentrations in water resources, and limiting pollutant discharges from effluent sources. Regulatory areas include sewage treatment and disposal, industrial and agricultural wastewater management, and control of surface runoff from construction sites and urban environments.
- Waste management laws govern the transport, treatment, storage, and disposal of all manner of waste, including municipal solid waste, hazardous waste, and nuclear waste, among many other types. Waste laws are generally designed to minimize or eliminate the uncontrolled dispersal of waste materials into the environment in a manner that may cause ecological or biological harm and include laws designed to reduce the generation of waste and promote or mandate waste recycling. Regulatory efforts include identifying and categorizing waste types and mandating transport, treatment, storage, and disposal practices.
- Environmental clean-up laws govern the removal of pollution or contaminants from environmental media such as soil, sediment, surface water, or groundwater. Unlike pollution control laws, clean-up laws are designed to respond after-the-fact to environmental contamination and consequently must often define not only the necessary response actions but also the parties who may be responsible for undertaking (or paying for) such actions. Regulatory requirements may include rules for emergency response, liability allocation, site assessment, remedial investigation, feasibility studies, remedial action, post-remedial monitoring, and site reuse.

2. Natural Resources Law

- Species protection: An endangered species is a species that is very likely to become extinct shortly, either worldwide or in a particular political jurisdiction. Endangered species may be at risk due to factors such as habitat loss, poaching, and invasive species. The International Union for Conservation of

Nature (IUCN), Red List lists the global conservation status of many species, and various other agencies assess the status of species within particular areas. Many nations have laws that protect conservation-reliant species which, for example, forbid hunting, restrict land development, or create protected areas. Some endangered species are the target of extensive conservation efforts such as captive breeding and habitat restoration.

- Water resources law (in some jurisdictions, shortened to "water law") in the field of law dealing with the ownership, control, and use of water as a resource. It is most closely related to property law and is distinct from laws governing water quality.
- Mining law is the branch of law relating to the legal requirements affecting minerals and mining. Mining law covers several basic topics, including the ownership of the mineral resource and who can work them. Mining is also affected by various regulations regarding the health and safety of miners, as well as the environmental impact of mining.
- Forestry laws govern activities in designated forest lands, most commonly concerning forest management and timber harvesting. Ancillary laws may regulate forest land acquisition and prescribed burn practices. Forest management laws generally adopt management policies, such as multiple-use and sustained yield, by which public forest resources are to be managed. Governmental agencies are generally responsible for planning and implementing forestry laws on public forest lands, and may be involved in forest inventory, planning, and conservation, and oversight of timber sales. Broader initiatives may seek to slow or reverse deforestation.
- Fisheries law is an emerging and specialized area of law. Fisheries law is the study and analysis of different fisheries management approaches such as catch shares e.g. Individual Transferable Quotas; TURFs; and others. The study of fisheries law is important to craft policy guidelines that maximize sustainability and legal enforcement. This specific legal area is rarely taught at law schools around the world, which leaves a vacuum of advocacy and research. Fisheries law also takes into account international treaties and industry norms to analyse fisheries management regulations. Besides, fisheries law includes access to justice for small-scale fisheries and coastal and aboriginal communities and labor issues such as child labour laws, employment law, and family law. Fisheries law also includes the study of aquaculture laws and regulations.

Check Your Progress - 1

Match the Acts in Column A with years in Column B

A	B
Indian Wildlife (Protection) Act	1981
The Water Act	1986
The Air (Prevention and Control of Pollution) Act	1972
Environment (Protection) Act	2002
Biological Diversity Act	1974

2.4.3.1.2. Important Legislations for Environment Protection

These important environmental legislations have been briefly explained below

a. The National Green Tribunal Act, 2010

The National Green Tribunal Act, 2010 (No. 19 of 2010) (NGT Act) has been enacted with the objectives to provide for the establishment of a National Green Tribunal (NGT) for the effective and expeditious disposal of cases relating to environmental protection and conservation of forests and other natural resources including enforcement of any legal right relating to the environment and giving relief and compensation for damages to persons and property and matters connected therewith or incidental thereto.

The Act received the assent of the President of India on June 2, 2010, and was enforced by the Central Government *vide* Notification no. S.O. 2569(E) dated October 18, 2010, with effect from October 18, 2010. The Act envisages the establishment of NGT to deal with all environmental laws relating to air and water pollution, the Environment Protection Act, the Forest Conservation Act, and the Biodiversity Act as having been set out in Schedule I of the NGT Act.

Consequent to the enforcement of the National Green Tribunal Act, 2010, the National Environment Tribunal Act, 1995 and the National Environment Appellate Authority Act, 1997 stand repealed. The National Environment Appellate Authority established under s 3(1) of the National Environment Appellate Authority Act, 1997stands dissolved, because of the establishment of the National Green Tribunal under the National Green Tribunal Act, 2010 *vide* Notification no. S.O. 2570(E) dated October 18, 2010.

b. The Air (Prevention and Control of Pollution) Act, 1981

The Air (Prevention and Control of Pollution) Act, 1981 (the "Air Act") is an act to provide for the prevention, control, and abatement of air pollution and the establishment of Boards at the Central and State levels to carry out the aforesaid purposes.

To counter the problems associated with air pollution, ambient air quality standards were established under the Air Act. The Air Act seeks to combat air pollution by prohibiting the use of polluting fuels and substances, as well as by regulating appliances that give rise to air pollution. The Air Act empowers the State Government, after consultation with the State Pollution Control Boards (SPCB), to declare any area or areas within the State as air pollution control area or areas. Under the Act, establishing or operating any industrial plant in the pollution control area requires consent from SPCBs. SPCBs are also expected to test the air in air pollution control areas, inspect pollution control equipment, and manufacturing processes.

c. The Water (Prevention and Control of Pollution) Act, 1974

The Water Prevention and Control of Pollution Act, 1974 (the "Water Act") has been enacted to provide for the prevention and control of water pollution and to maintain or restore the wholesomeness of water in the country. It further provides for the establishment of Boards for the prevention and control of water pollution to carry out the aforesaid purposes. The Water Act prohibits the discharge of pollutants into water bodies beyond a given standard and lays down penalties for non-compliance. At the Centre, the Water Act has set up the CPCB which lays down standards for the prevention and control of water pollution. At the State level, SPCBs function under the direction of the Central Pollution Control Board (CPCB) and the State Government.

Further, the Water (Prevention and Control of Pollution) Cess Act was enacted in 1977 to provide for the levy and collection of a cess on water consumed by persons operating and carrying on certain types of industrial activities. This cess was collected to augment the resources of the Central Board and the State Boards for the prevention and control of water pollution constituted under the Water (Prevention and Control of Pollution) Act, 1974. The Act was last amended in 2003.

d. The Environment Protection Act, 1986

The Environment Protection Act, 1986 (the "Environment Act") provides for the protection and improvement of the environment. The Environment Protection Act establishes the framework for studying, planning, and implementing long-term requirements of environmental safety and laying down a system of speedy and adequate response to situations threatening the environment. It is an umbrella legislation designed to provide a framework for the coordination of central and state authorities established under the Water Act, 1974 and the Air Act. The term "environment" is understood in a very wide term under s 2(a) of the Environment Act. It includes water, air, and land as well as the interrelationship which exists between water, air and land, and human beings, other living creatures, plants, micro-organisms, and property.

Under the Environment Act, the Central Government is empowered to take measures necessary to protect and improve the quality of the environment by setting standards for emissions and discharges of pollution in the atmosphere by any person carrying on an industry or activity; regulating the location of industries; management of hazardous wastes, and protection of public health and welfare. From time to time, the Central Government issues notifications under the Environment Act for the protection of ecologically-sensitive areas or issues guidelines for matters under the Environment Act.

In case of any non-compliance or contravention of the Environment Act, or of the rules or directions under the said Act, the violator will be punishable with imprisonment up to five years or with a fine up to Rs. 1, 00,000, or with both. In case of continuation of such violation, an additional fine of up to Rs 5,000 for every day during which such failure or contravention continues after the conviction for the first such failure or contravention will be levied. Further, if the violation continues beyond a period of one year after the date of conviction, the offender shall be punishable with imprisonment for a term which may extend to seven years.

e. Hazardous Waste Management Regulations

Hazardous waste means any waste which, because of any of its physical, chemical, reactive, toxic, flammable, explosive, or corrosive characteristics, causes danger or is likely to cause danger to health or environment, whether alone or when in contact with other wastes or substances.

There are several legislations that directly or indirectly deal with hazardous waste management. The relevant legislations are the Factories Act, 1948, the Public Liability Insurance Act, 1991, the National Environment Tribunal Act, 1995, and rules and notifications under the Environmental Act. Some of the rules dealing with hazardous waste management are discussed below:

- Hazardous Wastes (Management, Handling, and Transboundary) Rules, 2008, brought out a guide for manufacture, storage, and import of hazardous chemicals and management of hazardous wastes.

- Biomedical Waste (Management and Handling) Rules, 1998, were formulated along parallel lines, for proper disposal, segregation, transport, etc., of infectious wastes.
- Municipal Solid Wastes (Management and Handling) Rules, 2000, aim at enabling municipalities to dispose of municipal solid waste scientifically.

Because of the short-comings and overlapping of some categories causing inconvenience in implementation of the Biomedical Waste (Management and Handling) Rules, 1998 as well as the Municipal Solid Wastes (Management and Handling) Rules, 2000, the Ministry of Environment, Forest and Climate Change has formulated the draft Bio-Medical Waste (Management & Handling) Rules, 2015 (Draft BMW Rules) and the draft Solid Waste Management Rules, 2015 (Draft SWM Rules) and sought comments on the draft Rules.

The Draft BMW Rules are to replace the Biomedical Waste (Management and Handling) Rules, 1998, and the Draft SWM Rules are to replace the Municipal Solid Waste (Management and Handling) Rules, 2000. The objective of the Draft BMW Rules is to enable the prescribed authorities to implement the rules more effectively, thereby, reducing the bio-medical waste generation and also for its proper treatment and disposal and to ensure environmentally sound management of these wastes, and the Draft SWM Rules aim at dealing with the management of solid waste including it segregation at source, transportation of waste, treatment and final disposal.

- E-Waste (Management and Handling) Rules, 2011 were notified on May 1, 2011, and came into effect from May 1, 2012, with the primary objective to reduce the use of hazardous substances in electrical and electronic equipment by specifying the threshold for use of hazardous material and to channelize the e-waste generated in the country for environmentally sound recycling. The Rules apply to every producer, consumer or bulk consumer, collection centre, dismantler, and recycler of e-waste involved in the manufacture, sale, purchase, and processing of electrical and electronic equipment or components as detailed in the Rules.
- Batteries (Management & Handling) Rules, 2001 deal with the proper and effective management and handling of lead-acid battery waste. The Act requires all manufacturers, assemblers, re-conditioners, importers, dealers, auctioneers, bulk consumers, consumers, involved in the manufacture, processing, sale, purchase, and use of batteries or components thereof, to comply with the provisions of Batteries (Management & Handling) Rules, 2001.

f. Other Laws Relating to Environment

Besides, there are many other laws relating to the environment, namely –

1. The Wildlife Protection Act, 1972 The Wild Life (Protection) Act, 1972 was enacted to effectively protect the wildlife of this country and to control poaching, smuggling, and illegal trade in wildlife and its derivatives. The Act was amended in January 2003 and punishment and the penalty for offenses under the Act have been made more stringent. The Ministry has proposed further amendments in the law by introducing more rigid measures to strengthen the Act. The objective is to protect the listed endangered flora and fauna and ecologically important protected areas.

2. The Forest Conservation Act, 1980

The Forest Conservation Act, 1980 was enacted to help conserve the country's forests. It strictly restricts and regulates the de-reservation of forests or the use of forest land for non-forest purposes without the prior approval of the Central Government. To this end, the Act lays down the pre-requisites for the diversion of forest land for non-forest purposes.

The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, recognises the rights of forest-dwelling Scheduled Tribes and other traditional forest dwellers over the forest areas inhabited by them and provides a framework for according the same. The Indian Forest Act, 1927 consolidates the law relating to forests, the transit of forest produce, and the duty leviable on timber and other forest produce.

3. Public Liability Insurance Act, 1991

The Public Liability Insurance Act, 1991 was enacted with the objectives to provide for damages to victims of an accident that occurs as a result of handling any hazardous substance. The Act applies to all owners associated with the production or handling of any hazardous chemicals.)

4. The Biological Diversity Act, 2002

The Biological Diversity Act 2002 was born out of India's attempt to realise the objectives enshrined in the United Nations Convention on Biological Diversity (CBD), 1992 which recognises the sovereign rights of states to use their Biological Resources. The Act aims at the conservation of biological resources and associated knowledge as well as sustainably facilitating access to them. The National Biodiversity Authority in Chennai has been established to implement the objects of the Act.

5. Coastal Regulation Zone Notification

The Ministry of Environment and Forests had issued the Coastal Regulation Zone Notification *vide* Notification no. S O. 19(E), dated January 06, 2011, to ensure livelihood security to the fishing communities and other local communities living in the coastal areas, to conserve and protect coastal stretches, and to promote development sustainably based on scientific principles, taking into account the dangers of natural hazards in the coastal areas and sea-level rise due to global warming.

2.4.3.1.3. Schemes for Environmental Conservation

The Ministry of Environment, Forest, and Climate Change is implementing, certain schemes and act as remedial measures for the conservation of the environment and sustainable development of various ecosystems. The umbrella Scheme on Conservation of Natural Resources and Eco-systems through its different sub-schemes formulated for the protection of corals, mangroves, biosphere reserves, wetlands, and lakes conserve the natural resources and these eco-systems of the country. The sub-scheme of the National Plan for Conservation of Aquatic Ecosystems aims at the conservation of all aquatic eco-systems including lakes and wetlands of the country. National Afforestation Program and Green India Mission contribute towards the regeneration of degraded forests and their adjoining areas in the country. National River Conservation Program facilitates in improving the water quality of polluted stretches of rivers by preventing pollution loads from reaching the rivers through various pollution abatement works. National Coastal Management Programme ensures livelihood security to fishing and other local communities to conserve and protect coastal stretches and promotes coastal development based on scientific principles. National Mission on Himalayan Studies aims at focusing on the conservation of the Himalayan Ecosystem and

sustainable development of the Indian Himalayan Region. The Ministry also monitors the implementation of the United Nations Convention to Combat Desertification (UNCCD) and has been carrying out enabling activities and other obligations of the Convention. The program aims at networking and forging strategic partnerships among relevant Scientific Institutions and stakeholders for enhancing knowledge database and scientific inputs in reporting and revising desertification and land degradation. Collection, collation, and storage of subject-specific database on environmental issues for future retrieval and dissemination to all concerned for a sustainable quality of life for future generations are achieved through an Environmental Information System (ENVIS) Program of the Ministry.

The funding under the Central Sector Schemes is 100 percent from the Government of India. Under the Centrally Sponsored Schemes, as per the revised funding pattern from 2015-16 onwards, the Government of India's share is 50 percent for the rest of India and 80 percent for the North Eastern States and 3 Himalayan States i.e Jammu & Kashmir, Himachal Pradesh and Uttarakhand in the environment sector. The share of the Government of India is 60 percent for the rest of India in the schemes related to forestry and wildlife and 90 percent in respect of the North Eastern States and 3 Himalayan States.

a. National River Conservation Programme

National River Conservation Plan (NRCP) is a centrally funded scheme launched in 1995 aimed at preventing the pollution of rivers. It provides information about each state on the amount sanctioned under NRCP to which city and for what purpose. The objective of NRCP is to improve the water quality of the rivers, which are the major water sources in the country, through the implementation of pollution abatement works

The Ganga Action Plan (GAP) Phase - I was taken up as a 100% Centrally funded scheme and aimed at preventing the pollution of river Ganga and to improve its water quality. The river cleaning programme in the country was initiated with the launching of the Ganga Action Plan (GAP) in 1985. The pollution abatement works are implemented on a cost-sharing basis between the Centre and State Governments. The works include; collection, transportation, and treatment of municipal sewage, River Front Development (RFD), Low-Cost Sanitation (LCS), etc. Prevention and control of industrial pollution are being addressed by the Central and State Pollution Control Boards/Pollution Control Committee.

b. Sub-schemes of Conservation of Natural Resources and Eco-Systems

The Ministry of Environment, Forest, and Climate Change is implementing National River Conservation Programme, sub-schemes of Conservation of Natural Resources and Eco-Systems, National Afforestation Programme & Green India Mission, National Coastal Management Programme, National Mission on Himalayan Studies under Climate Change Program under the Central Sector & Centrally Sponsored Schemes of Government of India.

These schemes act as remedial measures for the conservation of the environment and sustainable development of various ecosystems. The umbrella Scheme on Conservation of Natural Resources and Eco-systems through its different sub-schemes formulated for the protection of corals, mangroves, biosphere reserves, wetlands, and lakes conserve the natural resources and these eco-systems of the country. The sub-scheme of the National Plan for Conservation of Aquatic Ecosystems aims at the conservation of all aquatic eco-systems including lakes and wetlands of the country. National Afforestation Program and Green India Mission contribute towards the regeneration of degraded forests and their adjoining areas in the country. National River Conservation Program facilitates in improving the water quality

of polluted stretches of rivers by preventing pollution loads from reaching the rivers through various pollution abatement works. National Coastal Management Programme ensures livelihood security to fishing and other local communities to conserve and protect coastal stretches and promotes coastal development based on scientific principles. National Mission on Himalayan Studies aims at focusing on the conservation of the Himalayan Ecosystem and sustainable development of the Indian Himalayan Region. The Ministry also monitors the implementation of the United Nations Convention to Combat Desertification (UNCCD) and has been carrying out enabling activities and other obligations of the Convention. The program aims at networking and forging strategic partnerships among relevant Scientific Institutions and stakeholders for enhancing knowledge database and scientific inputs in reporting and revising desertification and land degradation. Collection, collation, and storage of subject-specific database on environmental issues for future retrieval and dissemination to all concerned for a sustainable quality of life for future generations are achieved through an Environmental Information System (ENVIS) Program of the Ministry.

c. National Afforestation Programme & Green India Mission

The Ministry of Environment, Forest, and Climate Change (MOEFCC) is implementing plantation/afforestation schemes in the forest areas with a participatory approach. The plantation species under the schemes is selected by the implementing agencies/the members of Joint Forest Management Committees (JFMC) based on their needs, ecological conditions, and other local factors in consultation with the Forest Department. The native forest species are encouraged for plantation in the forest areas giving importance to trees with multiple uses. MOEFCC has not issued any specific direction for the plantation of fruit-bearing trees as it is decided by the JFM Committees considering local conditions and the micro plan of the area.

The overall objective of the National Afforestation Programme (NAP) scheme is ecological restoration of degraded forests and to develop the forest resources with peoples' participation, with a focus on improvement in livelihoods of the forest-fringe communities, especially the poor. NAP aims to support and accelerate the on-going process of devolving forest conservation, protection, management, and development functions to the Joint Forest Management Committees (JFMCs) at the village level, which are registered societies. The scheme is implemented by a three-tier institutional set up through the State Forest Development Agency (SFDA) at the state level, Forest Development Agency (FDA) at the forest division level, and JFMCs at the village level.

The major components of the scheme include afforestation under Seven plantation models, maintenance of previous years plantations, and Ancillary Activities like soil and moisture conservation activities (SMC), fencing, overheads, monitoring and evaluation (M&E), micro-planning, awareness-raising, Entry Point Activities (EPA), etc.

The National Afforestation and Eco-Development Board (NAEB), set up in August 1992, was responsible for promoting afforestation, tree planting, ecological restoration, and eco-development activities in the country, with special attention to the degraded forest areas and lands adjoining the forest areas, national parks, sanctuaries, and other protected areas as well as the ecologically fragile areas like the Western Himalayas, Aravallis, Western Ghats, etc.

Green India Mission (GIM) - National Mission for a Green India

The National Mission for Green India (GIM) is one of the eight Missions outlined under the National Action Plan on Climate Change (NAPCC). It aims at protecting; restoring and enhancing India's diminishing forest cover and responding to climate change by a combination of adaptation and mitigation measures.

Green India mission is one of the missions that come under the umbrella of NAPCC. Every country should arrest the downward spiral of climate change. Hence India as a responsible growing global power, India took up the responsibility of reducing the deleterious effects of climate change by launching different missions under NAPCC. Green India Mission is one of them. It was launched in 2014. The primary aim is to protect, restore, and enhance India's diminishing forest cover. This topic would be of importance in the IAS Exam for both Prelims and Mains.

Objectives of Green India Mission (GIM)

1. Growth in forest or tree cover to 5 million hectares (MHA) and increase the quality of forest cover in another 5 million hectares of forest or non-forest lands. There are separate sub-targets for a variety of forests and their ecosystems namely, grassland, dense forest, wetland, etc.
2. Increase the quality of degrading moderately dense forests – 1.5 million hectares (ha).
3. Ecologically restore open forests which are being degraded – 3 million hectares (ha)
4. Grasslands revival – 0.4 million hectares
5. Wetlands revival – 0.10 million hectares
6. Ecological restoration of shifting cultivation areas, mangroves, scrub, ravines, cold deserts, & abandoned mining areas – 1.8 million hectares with different sub-targets.
7. Increase in forest cover in urban areas and its outskirts – 0.20 million hectares.
8. Increase in forest and tree cover on marginal agricultural lands/fallows and other non-forest lands which comes under agroforestry – 3 million hectares.
9. Increase forest-based livelihood income for about 3 million households in and around these forest areas.
10. Increase Carbon Dioxide sequestration to a range of 50 to 60 million tonnes by 2020.

Implementation of Green India Mission (GIM)

At the national level implementation is done by the Ministry of Environment and Forests.

- The State Forest Development Agency will guide the mission at the state level.
- At the district level, the implementation will be done by the Forest Development Agency.
- The gram Sabha and various committees are the key institutions for planning and implementation at the village level.
- In urban areas, the ward level committees like Residents Welfare Association (RWA) linked to the municipality/municipal corporations facilitate planning and implementation under the mission.
- Potential to develop 1 lakh skilled local community youth who would provide support in community-based forest conservation. They would act as a bridge between the community and implementing agencies such as the forest department.

d. National Centre for Sustainable Coastal Management (NCSCM)

The National Centre for Sustainable Coastal Management (NCSCM), under the Ministry of Environment, Forest and Climate Change, Government of India has the following vision and mission that would aid in better protection, conservation, rehabilitation, management, and policy design of the coast. It would promote integrated and sustainable management of coastal and marine areas in India and advise the Union and States/ Union Territory Governments and other associated stakeholders on policy, and scientific matters relating to Integrated Coastal Management (ICZM)

Vision: Promote sustainable coasts through increased partnerships, conservation practices, scientific research, and knowledge management for the benefit and well-being of current and future generations

Mission and Role: Support integrated management of the coastal and marine environment for livelihood security, sustainable development, and hazard risk management by enhancing

- Knowledge
- Research and Advisory Support
- Partnerships and Network
- Coastal Community Interface

Consortium Partner Institutions: Fourteen institutions from coastal states have formed a consortium with NCSCM and signed the Anna University Declaration on 21 June 2010

Services Offered:

- Shoreline change assessment & coastal vulnerability assessment
- Coastal and marine environmental monitoring
- Mapping of coastal land use land cover
- Numerical modelling of near-coastal processes
- Preparation of Coastal Zone Management Plan (CZMP)
- Post-project monitoring for specific project sites
- Tourism Carrying capacity of islands and coastal areas
- Beach carrying capacity
- Coastal Regulation Zone maps at state and local levels
- Capacity building in Integrated Coastal Zone Management (ICZM)
- Preparation of Conservation Management Plan
- Sale of data Products
- Decision Support System for Coastal Management

e. National Mission on Himalayan Studies

Vision: To support the sustenance and enhancement of the ecological, natural, cultural, and socioeconomic capital assets and values of the IHR.

Mission: To launch and support innovative studies and related knowledge interventions (that do not tread on the beaten path) towards the sustenance and enhancement of the ecological, natural, cultural, and socio-economic capital assets and values of the IHR.

Goals: The NMHS envisages to work towards a set of linked and complementary goals including:

1. Fostering conservation and sustainable management of natural resources,
2. Enhancing supplementary and/or alternative livelihoods for IHR peoples and overall economic and ecological well-being of the region,
3. Controlling and preventing pollution in the region,
4. Fostering increased/augmented human and institutional capacities and the knowledge and policy environments in the region,
5. Strengthening, greening, and fostering the development of climate-resilient core infrastructure and basic services assets.

The objectives of the Mission include the following:

1. To build a body of scientific and traditional knowledge on the aforesaid indicative thematic areas
2. To build a network of practitioners (individual and institutions) engaged in working solutions to problems in the thematic areas
3. To demonstrate workable/implementable/replicable solutions to the problems in the thematic areas.

2.4.3.1.4. Wildlife Conservation Initiatives by Indian Government

India is one of the 17 mega diversities in the world and is home to 7.6% of all mammals, 12.6% of birds, 6.2% of reptiles, and 6.0% of flowering plant species. The country also has some of the most biodiverse regions on the planet and it comprises four of 35 biodiversity hotspots of the world like the Western Ghats, the Eastern Himalayas, Indo-Burma, and the Nicobar Islands in Sundaland. So far, the country's wildlife is preserved in 120+ national parks, 515 wildlife sanctuaries, 26 wetlands, and 18 Bio-Reserves, out of which 10 are part of the World Network of Biosphere Reserves. This large biodiverse land needs protection, and inarguably conservation is a mandatory measure.

Keeping in view the recent human encroachment, the Indian Government did take effective initiatives to conserve wildlife in the country, and amongst it, the most commendable initiative is the Wildlife Protection Act of 1972, which prohibits the trade of rare and endangered species. However, this is not the only laudatory measure taken by the Government of India (GOI), there is so much more that needs to be told about the schemes and projects that have helped the country maintain its rich wildlife. Here is a glance at the important wildlife conservation initiatives that GOI has taken:

1. Project Tiger: One of the most successful wildlife conservation ventures as 'Project Tiger' which was initiated way back in 1972, has not only contributed to the conservation of tigers but also of the entire ecosystem. This project was sponsored by the Ministry of Environment Forest and Climate Change. About 47 tiger reserves situated in more than 17 regions including Corbett National Park and Ranthambore National Park were part of this project which conducts assessments of several tigers, their habitat, hunting habits under the supervision of the Tiger Task Force. Project Tiger has seen significant success in the recovery of the habitat and increases in the population of the tigers in the reserve areas, from a scanty 268 in 9 reserves in 1972 to above 1000 in 28 reserves in 2006 to 2000+ tigers in 2016.

2. Project Elephant: Initiated in 1992 by the Government of India, Project Elephant aims at conserving elephants and their habitat and of migratory routes by developing scientific and planned management measures. Under the project welfare of the domestic elephants was also considered, issues like mitigation of human-elephant conflict were also taken care of. The project endeavored to strengthen the measures for the protection of elephants against poachers and unnatural death.

3. Crocodile Conservation Project: This project was yet another successful venture by the Government of India to conserve the Indian Crocodiles, whose species were on the verge of extinction. The project also contributed towards the conservation in a plethora of related fields. The main objectives of the crocodile project were to protect the remaining population of crocodiles and their natural habitat by establishing sanctuaries; to promote captive breeding; to improve management, and to involve the local people in the project intimately. It is worth noticing that with the initiation of the Crocodile Conservation Project, 4000 gharials/Aligator, 1800 mugger/crocodile, and 1500 saltwater crocodiles could be restocked.

4. UNDP Sea Turtle Project: To conserve the Olive Ridley Turtles, the UNDP (United Nations Development Programme) Sea Turtle Project was initiated by Wildlife Institute of India, Dehradun as the Implementing Agency in November 1999. The project was for 10 coastal states in India especially Odisha where it has contributed towards the preparation of a map of breeding sites of Sea Turtles; identification of breeding places and habitats along the coastline, and migratory routes taken by Sea Turtles. The project also helped in the development of guidelines to safeguard the turtle mortality rate and for tourism in sea turtle areas. Amongst the major achievements of the project is the demonstration of the use of Satellite Telemetry to locate the migratory route of sea turtles in the sea. Apart from these projects, GOI also has been handling projects like Vulture Conservation and India Rhino Vision (IRV) 2020.

5. Sea Turtle Project: MOEF initiated the Sea Turtle Conservation Project in collaboration with UNDP in 1999 with Wildlife Institute of India, Dehradun as the Implementing Agency. The objective of conservation of olive ridley turtles and other endangered marine turtles.

6. Indian Rhino Vision 2020: It Started in Phase 1 of IRV 2020 was carried out from 2005 to 2008. Its goal was to have a wild population of at least 3,000 Greater one-horned rhinos in the Indian state of Assam – spread over seven protected areas – by the year 2020.

7. Project Snow Leopard: This project was launched in 2009. The Objective was to safeguard and conserve India's unique natural heritage of high-altitude wildlife populations and their habitats by promoting conservation through participatory policies and actions.

8. Project Hangul: 'Hangul' (Kashmiri stag) is the only surviving species of the red deer family in Kashmir. The rare animal's strength fell from 5,000 at the beginning of last century to 900 in the 1980s, when militancy broke out in the border state. With the help of the World Wildlife Fund's 'Project Hangul' started in the '70s, their population had gone to 340 by the '80s. But it was short-lived. The objective of this project was to conserve 'Hangul' (Kashmiri Stag) in its natural habitat. Later the project was rechristened as "Save Kashmir's Red Deer Hangul" in 2009. Another attempt to save the Hangul was to breed it in captivity. Funds were sanctioned for captive breeding. Under the Species Recovery Programme, conservation breeding centers are opened at Sikargah Tral, Pulwama District, and Kangan. But they're not much progress on increasing the numbers.

9. Ganges Dolphin: This project started in 2016, the Wildlife Institute of India (WII) chalked out this project to develop a conservation action plan for the Gangetic River Dolphin to save the national aquatic animal from extinction. The project was aimed at ensuring a recovery plan of the Gangetic River Dolphin and their habitat in the country and engage stakeholders in the conservation of river ecosystems

Check Your Progress - 2

Fill in the blanks

1. The Western Ghats, the Eastern Himalayas are
    a. Biodiversity hotspots
    b. Project Hangul
    c. National Centres
    d. National Parks

2. National River Conservation Plan is
    a. Indian Rhino Vision
    b. Scheme for environmental conservation
    c. Green India Mission
    d. None of the above

2.4.4. Let us Summarise

Environmental law is a collective term encompassing aspects of the law that protect the environment.

In India, Environmental law is governed by the Environment Protection Act, 1986. This act is enforced by the Central Pollution Control Board and the numerous State Pollution Control Boards. Apart from this, there is also individual legislation specifically enacted for the protection of Water, Air, Wildlife, etc. Such legislation includes:

- The Water (Prevention and Control of Pollution) Act, 1974
- The Water (Prevention and Control of Pollution) Cess Act, 1977
- The Forest (Conservation) Act, 1980
- The Air (Prevention and Control of Pollution) Act, 1981
- Air (Prevention and Control of Pollution) (Union Territories) Rules, 1983
- The Biological Diversity Act, 2002 and the Wild Life Protection Act, 1972
- Batteries (Management and Handling) Rules, 2001
- Recycled Plastics, Plastics Manufacture, and Usage Rules, 1999
- The National Green Tribunal established under the National Green Tribunal Act of 2010 has jurisdiction over all environmental cases dealing with a substantial environmental question and acts covered under the Water (Prevention and Control of Pollution) Act, 1974.
- Water (Prevention and Control of Pollution) Cess Rules, 1978
- Ganga Action Plan, 1986
- The Forest (Conservation) Act, 1980
- Wildlife Protection Act, 1972
- The Public Liability Insurance Act, 1991 and the Biological Diversity Act, 2002.
- Basel Convention on Control of Transboundary Movements on Hazardous Wastes and Their Disposal, 1989 and Its Protocols
- Hazardous Wastes (Management and Handling) Amendment Rules, 2003

Pollution control laws

1. **Environmental Impact Assessment** is the assessment of the environmental consequences (positive-negative) of a plan, policy, program, or actual projects before the decision to move forward with the proposed action. Air quality laws govern the emission of air pollutants into the atmosphere. A specialized subset of air quality laws regulates the quality of air inside buildings.
2. **Water quality laws** govern the release of pollutants into water resources, including surface water, groundwater, and stored drinking water.
3. **Waste management laws** govern the transport, treatment, storage, and disposal of all manner of waste, including municipal solid waste, hazardous waste, and nuclear waste, among many other types.
4. **Environmental clean-up** laws govern the removal of pollution or contaminants from environmental media such as soil, sediment, surface water, or groundwater.

Natural resources law

1. **Species protection:** Deals with the protection of endangered species
2. **Water resources law** dealing with the ownership, control, and use of water as a resource.
3. **Mining law** is the branch of law relating to the legal requirements affecting minerals and mining.
4. **Forestry laws** govern activities in designated forest lands, most commonly concerning forest management and timber harvesting.
5. **Fisheries law** deals with the study and analysis of different fisheries management approaches.

Important legislation for environmental protection

- The National Green Tribunal Act, 2010 has been enacted with the objectives to provide for the establishment of a National Green Tribunal (NGT) for the effective and expeditious disposal of cases relating to environmental protection and conservation of forests and other natural resources including enforcement of any legal right relating to the environment and giving relief and compensation for damages to persons and property and matters connected therewith or incidental thereto.
- The Air (Prevention and Control of Pollution) Act, 1981 is an act to provide for the prevention, control, and abatement of air pollution and the establishment of Boards at the Central and State levels to carry out the aforesaid purposes.
- The Water (Prevention and Control of Pollution) Act, 1974 has been enacted to provide for the prevention and control of water pollution and to maintain or restore the wholesomeness of water in the country.
- The Environment Protection Act, 1986 provides for the protection and improvement of the environment.
- Hazardous Wastes Management Regulations Hazardous waste means any waste which, because of any of its physical, chemical, reactive, toxic, flammable, explosive, or corrosive characteristics, causes danger or is likely to cause danger to health or environment, whether alone or when in contact with other wastes or substances.

Other Laws Relating to Environment

- The Wildlife Protection Act, 1972 was enacted to effectively protect the wildlife of this country and to control poaching, smuggling, and illegal trade in wildlife and its derivatives.

- The Forest Conservation Act, 1980 was enacted to help conserve the country's forests. It strictly restricts and regulates the de-reservation of forests or the use of forest land for non-forest purposes without the prior approval of the Central Government.
- Public Liability Insurance Act, 1991 was enacted with the objectives to provide for damages to victims of an accident that occurs as a result of handling any hazardous substance.
- The Biological Diversity Act, 2002 aims at the conservation of biological resources and associated knowledge as well as sustainably facilitating access to them.

Schemes for environmental conservation

- National River Conservation Plan (NRCP) is a centrally funded scheme launched in 1995 aimed at preventing the pollution of rivers.
- Sub-schemes of Conservation of Natural Resources and Eco-Systems, act as remedial measures for conservation of the environment and sustainable development of various ecosystems.
- National Afforestation Programme & Green India Mission was responsible for promoting afforestation, tree planting, ecological restoration, and eco-development activities in the country, with special attention to the degraded forest areas and lands adjoining the forest areas, national parks, sanctuaries, and other protected areas as well as the ecologically fragile areas like the Western Himalayas, Aravallis, Western Ghats, etc.
- Green India Mission (GIM) aims at protecting; restoring and enhancing India's diminishing forest cover and responding to climate change by a combination of adaptation and mitigation measures.
- National Centre for Sustainable Coastal Management (NCSCM)Promote sustainable coasts through increased partnerships, conservation practices, scientific research, and knowledge management for the benefit and well-being of current and future generations
- National Mission on Himalayan Studies To support the sustenance and enhancement of the ecological, natural, cultural, and socioeconomic capital assets and values of the IHR.

Wildlife conservation initiatives by the Indian government

35 biodiversity hotspots of the world like the Western Ghats, the Eastern Himalayas, Indo-Burma, and Nicobar Islands in Sundaland. So far, the country’s wildlife is preserved in 120+ national parks, 515 wildlife sanctuaries, 26 wetlands, and 18 Bio-Reserves, out of which 10 are part of the World Network of Biosphere Reserves.

- Project Tiger
- Project Elephant
- Crocodile Conservation Project
- UNDP Sea Turtle Project
- Sea Turtle Project
- Indian Rhino Vision 2020
- Project Snow Leopard
- Project Hangul
- Ganges Dolphin

2.4.5. Answers to 'Check Your Progress - 1 and 2'

Answers to Check Your Progress - 1
Match the Acts in Column **A** with years in Column **B**

A	B
Indian Wildlife (Protection) Act	1972
The Water Act	1974
The Air (Prevention and Control of Pollution) Act	1981
Environment (Protection) Act	1986
Biological Diversity Act	2002

Answers to Check Your Progress - 2
Fill in the blanks

1. a)
2. b)

2.4.6. Unit end Exercises

- Explain the environmental conservation measures taken in India.
- Describe the legislations for environmental conservations.
- Explain the Schemes for environmental conservation.
- Explain the Wildlife conservation initiatives by Indian government.

2.4.7. References

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Block 2 : India and Environmental Issues and Policies

Unit 5 : Constitutional Amendments Made Environmental Laws

Unit Structure

2.5.1. Learning Objectives

After completing this Unit, the student teachers will be able to

- Explain the Constitutional amendments made Environmental Laws;
- Describe the legislations for Environmental Conservations;
- Explain the Schemes for Environmental Conservation; and
- Explain the Wildlife Conservation initiatives by the Indian government.

2.5.2. Introduction

In the previous unit, you have learnt about the Environmental conservation measures taken in India. To support the conservation of the Environment, Constitution was amended by the 42nd Amendment Act, 1976. By the amendment, Articles 48A and Article 51A (g) were inserted in the Constitution. Article 48A, interalia, provides that the State shall endeavour to protect and improve the environment. Let us learn more about these Constitutional amendments related to the Conservation of the Environment in this unit.

2.5.3. Learning Points and Learning Activities

2.5.3.1. Constitutional Amendments Made Environmental Laws

The year 1976 is remembered as a landmark for the Indian Constitution, because of the sweeping 42nd amendment. History often takes note of the introduction of the world's secular and socialist to the Preamble, done by the Indira Gandhi government amid the Emergency. For environmentalists, it stands out for making the environment part of the Constitution. The 42nd amendment introduced Article 48A, as part of the Directive Principles of State which read,

"The State shall endeavour to protect and improve the environment and to safeguard the forests and wildlife of the country."

Article 51A (g), part of the Fundamental Duties read, "It shall be the duty of every citizen of India... to protect and improve the natural environment..."

These two are often read together with Article 21A, the judicially enforceable right to life, by courts. Three widely different parts of the Constitution come together to not only safeguard the right to the environment but also the rights of the environment.

a. Environment Legislation and Amendments

In the Constitution of India, it is clearly stated that the state has to 'protect and improve the environment and to safeguard the forests and wildlife of the country'. It imposes a duty on every citizen 'to protect and improve the natural environment including forests, lakes, rivers, and wildlife'. Reference to the environment has also been made in the Directive Principles of State Policy as well as the Fundamental Rights.

The Department of Environment was established in India in 1980 to ensure a healthy environment for the country. This later became the Ministry of Environment and Forests in 1985. The constitutional provisions are backed by several laws – acts, rules, and notifications. The Environment Protection Act of 1986(EPA) came into force soon after the Bhopal Gas Tragedy and is considered umbrella legislation as it fills many gaps in the existing laws. Thereafter a large number of laws came into existence as the problems began arising e.g. Handling and Management of Hazardous Waste Rules in 1989. Following is a list of the environmental legislation that has come into effect:

1. General
2. Forest and wildlife
3. Water
4. Air

1. General

1986 – The Environment (Protection) Act authorizes the central government to protect and improve environmental quality, control and reduce pollution from all sources, and prohibit or restrict the setting and /or operation of any industrial facility on environmental grounds.

1986 – The Environment (Protection) Rules lays down procedures for setting standards of emission or discharge of environmental pollutants.

1989 – Hazardous waste (Management and Handling) Rules objective is to control generation, collection, treatment, import, storage, and handling of hazardous waste.

1989 – The Manufacture, Storage and Import of Hazardous Chemical Rules defines the terms used in this context, and sets up an Authority to inspect, once a year, the industrial activity connected with hazardous chemicals and isolated storage facilities.

1989 – The Manufacture, Use, Import, Export, and Storage of hazardous Micro-organisms/ Genetically Engineered Organisms or Cells Rules were introduced to protect the environment, nature, and health, in connection with the application of gene technology and microorganisms.

1991 – The Public Liability Insurance Act and Rules and Amendment, 1992 was drawn up to provide for public liability insurance to provide immediate relief to the persons affected by accident while handling any hazardous substance.

1995 – National environmental Tribunal Act has been created to award compensation for damages to persons, property, and the environment arising from any activity involving hazardous substances.

1997 – The National Environment Appellate Authority Act has been created to hear appeals concerning restrictions of areas in which classes of industries etc are carried out or prescribed subject to certain safeguards under the EPA (Environment Protection Act).

1998 – Biomedical waste (Management and Handling) Rules are legally binding on the health care institutions to streamline the process of proper handling of hospital waste such as segregation, disposal, collection, and treatment.

Forest and wildlife

1927 – Indian Forest Act and Amendment in 1984 is one of the many surviving colonial statutes. It was enacted to 'consolidate the law related to forest, the transit of forest produce and the duty leviable on timber and other forest produce.

1972 – Wildlife Protection Act, Rules 1973, and Amendment in 1991 provide for the protection of birds and animals and for all matters that are connected to it whether it be their habitat or the waterhole or the forest that sustain them.

1980 – The Forest (Conservation) Act and Rules 1981 provides for the protection of and the conservation of the forests.

3. Water

1882 – The Easement Act allows private rights to use a resource i.e. groundwater, by viewing it as an attachment to the land. It also states that all surface water belongs to the state and is a state property.

1897 – Indian Fisheries Act establishes two sets of penal offenses whereby the government can sue any person who uses dynamite or other explosive substance in any way (whether coastal or inland) with intent to catch or destroy any fish or poisons fish to kill.

1956 – The River Boards Act enables the states to enroll the Central Government in setting up an Advisory River Board to resolve issues in interstate cooperation.

1970 – Merchant Shipping Act aims to deal with waste arising from ships along with the coastal areas within a specified radius.

1974 – The Water (Prevention and Control of Pollution) Act establishes an institutional structure for preventing and abating water pollution. It establishes standards for water quality and effluent. Polluting industries must seek permission to discharge waste into effluent bodies. The Pollution Control Board (CPCB) was constituted under this act.

1977 – The Water (Prevention and Control of Pollution) Cess Act provides for the levy and collection of cesses or a fee on water-consuming industries and local authorities.

1978 – The Water (Prevention and Control of Pollution) Cess Rules contains the standard definitions and indicate the kind of and location of meters that every consumer of water is required to affix.

1991 – Coastal Regulation Zone Notification puts regulations on various activities, including construction, are regulated. It gives some protection to the backwaters and estuaries.

Air

1948 – Factories Act and Amendment in 1987 was the first to express concern for the working environment of the workers. The amendment in 1987 has sharpened its environmental focus and expanded its application to hazardous processes.

1981 – Air (Prevention and Control of Pollution) Act provides for the control and abatement of air pollution. It entrusts the power of enforcing this act to the Central Pollution Control Board.

1982 – Air (Prevention and Control of Pollution) Rules define the procedures of the meetings of the Boards and the powers entrusted to them.
1982 – Atomic Energy Act deals with radioactive waste.
1987 – Air (Prevention and Control of Pollution) Amendment Act empowers the central and state pollution boards to meet with grave emergencies of air pollution.
1988 – Motor Vehicles Act states that all hazardous waste is to be properly packaged, labeled, and transported.

Check Your Progress - 1
Explain the environment legislation and amendments

2.5.3.2. Constitutional Mandate for Environment Protection in India

1. Constitutional Position

A. Before the 42nd Amendment

The Constitution of India came into force on 26 January 1950. At that time it did not contain any specific provision dealing directly with the environment. The only provision which was of some significance was Article 47 of the Directive Principles of State Policy which reads:

"The State shall regard the raising of the level of nutrition and standard of living of its people and the improvement of public health as among its primary duties."

Article 21 of the Constitution which deals with the right to life and personal liberty was not of much help in the beginning as it was given a very restricted and narrow meaning. This article runs as follows:

"No person shall be deprived of his life or personal liberty except according to the procedure established by law."

But in due course of time, the problem of pollution and the environment started drawing the attention of environmentalists. In the year 1972 our Prime Minister late Mrs. Indira Gandhi attended the United Nations Conference on Human Environment and Development in Stockholm. In that conference, the following two resolutions were passed which are known as the Magna Carta of our environmental laws.

1. Man has the fundamental right to freedom, equality, and adequate conditions of life in an environment of a quality that permits a life of dignity and well-being; and
2. Man bears a solemn responsibility to protect and improve the environment for present and future generations.

B. 42nd Constitution Amendment and after

In 1976, under the leadership of late Mrs. Indira Gandhi, the Constitution's 42nd Amendment was passed and provisions regarding the protection of the environment were incorporated into it. In the Chapter of Directive Principles of State Policy, a new provision in the form of Article 48A was incorporated which runs as follows:

"48-A. Protection and Improvement of Environment and safeguarding of Forests and Wildlife. - The State shall endeavour to protect and improve the environment and to safeguard the forests and wildlife of the country."

Apart from this provision, a new provision in the form of "Fundamental Duties" as Article 51A was also incorporated by the 42nd Constitution amendment. Sub-clause (g) of Article 51A is important which provides:

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

The above-mentioned constitutional provisions impose two-fold responsibilities. On the one hand, they give the directive to the State for the protection and improvement of the environment and on the other, they cast a duty on every citizen to help in the preservation of the natural environment3.

The scope of Article 51A (g) was examined by the High Court of Rajasthan in the L. K. Koolwal case in the State of Rajasthan. Under the Rajasthan Municipalities Act, 1959, the Municipal Authority is charged with the primary duty "to clean public streets, sewers and all spaces and places, not being private property, which are open to the enjoyment of public, removing of noxious vegetation and all public nuisances and to remove filth, rubbish, night soil, odour or any other noxious or offensive matter." The petitioner L. K. Koolwal moved a writ petition under Article 226 of the Constitution before the Rajasthan High Court showing that the municipality has failed to discharge its "primary duty" resulting in the acute sanitation problem in the city of Jaipur which is hazardous to the life of the citizens of Jaipur. The High Court while pronouncing as the judge explained the true scope of Article 51A in the following terms:

"We can call Article 51A ordinarily as the duty of the citizens. But in fact, it is the right of the citizens as it creates the right in favor of citizens to move to the Court to see that the State performs its duties faithfully and the obligatory and primary duties are performed following the law of the land. Article 51-A gives a right to the citizens to move the Court for the enforcement of the duty cast on State instrumentalities, agencies, departments, local bodies and statutory authorities created under the peculiar law of the State."

Thus, Article 51-A has come as a boon so far as environmental protection is concerned. But its benefit can be availed of only if people are alive to their duties regarding the protection of the environment.

Article 51A(g) if read with Article 51A(j) it may give probably a better result Article 51A(j) reads as follows :

"It shall be the duty of every citizen of India to strive towards excellence in all spheres of individual and collective activity so that the nation constantly rises to higher levels of endeavour and achievements."

Strictly speaking, no constitution deals with a matter such as environmental protection. Because basically, any constitution contains only the rules of laws about the power structure, allocation, and manner of exercise. Besides the Indian Constitution is already a bulky document and brevity is the character of an ideal Constitution. Hence from the point of view of the principles of the constitutional law as well as, the length of the Constitution, it was impossible to have any such provision safeguarding the healthy environment. Therefore, till the subsequent amendments, the constitutional text of India was

without any specific provision for the protection and promotion of the environment. However, the seeds of such provision could be seen in Article 47 of the constitution which commands the State to improve the standard of living and public health. To fulfill this constitutional goal, the State must provide a pollution free environment.

In protecting the natural environment Article 48-A is of immense importance today. Because with the activist approach of the judiciary in India the legal value of Directive Principles jurisprudence has constantly grown up in the Indian Constitutional set-up. Hence the above provisions are of pivotal significance.

The Government of India to accelerate the pace for environment protection further amended the constitutional text by making the following changes.

a. Seventh Schedule of the Constitution

In the concurrent list, the 42nd Amendment is inserted.

1. Entry 17-A, providing for forests.
2. Entry 17-B, for the protection of wild animals and birds.
3. (Entry 20-A, providing for population control and family planning.

b. Eleventh Schedule of the Constitution

This new schedule was added by the Constitution 73rd Amendment Act, 1992, which received the assent of the President on 20.4.1993. This schedule has 8 entries (2, 3, 6, 7,11,12,15, and 29) providing for environmental protection and conservation.

c. Twelfth Schedule of the Constitution

The Entry-8 of this schedule added to the constitutional text by the 74 Amendment Acts, 1992, which received the assessment of the President on 20.4.1993 provides for the Urban Local bodies with the function of environment and promotion of ecological aspect to them.

Due to the above changes the division of legislative power between the Union and the States was spelt out in the following three lists of the 7th Schedule of the constitution.

List I (Union List) Entries	52. Industries
	53. Regulation and development of oil fields and mineral oil/resources
	54. Regulation of mines and mineral development.
	55. Regulation and development of inter-state rivers and river valleys.
	56. Fishing and fisheries beyond territorial waters.
List II (State List) Entries	6. Public health and sanitation.
	14. Agriculture protection against past and prevention of plant diseases.
	18. Land colonization etc.
	21. Fisheries.
	23. Regulation of Mines and Mineral development subject to the provisions of
	24. Industries subject to the provisions of

List III (Common or Concurrent List) Entries	17-A Forests.
	17-B Protection and wild animals and birds.
	20. Economic and social planning.
	20A Population control and family planning.

The Eleventh Schedule, added to the Constitution by the Constitution 73rd Amendment Act, 1992, assigns and functions of soil conservation, water management, social and form forestry, drinking water, fuel, and fodder, etc. to the Panchayats with a view to environmental management.

The 12th Schedule of the Constitution added by 74th Amendment Act, 1992 commands the Urban local bodies such as municipalities to perform the functions of protection of environment and promotion of ecological aspects.

The constitutional changes effected in the 7th Schedule by the 42nd Amendment Act, 1976 is a milestone step, in the direction of the protection of the environment. Because the subject of forests originally was in the State list as entry 19, this resulted in no uniform policy by the State to protect the forests. By placing the item 'forests' now in the concurrent list by the entry 17A, along with the State, Parliament has acquired a law-making power.

Because of the above change, to have a uniform policy in forest management the Government of India in the year 1980 set up the Ministry of Environment and Forests. By this change, Parliament also enacted, the central legislation i.e. Forest Conservation Act, 1980, which was amended in 1988. The government also adopted the new National Forest Policy in 1988 with a twin object. One to protect the forests and another to consider the needs of the forest dwellers.

Similarly, the insertion of the entry 20A in the concurrent list empowers the Parliament to regulate the population explosion, one of the prime causes of environmental pollution. By these changes, legally and constitutionally it has become possible to take uniform action in the matters of proper management of the environment.

2. Right to Environment as a Fundamental Right

The judiciary dynamic interpretation of fundamental rights has regulated into it the rights to a healthy environment from the following Articles:

(a) Article 14:	"State shall not deny to any person equality before the law or the equal protection of the laws within the territory of India."
(b) Article 19 (6):	State is empowered to make any law imposing in the interests of the general public, reasonable restrictions on the exercise of freedom to practice any profession, or to carry on any occupation, trade or business guaranteed by (1) (g).
(c) Article 21:	"No person shall be deprived of his life or personal liberty except according to procedure established by law".

The importation of the 'due process' clause by the activist approach of the Supreme Court in Maneka Gandhi's case has revolutionized the ambit and scope of the expression 'right to life' embodied in Article 21 of the Constitution. The right to live in a healthy environment is one more golden feather of Article 21. The right connotes that the enjoyment

of life and its attainment and fulfillment guaranteed by Article 21 embraces the protection and preservation of nature's gift without which life cannot be enjoyed. The Supreme Court of India, in 1980, indirectly conceived this right in a monumental judgment in the case of Ratlam Municipality V/s. Vardichand. In this case, the Bench of Justice V. R. Krishna Iyer and Justice Chinnappa Reddy held the neglect of sanitation of the town of Ratlam by the Municipal Council caused Health hazards.

The Court's decision was founded on its earlier decision in Govind V. Shanti Sarup, where Section 133 of the Code of Criminal Procedure was used by the Court to preserve the environment in the interest of "health, safety, and convenience of public at large".

In another landmark case, Rural Litigation and Entitlement Kendra Vs State of Uttar Pradesh although the Court has successfully read Article 21 in Article 48-A of Part IV of the Constitution. In this case, the Apex Court converted a letter into a written petition alleging that the operation of unauthorized and illegal, mining in the Mussorie-Dehradun belt affected the ecology of the areas and led to environmental disorder. The Bench consisting of Chief Justice P.N. Bhagwati (as he then was), Justice A.N. Sen, and Justice RanganathMisra ordered closing down of mining operations on the ground that limestone quarries operation causing ecological imbalance ad a hazard to a healthy environment.

From the jurist's process, it could be submitted that Court restrained itself from invoking Article 21 directly, but regarded the right to live in a healthy environment as a part of a fundamental right.

In M. C. Mehta V. Shriram Food and Fertilizer Industries and Union of India (Oleum Gas Leak Case-I) petitioner filed the writ against the oleum gas leakage and for closing down one of the units of Shriram Food and Fertilizers industries belonging to Delhi Cloth Mills Ltd. The Court allowed restarting the plant subject to certain stringent conditions laid down in the order. But the notable development is that the Court held that, can enterprise, engaged in any hazardous or inherently dangerous industry which could pose a threat to public health owned an absolute and non-delegable duty to the community to ensure that no harm resulted to anyone. Here again, Court did not refer to Article 21. But in the Oleum Gas Leak Case, M.C. Mehta Vs. Union of India, Chief Justice P. N. Bhagwati speaking for the Court treated the right to live in a healthy environment as a fundamental right under Article 21 of the Constitution.

These applications for compensation are for the enforcement of the fundamental rights to life enshrined in Article 21 of the Constitution.

In the ultimate analysis of the problem of environmental pollution and its solution it is submitted that no doubt, the legal, constitutional measures are necessary for the process of management of the proper and better environment. But it is not the ever-lasting solution. The ever-lasting solution is that it calls for the people's inner feeling for the protection of the environment, the environmental value system, the peoples' movement rather than a legal movement.

Hence, it calls for mass education and awareness. This aspect has been very rightly upheld by the Supreme Court in the case of M. C. Mehta V. Union of India. The peoples' collective conscience should wake up before the matter slips out of the hands. Each country

now must seriously strive for the maintaining of ecological balance, otherwise, tomorrow will be too late.

Although the expression 'environment' has not been expressly mentioned in the Constitution, there are many items in the legislative lists, which enable the Centre and the states to make law in the field of environment. It took a long time for the apex court to pronounce explicitly that the right to life under article 21 of the Constitution includes the right to live in a healthy environment. The courts often had to decide on the conflicts of rights between citizens. For instance, the freedom of speech and expression, the right to carry on a business, trade, or occupation; the freedom of religion; and above all the right to equality, are the areas where these conflicts arise in contra-distinction to the right to a healthy environment under article 21, The freedom of interstate commerce was also adverted to. There were also conflicts between Central legislation and state legislations. The constitutional mandate under directive principles and the fundamental duty to protect and improve the environment has a substantial role to play in reconciling these conflicts.

3. Ecological Balance

Do the new dimensions of the right to life extend to the right to health and other hygienic conditions? The Rural Litigation and Entitlement Kendra v. State of Uttar Pradesh is the first case where the Supreme Court attempted to look into this question. It ordered the closure of mining operations in certain areas, though in certain other areas it allowed them to be phased out in due course. Notably, the court considered the hardship caused to the lessees but was of the view that it is a price that has to be paid for protecting and safeguarding the right of the people to live in a healthy environment with minimal disturbance to ecological balance. For rehabilitation of the lessees, it was suggested that preference must be given to them when mining leases were granted in other areas of the state.

The case was filed under article 32 of the Constitution, and orders were given with emphasis on the need to protect the environment. The court was evolving a new right to environment, without specifically mentioning it.

Check Your Progress - 2

Explain Right to Environment as a fundamental right

2.5.3.3. Environmental Law Amendments

The five laws related to environmental protection and wildlife are:

1. The Environment (Protection) Act, 1986;
2. The Forest (Conservation) Act, 1980;
3. The Wildlife Protection Act, 1972;
4. Water (Prevention and Control of Pollution) Act, 1974; Air (Prevention and Control of Pollution) Act, 1981

The amendments related to the above laws are explained below.

1. The Environment (Protection) Act, 1986: It empowers the Central Government to establish authorities charged with the mandate of preventing environmental pollution in all its forms and to tackle specific environmental problems that are peculiar to different parts of the country. The Act was last amended in 1991. This Act also authorizes the central government to protect and improve environmental quality, control and reduce pollution from all sources, and prohibit or restrict the setting and /or operation of any industrial facility on environmental

grounds. The Environment (Protection) Act was enacted in 1986 to provide for the protection and improvement of the environment.

2. The Forest (Conservation) Act, 1980: Is an Act of the Parliament of India to provide for the conservation of forests and for matters connected therewith or ancillary or incidental thereto. It was further amended in 1988. It was enacted by the Parliament of India to control further deforestation of Forest Areas in India. In 1992, some amendments were made in the Act which made provisions for allowing some non-forest activities in forests, without cutting trees or limited cutting with prior approval of Central Govt. These activities are the setting of transmission lines, seismic surveys, exploration, drilling, and hydroelectric projects. The last activity involves large scale destruction of the forest, for which prior approval of the Centre is necessary.

3. The Wildlife Protection Act, 1972: Provides the legal framework for the protection of various species of wild animals, management of their habitat, and also for the regulation and control of trade in the products derived from wild animals. The Act has been amended from time to time.

The Union Cabinet approved the following amendments to the Wild Life (Protection) Act, 1972:

i. Amendment to Section 2	Definitions of 'Gram Sabha', 'Panchayat', and 'Scheduled Areas' have been added to the Act.
ii. Amendment to Section 18	Provisions for having consultation with Gram Sabha in the event of the intention of the State Government for declaration of a Sanctuary has been included in the Act.
iii. Amendment to Section 22	Records of the Gram Sabha and the Panchayat during the inquiry by the Collector on the claims to be considered by him during the process of notification of the Sanctuary.
iv. Amendment to Section 33	Consultation with the Gram Sabha concerned for management and maintenance of a Sanctuary has been made mandatory.
v. Amendment to Section 35	Provisions for having consultation with Gram Sabha in the event of the intention of the State Government for declaration of a National Park has been included in the Act.
vi. Amendment to Section 36D	Representative of Panchayat or tribal community have been included in the Community Reserve Management Committee.
vii. Amendment to Section 38	Provision for having consultation with Gram Sabha in the event of declaration of a National Park by the State Government has been included in the Act.

The Ministry of Panchayati Raj had advised additional amendments to these Sections.

4. Water (Prevention and Control of Pollution) Act, 1974: This cess is collected to augment the resources of the Central Board and the State Boards for the prevention and control of water pollution constituted under the Water (Prevention and Control of Pollution) Act, 1974. The Act was last amended in 2003.

1. **Air (Prevention and Control of Pollution) Act, 1981:** This Act was amended as follows. (1) This Act may be called the Air (Prevention and Control of Pollution) Amendment Act, 2018. (2) It shall come into force on such date as the Central Government may, by notification in the Official Gazette, appoint.

Check Your Progress - 3

Choose the correct answer

1. The article that says "It shall be the duty of every citizen of India to protect and improve the natural environment…and to have compassion for living creatures" is
   a) Article 42
   b) Article 48A
   c) Article 51A(g)
   d) Article 47

2. Water (Prevention and Control of Pollution) Act, 1974 was last amended in
   a) 2003
   b) 1964
   c) 2006
   d) 2020

2.5.4. Let us Summarise

- Constitutional amendments made environmental laws: The 42nd amendment introduced Article 48A, part of the Directive Principles of State which read,
- "The State shall endeavour to protect and improve the environment and to safeguard the forests and wildlife of the country." Article 51A (g), part of the Fundamental Duties read, "It shall be the duty of every citizen of India... to protect and improve the natural environment..."
- Environment Legislation and Amendments: In the Constitution of India, it is clearly stated that the state must 'protect and improve the environment and to safeguard the forests and wildlife of the country'. It imposes a duty on every citizen 'to protect and improve the natural environment including forests, lakes, rivers, and wildlife'. Reference to the environment has also been made in the Directive Principles of State Policy as well as the Fundamental Rights.

Following is a list of the environmental legislation that has come into effect:

1. General

1986 – The Environment (Protection) Act
1986 – The Environment (Protection) Rules
1989 – Hazardous waste (Management and Handling) Rules
1989 – The Manufacture, Storage and Import of Hazardous Chemical Rules
1989 – The Manufacture, Use, Import, Export, and Storage of hazardous Micro-organisms/ Genetically Engineered Organisms or Cells Rules
1991 – The Public Liability Insurance Act and Rules and Amendment, 1992
1995 – National environmental Tribunal Act
1997– The National Environment Appellate Authority Act
1998 - Biomedical waste (Management and Handling) Rules

2. Forest and wildlife
1927 – Indian Forest Act and Amendment in 1984
1972 – Wildlife Protection Act, Rules 1973 and Amendment in 1991
1980– The Forest (Conservation) Act and Rules 1981

3. Water
1882 – The Easement Act
1897– Indian Fisheries Act
1956 – The River Boards Act
1970 – Merchant Shipping Act
1974 – The Water (Prevention and Control of Pollution) Act
1977 – The Water (Prevention and Control of Pollution) Cess Act
1978 – The Water (Prevention and Control of Pollution) Cess Rules
1991– Coastal Regulation Zone Notification

4. Air
1948 – Factories Act and Amendment in 1987
1981 – Air (Prevention and Control of Pollution) Act
1982 – Air (Prevention and Control of Pollution) Rules
1982 – Atomic Energy Act
1987– Air (Prevention and Control of Pollution) Amendment Act
1998- Motor Vehicles Act

I. Constitutional mandate for environment protection in India: Constitutional Position

a. Before the 42nd Amendment

The Constitution of India came into force on 26 January 1950. At that time, it did not contain any specific provision dealing directly with the environment. The only provision which was of some significance was Article 47 of the Directive Principles of State Policy which reads:

"The State shall regard the raising of the level of nutrition and standard of living of its people and the improvement of public health as among its primary duties."

b. 42nd Constitution Amendment and after

In 1976, under the leadership of late Mrs. Indira Gandhi, the Constitution's 42nd Amendment was passed and provisions regarding the protection of the environment were incorporated into it. In the Chapter of Directive Principles of State Policy, a new provision in the form of Article 48A was incorporated which runs as follows:

"48-A. Protection and Improvement of Environment and safeguarding of Forests and Wildlife. - The State shall endeavour to protect and improve the environment and to safeguard the forests and wildlife of the country."

The Government of India to accelerate the pace for environment protection further amended the constitutional text by making the following changes.

1. Seventh Schedule of the Constitution

In the concurrent list, the 42nd Amendment is inserted.

1. Entry 17-A, providing for forests.
2. Entry 17-B, for the protection of wild animals and birds.
3. Entry 20-A, providing for population control and family planning.

2. Eleventh Schedule of the Constitution

This new schedule was added by the Constitution 73rd Amendment Act, 1992, which received the assent of the President on 20.4.1993. This schedule has 8 entries (2, 3, 6, 7,11,12,15, and 29) providing for environmental protection and conservation.

3. Twelfth Schedule of the Constitution

The Entry-8 of this schedule added to the constitutional text by the 74 Amendment Acts, 1992, which received the assessment of the President on 20.4.1993 provides for the Urban Local bodies with the function of environment and promotion of ecological aspect to them.

Due to the above changes the division of legislative power between the Union and the States was spelt out into three lists of the 7th Schedule of the constitution.

II. Right to Environment as a Fundamental Right

The judiciary dynamic interpretation of fundamental rights has regulated into it the rights to a healthy environment from the following Articles:

a. Article 14: "State shall not deny to any person equality before the law or the equal protection of the laws within the territory of India."

b. Article 19 (6): State is empowered to make any law imposing in the interests of the general public, reasonable restrictions on the exercise of freedom to practice any profession, or to carry on any occupation, trade or business guaranteed by (1) (g).

c. Article 21: "No person shall be deprived of his life or personal liberty except according to the procedure established by law".

Environmental law amendments: The laws related to environmental protection and wildlife are:

- The Environment (Protection) Act, 1986;
- The Forest (Conservation) Act, 1980;
- The Wildlife Protection Act, 1972;
- Water (Prevention and Control of Pollution) Act, 1974;
- Air (Prevention and Control of Pollution) Act, 1981

The Union Cabinet approved the following amendments to the Wild Life (Protection) Act, 1972:

- Amendment to Section 2
- Amendment to Section 18
- Amendment to Section 22
- Amendment to Section 33
- Amendment to Section 35
- Amendment to Section 36D
- Amendment to Section 38

The Ministry of Panchayati Raj had advised additional amendments to these Sections.

- Water (Prevention and Control of Pollution) Act, 1974
- Air (Prevention and Control of Pollution) Act, 1981

2.5.5. Answers to 'Check Your Progress - 1, 2 and 3'

Check Your Progress - 1
Refer Section 2.5.3.1 of self-instructional material

Check Your Progress - 2
Refer section 2.5.3.2. of Instructional material

Check Your Progress - 3

1. c)
2. a)

2.5.6. Unit end Exercises

- Explain the Constitutional amendments made environmental laws.
- Describe the legislation for environmental conservation.
- Explain the Schemes for environmental conservation.
- Explain the Wildlife conservation initiatives taken by the Indian government.

2.5.7. References

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Block 2 : India and Environmental Issues and Policies

Unit 6 : Environmental Movements and Developments In India

Unit Structure

2.6.1. Learning Objectives

After completing this Unit, the student teachers will be able to

- Explain the environmental movements and developments in India;
- Describe forest-based environmental movements in India;
- Explain the River-based environmental movements in India; and
- Explain the Other Environmental movements in India.

2.6.2. Introduction

In the previous unit, we have learnt about the Constitutional amendments made to Environmental Laws. As you are aware that these amendments were a result of active people's initiative. In this unit let us learn about the Environmental movements and developments in India. The environmental movement is a global movement that favours the sustainable management of natural resources. It often stresses the protection of the environment via changes in public policy. Many environmental movements are centred on ecology and focused on the welfare of the environment, seeks to protect and conserve the elements of the earth's ecosystem.

The original concepts of the environmental movement originated in the mid-19th century in Europe as a response to the Industrial Revolution. The first seed of an environmental movement in India was the foundation in 1964 of Dasholi Gram Swarajya Sangh, a labour cooperative started by Chandi Prasad Bhatt. One of the largest and most successful environmental campaigns, Narmada Bachao Andolan began with a wide developmental agenda, questioning the very rationale of large dam projects in India" In this unit let us learn in detail about major environmental movements in India.

2.6.3. Learning Points and Learning Activities

2.6.3.1. Environmental Movements in India

a. Environmental movements

Environmental Movement is a diverse scientific movement regarding concerns for environmental conservation and improvement. Environmentalists advocate the sustainable management of resources, and the protection of the natural environment through changes in public policy. In its recognition of humanity as a participant in ecosystems, the movement is centred around ecology. The environmental movements favour the sustainable management of natural resources. The spatial scope of various environmental movements ranges from being local to almost global. The environmental movements are conceived as broad networks of people and organizations engaged in collective action in the pursuit of environmental benefits.

b. Origin of Environmental Movements in India

The genesis of concern for environmental protection in India can be traced back to the early twentieth century when people protested against the commercialization of forest resources during the British colonial period. In the 1970s, the Chipko movement was formed in India; influenced by Mahatma Gandhi. The Department of Environment was established in 1980 and a full-fledged Ministry of Environment and Forests was created five years later. A large number of environmental movements have emerged in India especially after the 1970s and 1980s.

In India, the environmental movement has played a key role in three areas such as

1. In creating public awareness about the importance of bringing about a balance between environment and development,
2. In opposing developmental projects that are inimical to social and environmental concerns, and
3. In organizing model projects that show the way forward towards non-bureaucratic and participatory, community-based natural resource management systems.

c. Reasons for the Emergence of Environmental Movements in India

Major reasons for the emergence of environmental movements in India

1. Control over natural resources,
2. False developmental policies of the government,
3. Socioeconomic reasons,
4. Environmental degradation/ destruction and
5. Spread of environmental awareness and media.

2.6.3.2. The Forest-based Movements

a. Bishnoi Movement

Year: 1700s
Place: Khejarli, Marwar region, Rajasthan state.
Leaders: Amrita Devi along with Bishnoi villagers in Khejarli and surrounding villages.
Aim: Save sacred trees from being cut down by the king's soldiers for a new palace.

Amrita Devi and Bishnoi Movement: Amrita Devi, a female villager could not bear to witness the destruction of both her faith and the village's sacred trees. She hugged the trees and encouraged others to do the same. 363 Bishnoi villagers were killed in this movement. The Bishnoi tree martyrs were influenced by the teachings of Guru MaharajJambaji, who founded the Bishnoi faith in 1485 and set forth principles forbidding harm to trees and animals. The king who came to know about these events rushed to the village and apologized, ordering the soldiers to cease logging operations. Soon afterward, the maharajah designated the Bishnoi state as a protected area, forbidding harm to trees and animals. This legislation still exists today in the region.

b. Chipko Movement

Year: 1973
Place: In Chamoli district and later at Tehri-Garhwal district of Uttarakhand.
Leaders: Sundarlal Bahuguna, Gaura Devi, Sudesha Devi, Bachni Devi, Chandi Prasad Bhatt, Govind Singh Rawat, Dhoom Singh Negi, Shamsher Singh Bisht, and Ghanasyam Raturi.
Aim: The main objective was to protect the trees on the Himalayan slopes from the axes of contractors of the forest.

The Movement: Mr. Bahuguna enlightened the villagers by conveying the importance of trees in the environment which checks the erosion of soil, causes rains, and provides pure air. The women of Advani village of Tehri-Garhwal tied the sacred thread around trunks of trees and they hugged the trees, hence it was called the 'Chipko Movement' or 'hug the tree movement'. The main demand of the people in these protests was that the benefits of the forests (especially the right to fodder) should go to local people. The Chipko movement gathered momentum in 1978 when the women faced police firings and other tortures. The then state Chief Minister, HemwatiNandanBahuguna set up a committee to look into the matter, which eventually ruled in favor of the villagers. This became a turning point in the history of eco-development struggles in the region and around the world.

The demands of the Chipko movement were as follows:

1. Complete stoppage of cutting trees for commercial purposes;
2. The traditional rights should be recognized based on the minimum needs of the people;
3. Making the arid forest green by increasing people's participation in tree cultivation;
4. Formation of village committees to manage forests;
5. Development of the forest-related home-based industries and making available the raw materials, money, and technique for it.
6. Giving priority to afforestation in the light of local conditions, requirements, and varieties.

Three important aspects were responsible for the success of the Chipko movement.

- First, the close links between the livelihoods of the local people and the nature of the movement. The local people consider Chipko as a fight for basic subsistence which has been denied to them by the institutions and policies of the State (Guha, 1989).
- The second aspect is about the nature of agitation. Unlike other environmental movements, Chipko has strictly adhered to the Gandhian tradition of freedom struggle, i.e., non–violence.

- Third, the simplicity and sincerity of the leaders like Sunderlal Bahuguna and their access to national leaders like Mrs. Indira Gandhi, other politicians, and officials also helped to the success of the movement to a large extent.

c. Save silent valley Movement

Year: 1978
Place: Silent Valley, an evergreen tropical forest in the Palakkad district of Kerala, India.
Leaders: The Kerala Sastra Sahitya Parishad (KSSP) an NGO, and the poet-activist Sughathakumari played an important role in the Silent Valley protests.
Aim: To protect the Silent Valley, the moist evergreen forest from being destroyed by a hydroelectric project.

Save Silent Valley was a social movement aimed at the protection of Silent Valley, an evergreen tropical forest in the Palakkad district of Kerala, India. It was started in 1973 by an NGO led by school teachers and the Kerala Sastra Sahithya Parishad (KSSP) to save the Silent Valley from being flooded by a hydroelectric project.

The valley was declared as Silent Valley National Park in 1985. The Kuntipuzha is a major river that flows 15 km southwest of Silent Valley. It takes its origin in the lush green forests of Silent Valley. In 1928 the location at Sairandhri on the Kunthipuzha River was identified as an ideal site for electricity generation. In 1970 Kerala State Electricity Board (KSEB) proposed a hydroelectric dam across the Kunthipuzha River that runs through Silent Valley, that will submerge 8.3 sq km of untouched moist evergreen forest. In February 1973, the Planning Commission approves the project at a cost of about Rs 25 crores. After the announcement of imminent dam construction, the valley became the focal point of the Save Silent Valley Movement, India's fiercest environmental debate of the decade. Because of concern about the endangered lion-tailed macaque, the issue was brought to public attention.

In 1977 the Kerala Forest Research Institute carried out an environmental impact study of the Silent Valley area and proposed that the area be declared a biosphere reserve. In 1978 Indira Gandhi, Prime Minister of India, approved the project, with the condition that the state government enacts legislation ensuring the necessary safeguards. Also that year the IUCN (International Union of conservation of nature) passed a resolution recommending protection of lion-tailed macaques in Silent Valley and Kalakkad and the controversy heated up. In 1979 the Government of Kerala passed legislation regarding the Silent Valley Protection Area (Protection of Ecological balance Act of 1979) and issued a notification declaring the exclusion of the hydroelectric project area from the proposed national park.

d. Jungle bachao Andholan

Year: 1982
Place: Singhbhum district of Bihar
Leaders: The tribals of Singhbhum.
Aim: Against the government's decision to replace the natural sal forest with Teak.

Jungle Bachao Andolan: The Jungle Andolan of Singhbum district for land, forest, and water was the struggle for right over and part of the socio-economic aspects of the Jharkhand Movement. The tribals of the Singhbhum district of Bihar started the protest when the

government decided to replace the natural sal forests with the highly-priced teak. This move was called by many as “Greed Game Political Populism”. Later this movement spread to Jharkhand and Orissa. The movement, which spread to nearby states, has highlighted the gap between the Forest Department's aims and the people's.

The movement was at a peak in 1978 and several police firings include Ichahatu police firing, Serengda police firing, Sarjomhatu police firing, and Eligada police firing. This movement survived till 1983 and 18 people were killed. The government of Bihar tried to crush the movement, thousands of Adivasis were beaten and cases registered in police stations against thousands of people and put them behind bars. It was a long period in the history of the Jharkhand Movement after the independence of India.

The historical background of the Jharkhand Movement is the natural attachment of people with the land, forest, and water. They touch every aspect of people’s life and death, pain, and pleasure. The tribes have birth-relation with land, forest, and water, the concept of right came much later, this is a conspiracy to break this relation of tribes by broken promises. The innocent tribal by nature were trapped into so-called mainstream civilized communities. The people of Jharkhand are animists and the natural beauty of the land, forest and water are the centres of their devotion. When and wherever one has attempted to drive them out from their devotional centres, they have never reconciled. This is their unique system of devotion to the earth, Tribal’s devotional way of life to the earth may be the subject of lesion and inspiration for the environmentalists and intellectuals who are organizing national and international seminars on environmental issues and for the policymakers of this land.

e. Appiko Movement

Year: 1983
Place: Uttara Kannada and Shimoga districts of Karnataka State
Aim: Against the felling and commercialization of natural forest and the ruin of ancient livelihood.
Leaders: Pandurang Hegde.

Appiko Movement: Appiko’s greatest strength is that it is neither driven by a personality nor having been formally institutionalized. However, it does have a facilitator in Pandurang Hegde. He helped launch the movement in 1983. It can be said that the Appiko movement is the southern version of the Chipko movement. The Appiko Movement was locally known as “AppikoChaluvali”. The locals embraced the trees which were to be cut by contractors of the forest department. Here the destruction of the forest was caused due to the commercial felling of trees for timber extraction. Natural forests of the region were felled by the contractors which resulted in soil erosion and drying up of perennial water resources. In the Saklani village in Sirsi, the forest dwellers were prevented from collecting usufructs like twigs and dried branches and non-timber forest products for fuelwood, fodder. honey etc. They were denied their customary rights to these products. In September 1983, women and youth of the region decided to launch a movement similar to Chipko, in South India. Women and youth from Saklani and surrounding villages walked five miles to a nearby forest and hugged trees there. They forced the fellers and the contractors of the state forest department to stop cutting trees. The people demanded a ban on the felling of green trees. The agitation continued for 38 days and this forced the state government to finally concede to their demands and withdrew the order for the felling of trees. For some time, the government stopped the felling of trees which was resumed again after some time which resumed the movement again. The

movement was backed by the local people. Even the daily wage labourers hired by the contractors to fell trees stopped doing their work.

In October, the movement entered into its second phase and this took place in Bengaon forest Here the forest was of a mix tropical semi-evergreen type and mostly on hilly terrain. The inhabitants of the region who were primarily tribal or the indigenous people depended on the forest for their survival and livelihood. The disappearance of bamboo due to commercial felling deprived them of the basic source to make items like baskets, mats, etc. The main source of their income was the sale of these items. When the felling of trees did not stop people started the movement. The movement was spontaneous in nature. The local indigenous people hugged trees to stop them from cutting and finally the government had to give in to their demands. Similar movements also started in other areas like Husri. It also inspired the local people to launch the movement.

Appiko movement became a symbol of people's power for their rights of natural resources vis-a-vis the state. In November, the movement spread to Nidgod village in Siddapur taluka preventing the state from commercial felling of trees in this deciduous forest of the region. The Appiko movement was successful in its three-fold objectives, i.e., protection of the existing forest cover, regeneration of trees in denuded lands, and utilizing forest wealth with proper consideration to the conservation of natural resources.

The movement also created awareness among the villagers throughout the Western Ghats about the ecological danger posed by the commercial and industrial interests to their forest which was the main source of sustenance. Like the Chipko, the Appiko movement revived the Gandhian way of protest and mobilisation for a sustainable society in which there is a balance between man and nature.

f. Save Western Ghats Movement

Year: 1986

Place: Gujarat and most of Western Maharashtra and another for the Southern states of Goa, Karnataka, Kerala, and Tamil Nadu.

Leaders: Prof. K.C. Malhotra, Kumar Kalanand Mani

Aim: To create an integrated Ecological perspective providing for both environmental protection as well as the rights of the rural communities.

Save the Western Ghats Movement (SWGM) was a landmark event in environmental activism in India.

In October 1986, it was decided to organize a march along the entire length of the Western Ghats, to focus attention on the urgent need to halt the process of degradation that was threatening to create irremediable damage to the entire area. The goal was to create an integrated Ecological perspective providing for both environmental protection as well as the rights of the rural communities.

The march had two Joint Coordinating Agencies, one for the Northern Districts, in Gujarat and most of Western Maharashtra and another for the Southern states of Goa, Karnataka, Kerala, and Tamil Nadu.

A National Advisory Committee was formed, with the renowned anthropologist, Prof. K.C. Malhotra as the Chairperson and with eminent persons in various related fields as members to provide support and advice. The actual March planning and management was the responsibility of the Central Organising Committee with Kumar Kalanand Mani of Peaceful Society as Central Coordinator. In the field, there were parallel regional structures for the Northern and the Southern stretches of the Ghats.

The March from November 1987 to February 1988 was a 100 days event, which included 95 days of actual travel along the entire length of the Western Ghats plus 5 days of Conference and meetings in Goa. The march was in two teams, one starting from Navapur in the North and the other from Kanyakumari in the south. Representatives from over 160 Organizations and thousands of individuals participated in the march, there were over 600 meetings conducted during the course of the route. There was extensive media coverage not only in the local press but also on the national and even international level.

All the teams converged on Bandora where there were three days of sharing of the participants followed by a 2-day conference on "save the western Ghats". The entire group of over 700 marchers then marched to Panjim for a final rally, where thousands more joined them.

Check Your Progress - 1

Choose the correct response

1. To protect the Silent Valley the moist evergreen forest from being destroyed by a hydroelectric project the movement was held in the year
    1. 2011
    2. 1996
    3. 2010
    4. 1978

2. The year of the Appiko movement is
    1. 2010
    2. 1972
    3. 1983
    4. None of the above

2.6.3.3. The River-based Movements

a. Narmada bachao Andholan(NBA)

Year: 1985

Place: Narmada River, which flows through the states of Gujarat, Madhya Pradesh, and Maharashtra.

Leaders: Medha Patker, Baba Amte, Adivasis, farmers, environmentalists, and human rights activists.

Aim: To provide project information and legal representation to the concerned residents of the Narmada valley.

Narmada Bachao Andolan (NBA): was an Indian social movement spearheaded by native tribals (Adivasis), farmers, environmentalists, and human rights activists against several large dam projects across river Narmada, which flows through the states of Gujarat, Madhya Pradesh, and Maharashtra. Sardar Sarovar Dam in Gujarat is one of the biggest dams on the river and was one of the first focal points of the movement. It was a part of the Narmada Dam Project, whose main aim was to provide irrigation and electricity to people of the above states.

The mode of the campaign under NBA included court actions, hunger strikes, rallies, and gathering support from notable film and art personalities. The Narmada Bachao Andolan, with its leading spokespersons Medha Patkar and Baba Amte. Narmada Bachao Andolan was also joined by several NGOs with local people, professionals, and activists as the founders with a non-violent approach. It was led by Medha Patkar. Nationally, they wanted an alternative structure of development and internationally, they wanted to build pressure on the World Bank to take accountability.

NBA's slogans include – Vikas Chahiye, Vinash Nahin! (Development wanted, not destruction) and "koi nahihatega, bandhnahibanega!" (we won't move, the dam won't be constructed).

b. Tehri dam conflict

Year: 1990's
Place: Bhagirathi River near Tehri in Uttarakhand.
Leader: Sundarlal Bahuguna
Aim: The protest was against the displacement of town inhabitants and the environmental consequence of the weak ecosystem.

Tehri dam conflict: The Tehri Dam is the Highest dam in India and one of the highest in the world. Tehri Dam is a multi-purpose rock and earth-fill embankment dam on the Bhagirathi River near Tehri in Uttarakhand, India. It is the primary dam of the THDC India Ltd. and the Tehri hydroelectric complex. People opposed the construction of a terrible Dam on the river Ganga and Sardarsarovar project over river Narmada because a huge amount of forest and wild animals damage due to water stored by the dams. Also, Adivasi lives in this area so, it also affects the Adivasi. What will happen if the Tehri dam breaks? Were such a catastrophe to occur, the potentially resulting dam-break would submerge numerous towns downstream, whose populations total near half a million.

The Tehri Dam has been the object of protests by environmental organizations and the local people of the region. Mr. V.D. Saklani, lawyer and founder of the Anti-Tehri Dam Struggle Committee, was quick to point out the consequences associated with the large project. Environmental activist SunderlalBahuguna led the Anti-Tehri Dam movement for years, from the 1980s till 2004. The protest was against the displacement of town inhabitants and the environmental consequence of the weak ecosystem. The major objections include seismic sensitivity of the region, submergence of forest areas along with Tehri town, etc. Despite the support from other prominent leaders like SunderlalBahuguna, the movement has failed to gather enough popular support at the national as well as international levels.

Check Your Progress - 2

Choose the correct response

1. Narmada BachaoAndholan was held in the year
    1. 1985
    2. 1996
    3. 2010
    4. 1978

2. Tehri dam conflict was led by
    1. Baba Amte
    2. Medha Patkar
    3. Sundarlal Bahuguna
    4. Kumar Kalanand Mani

2.6.3.4. Other Environmental Movements

a. Navdanya Movement

Year: 1987
Place: Karnatak and TehriGarhwal
Leaders: Vandana Shiva
Aim: Promote biodiversity conservation, biodiversity, organic farming, the rights of farmers, and the process of seed saving

Navdanya Movement: It was started in 1987, this Seed saving movement started in Karnatak and Tehri Garhwal which was registered as a trust in 1991. Navdanya is an Indian-based non-governmental organisation that promotes biodiversity conservation, biodiversity, organic farming, the rights of farmers, and the process of seed saving. One of Navdanya's founders, and outspoken members, is Vandana Shiva, an environmental activist, physicist, and author. Whether it's about empowering women or anti-globalization campaigns, environmental activist Vandana Shiva has always had an upper hand in her fights against the authorities. Her ecofeminist movement reinstated a farming system centred on engaging women, changing the current system. She founded Navdanya in 1982, an organisation promoting biodiversity conservation and organic farming. The organization has not only helped create markets for farmers but also promoted quality food for consumers, connecting the seed to the cooked food.

Navdanya began in 1984 as a program of the Research Foundation for Science, Technology, and Ecology (RFSTE), a participatory research initiative founded by the environmentalist Vandana Shiva, to provide direction and support to environmental activism. "Navdanya" means "nine crops" that represent India's collective source of food security.

Navdanya is a member of the Terra Madre slow food movement. Navdanya is a network of seed keepers and organic producers spread across 16 states in India. Navdanya has helped set up 54 community seed banks across the country, trained over 500,000 farmers in "food sovereignty" and sustainable agriculture over the past two decades, and helped set up the largest direct marketing, fair trade organic network in the country. Navdanya has also set up a learning center, BijaVidyapeeth (School of the Seed) on its biodiversity conservation and organic farm in Doon Valley, Uttarakhand, North India. It has criticised genetic

engineering. Navdanya claims to be women centred movement for the protection of biological and cultural diversity.

b. Tarun Bharat Sangh

Year: 2001
Place: Rajasthan
Leaders: Rajinder Singh
Aim: motivate villagers to harvest rainwater

Tarun Bharat Sangh: Rajendra Singh, founder of Tarun Bharat Sangh NGO of Rajasthan. Tarun Bharat Sangh was founded in 1975 in Jaipur by a group of students and professors from the University of Rajasthan. In 1985 the direction of the organization changed when four young members of the organization went to live in the rural area of Alwar to teach rural children and do rural development. Of those four, Rajendra Singh stayed when the other three left. He asked the local people what they needed most, and he found that they needed easier access to water. With the villagers, he organized the building of a "johad", which is a traditional rainwater storage tank. He brought water to about 850 parched villages in Rajasthan and motivated villagers to harvest rainwater. "He advocated small ponds and check dams but did not oppose big dams or canal networks blindly," said *India Today* in December 2003.

Tarun Bharat Sangh (TBS) is a non-profitable environmental NGO; with headquarter in Bheekampura, Alwar, Rajasthan. Dr. Rajendra Singh (known as Waterman of India) is the incumbent chairman of TBS since 1985. TBS started their work by mobilizing communities around the issue of water, and supporting them in reviving and revitalising the traditional systems of water management through the construction of 'Johads', 'Anicut', and 'Bands' for rainwater harvesting from shramdan and partly by TBS. TBS has built on existing cultural traditions of the area to revive the feeling of oneness with nature that existed in the village communities and to create an understanding and ethos of integrated ecosystem development. At Present the contribution of the organization is spread around 1000 villages of 15 districts of the state of Rajasthan. The organization has been part of rejuvenating and reviving 11 rivers in the state of Rajasthan naming, Ruparel, Sarsa, Arvari, Bhagani, Jahajwali, Shabi, and establishment about 11,800 johads. As a result of these contributions, TBS was awarded STOCKHOLM WATER PRIZE (Nobel Prize for water) in 2015. Presently, TBS' focus rests upon access to water by the rejuvenation of water resources, tackling issues like human and wildlife conflicts.

Check Your Progress - 3
Choose the correct response
1. Navdanya Movement (1987) was led by
    1. Vandana Shiva
    2. Medha Patkar
    3. Sundarlal Bahuguna
    4. None of the above

2. The Chairman of Tarun Bharat Sangh is
    1. Baba Amte
    2. Rajinder Singh
    3. Vandana Shiva
    4. Medha Patkar

2.6.4. Let us Summarise

- Environmental Movement is a diverse scientific movement regarding concerns for environmental conservation and improvement.
- The genesis of concern for environmental protection in India can be traced back to the early twentieth century when people protested against the commercialization of forest resources during the British colonial period. In the 1970s, the Chipko movement was formed in India; influenced by Mahatma Gandhi.
- Major reasons for the emergence of environmental movements in India are Control over natural resources, False developmental policies of the government, Socioeconomic reasons, Environmental degradation/ destruction, Spread of environmental awareness, and media.

The Forest-based Movements

- Bishnoi Movement(the 1700s), in Khejarli, Marwar region, Rajasthan state.
- initiated by Amrita Devi along with Bishnoi villagers in Khejarli and surrounding villages. The main aim is to Save sacred trees from being cut down by the king's soldiers for a new palace.
- Chipko movement (1973), in Chamoli district and later at Tehri-Garhwal district of Uttarakhand, initiated by Sundarlal Bahuguna, Gaura Devi, Sudesha Devi, Bachni Devi, Chandi Prasad Bhatt, Govind Singh Rawat, Dhoom Singh Negi, Shamsher Singh Bisht, and GhanasyamRaturi. The main objective was to protect the trees on the Himalayan slopes from the axes of contractors of the forest.
- Save silent valley movement (1978) in Silent Valley, an evergreen tropical forest in the Palakkad district of Kerala, India. The Kerala Sastra Sahitya Parishad (KSSP) an NGO, and the poet-activist Sughathakumari played an important role in the Silent Valley protests. To protect the Silent Valley, the moist evergreen forest from being destroyed by a hydroelectric project.
- Jungle Bachao Andolan (1982) Singhbhum district of Bihar. The tribals of Singhbhum. The main aim is to Against the government's decision to replace the natural sal forest with Teak.
- Appiko movement (1983), in Uttara Kannada and Shimoga districts of Karnataka State, initiated by Pandurang Hegde. Main aim: Against the felling and commercialization of natural forest and the ruin of ancient livelihood.
- Save western Ghats movement (1986), in Gujarat and most of Western Maharashtra and another for the Southern states of Goa, Karnataka, Kerala, and Tamil Nadu. Initiated by Prof. K.C. Malhotra, Kumar Kalanand Mani. Main aim to create an integrated Ecological perspective providing for both environmental protection as well as the rights of the rural communities.

The River-based Movements

- Narmada Bachao Andolan (1985), in Gujarat, Madhya Pradesh, and Maharashtra. Initiated by MedhaPatker, Baba Amte. The main aim The NBA's major aim was to provide project information and legal representation to the concerned residents of the Narmada valley.

- Tehri dam conflict(1990's), in Uttarakhand. Initiated by Sundarlal Bahuguna. The protest was against the displacement of town inhabitants and the environmental consequence of the weak ecosystem.

Other Environmental Movements

- Navdanya Movement (1987), in Karnataka and TehriGarhwal. Initiated by Vandana Shiva. The main aim was to promote biodiversity conservation, biodiversity, organic farming, the rights of farmers, and the process of seed saving
- Tarun Bharat Sangh (2001) in Rajasthan, initiated by Rajinder Singh, the main aim was to motivate villagers to harvest rainwater.

2.6.5. Answers to 'Check your progress - 1, 2 and 3'

Check Your Progress - 1

1. d)
2. c)

Check your progress - 2

1. a)
2. c)

Check your progress - 3

1. a)
2. b)

2.6.6. Unit end Exercises

1. Write a note on the environmental movements in India.
2. Discuss the main features of the Chipko movement.
3. Write a note on Narmada Bachao Andolan (NBA).
4. In your opinion, how are the environmental and ecological rights related to democracy and developments in India? Explain.

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