PG PS/SO S4-04 (DSE)

TWO YEAR MASTER'S DEGREE COURSE
(CBCS in Accordance with NEP 2020)

SEMESTER-IV

ENVIRONMENTAL SOCIOLOGY

Surya Kumar Bhuyan School of Social Sciences
KRISHNA KANTA HANDIQUI STATE OPEN UNIVERSITY

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March, 2025

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Printed and published by Registrar on behalf of the Krishna Kanta Handiqui State Open University.

Head Office : Patgaon, Rani Gate, Guwahati-781 017;

City Office : Housefed Complex, Dispur, Guwahati-781 006; Website: www.kkhsou.in

The University acknowledges with thanks the financial support provided by the **Distance Education Bureau, UGC**, for the preparation of this study material.

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COURSE INTRODUCTION

The course **'Environmental Sociology'** introduces a specialised field of Sociology dealing with the Environment. It intends to familiarize the learners with some of the basic concepts in Environmental Sociology. Its objective is to make the learners understand about the human-nature interaction and the contemporary environmental issues.

The course comprises of 13 units. **Unit 1- Unit 8** discusses mostly the different concepts and theoretical perspectives in Environmental Sociology **Unit 9-13** mostly focuses on environmental problems. **Unit 1** helps the learner to understand the basic concepts like Environment, Eco-System and Ecology. **Unit 2** describes the emergence of Environmental sociology and explains its scope and its emergence in India. **Unit 3** discusses the different theoretical perspectives. **Unit 4** deliberates on the different types of Environmentalism. **Unit 5** discusses about the relationship between Culture, Gender and Environment. **Unit 6** discuses about Sustainable Development. **Unit 7** deliberates on the different types of natural resources and their utilization. **Unit 8** discusses about different environmental issues and problems. **Unit 9** discusses about two very serious environmental concerns of our time i.e Global Warming and Climate Change. **Unit 10** critically discusses how development and modernisation is posing threat to the environment. **Unit 11** talks about the different environmental movements. **Unit 12** focuses on environmental ethics and environmental laws. **Unit 13** discusses about the different environmental problems of the Northeastern region of India.

The course on Environmental Sociology aims to make the learners more sensitive towards the environment. After going through the entire course, the learner shall get a detailed understanding of the basic concepts and theoretical perspectives of Environmental Sociology. They would also be able to critically analyse the contemporary environmental issues and problems. Further, they would also know about the various laws. policies and measures to protect and preserve the environment.

UNIT 1: ENVIRONMENT AND ECOLOGY

UNIT STRUCTURE

1.1 Learning Objectives
1.2 Introduction
1.3 Environment: Meaning, Definition and Types
1.4 Eco-System
1.5 Ecology
1.6 Let Us Sum Up
1.7 Further Reading
1.8 Answers to Check Your Progress
1.9 Model Questions

1.1 LEARNING OBJECTIVES

After going through this unit you will be able to-

- understand the concept of environment
- explain what an eco-system is
- discuss about ecology and its scope
- distinguish between cultural ecology and political ecology
- analyse the importance of the study of ecology in society.

1.2 INTRODUCTION

Our species have prospered with rapid advancement of adaptation with our environment. The history remains our witness to see the changes (sometimes disturbing and sometimes developmental) that always talk about the interplay between the natural environment and society. Like demography, ecology is another cousin of sociology; it is the study of the interaction of living organisms and the natural environment. Again, ecosystem is a system composed of the interaction of all living organisms and their natural environment. In this unit, we shall discuss in details the concepts of Environment, Eco-system and Ecology. \

1.3 ENVIRONMENT: MEANING, DEFINITION AND TYPES

The term 'environment' is derived from the French word 'environner' which means 'to encircle' or 'to surround'. Thus, environment is a complex of so many things (light, soil, water, etc.) which surround an organism. We can trace some dictionary meanings for the word 'environment'. The dictionary meaning of the word 'environment' is two-fold a) external conditions or surroundings especially those in which people live and work; b) in ecological sense it means the external surroundings in which a plant or animal lives which tend to influence its development and behavior.

The word 'environment' in its etymological sense gives the meaning "surroundings, especially the material and spiritual influences which affect the growth, development and existence of a living being. It means 'the circumstances or conditions that surround an organism or group of organisms', or 'the complex of social or cultural conditions that affect an individual or community."

In the context of human beings, environment is the sum of all social, economical, biological, physical or chemical factors which constitutes the surroundings of man, who is both creator and moulder of his own environment."

- **Definitions of Environment :**

According to Simon Ball and Stuart Bell, "Environment is a difficult word to define. Its normal meaning relates to 'surroundings', but obviously that is a concept that is relative to whatever object it is which is surrounded. Used in that sense environment could include virtually anything, indeed, as Einstein once remarked, "The environment is everything that isn't me." However, 'environment ' has now taken on a rather more specific meaning, though still a very vague and general one, and may be treated as covering the physical surroundings that are common to all of us, including air, space, waters, land, plants and wildlife."

Goudie states,"Environment is the representative of physical components of the earth, wherein man is the important factor influencing his environment."

- **Different types of Environment:**

  Environment can be divided into two categories:

- **Natural environment:** The environment that comes into existence without the interference of man is called natural environment.
- **Man-made environment:**When human beings modify their environment according to their own needs, then it is called man-made environment.

Two other classifications of environment:

- **Physical environment:**It consists of forces of nature like wind, temperature and light, time, non-living materials like soil and water.
- **Biological environment:**It includes the plants, animals and other organisms (biotic).

1.4 ECO-SYSTEM

The term 'eco-system' has been used widely. Eco-system is the basic functional unit in ecology. British ecologist Sir Arthur G. Tansely (1935) introduced the term 'ecosystem' for the first time.An 'ecosystem' is a region with a specific and recognizable landscape form, such as a forest, grassland, desert, wetland or coastal area. The nature of the ecosystem depends on its geographical features such as hills, mountains, plains, rivers, lakes, coastal areas or islands and is also controlled by climatic conditions- the amount of sunlight, temperature and rainfall in the region. 'Eco' from the word 'ecosystem' refers to 'environment' and 'system' to its various components.An 'ecosystem' is a single whole made up of many sub-systems i.e. populations, communities and environment. It is a basicfunctional unit of variable size consistingofboth biotic and abiotic components interacting with each other to sustain the life upon earth. The components that make an ecosystem are of two types-

- **Non- living or abiotic components:**

The geographical, climatic and soil characteristics form the non-living or abiotic components of an ecosystem. It includes ---

- The amount of inorganic substances involved in material cycles. The amount of the inorganic substances, present at any given time in an ecosystem, is designated as the standing state or standing quality
- Amount and distribution of inorganic chemicals, such as chlorophylls etc., and of organic materials, as proteins, carbohydrates, lipids etc., present either in the biomass or in the environment.
- The climate of the given region.

- **Living or biotic components**

The living part of an ecosystem is referred to as the biotic component.

- **Definitions of Ecosystem:**

According to Odum (1971), "Ecosystem is a unit that includes all of the organisms in a given area interacting with the physical environment, so that a flow of energy leads to clearly defined trophic structure, biotic diversity and material cycles within the system".

Michael Allaby (1983) says, "A community of interdependent organisms together with the environment is known as ecosystem".

ErachBharucha(2005):- "The living community of plants and animals in any area together with the non-living components of the environment, such as soil, air and water- constitute the ecosystem."

- **Basic principles or characteristics of an ecosystem:**

The basic characteristics of an ecosystem are given below-

- All ecosystems have two major components: biotic and abiotic.
- The non-living environment supplies the nutrients and energy in the form of sunlight. It also controls the smooth functioning of ecosystem and also the inter-relationships among the members of its biotic community. Therefore, non-living environment is a very essential part of any ecosystem.

- Plants and animals have interdependence between them. An exchange of materials takes place between the biological community and non-living environment.
- An ecosystem acts as a stabilizer of the changes and fluctuations that occasionally occur in the environment. An ecosystem has self-regulating mechanism of checks and balances that helps to achieve this stability.
- Ecosystem is a major structural and functional unit of ecology. The structure of an ecosystem is dependent on its species diversity. The simple ecosystems have less species and the more complex ecosystems have high species diversity.

1.5 ECOLOGY

The word 'ecology' comes from two Greek words, namely 'Oikos' (meaning 'household', 'place to live' or 'habitation') and 'Logos' (meaning 'study or 'discourse') to denote and deal with the organism and its place of living i.e. 'at home'. Ecology denotes such relationships between the organisms and their environment.

Ecology as a subject in India is known since long. The Vedas, Epics and Puranic writings have dealt with ecological thoughts; for instance, Charaka, an ancient physician described the importance of Vayu (air), Jala (water), Vruksha(tree), Desha (topography)and Kala (time)in the regulating process of life.

Greek Philosophers Hipocrates, Aristotle, Theophrastus, Reaumur etc. have mentioned about the concept of ecology in their writings, basically when these philosophers have written the natural history and the habits of animals and plants growing in different environment or areas. Theophrastus has been entitled as the 'First ecologist' who first explained the inter-relations between organisms and their environment.

There are some controversies about the person who coined the term 'ecology' and used it in literature.

According to Kormondy, Henry david Thoreau, the American Naturalist and philosopher, has used the term 'Ecology' for the first time in

the year 1857 but he did not provide a proper definition for it. We can have some other evidences in literature that says, H. Reiter, The German biologist, has used the term "ecology' for the first time in 1868 (see Reiter, 1885; Macmillam, 1897).

The French Zoologist, Isodore Geoffroy St. Hilarie (1859) had proposed the term 'ethology'for "the study of the relations of the organisms within the family and society in the aggregate and in the community."

In 1866, the German Zoologist Ernst Haeckel has used the term 'oekologie' to refer to the inter-relationship between the living organisms and their environment. He defined the ecology of an organism as "…..the knowledge of the sum of the relations of organisms to the surrounding outer world, to organic and inorganic conditions of existence….." .That is how the word 'ecology' has appeared to refer to the study of the mutual relationship between living organisms (biotics) and non-living environment (abiotics).

- **Scope of Ecology:**

Although ecology is a multidisciplinary science, it is usually considered as branch of Biology, since the various forms of living organisms are the taxonomic divisions of biology which deal with the morphology, physiology, ecology etc. of specific kinds of organisms.

Ecology basically is a science that deals with the relationship of all the organisms to their environment. Ecology as a subject matter not only includes the life sciences but also physics, chemistry, geography, geology, meteorology, climatology, hydrology, archaeology, anthropology and sociology. Therefore, the scope of ecology is too vast. It deals with biotic components, animals and plants, natural history etc.

In ecology, organism is the self-regulating or self-perpetuating mechanism which is always in a process to maintain equilibrium with its environmentand living organisms have the ability to respond to the environmental stimuli. Therefore, they are called 'physico-chemical' mechanisms.

Historically, the urge for studying about plants and animals initiated the development of ecology. In that way, ecology can be divided into plant

ecology and animal ecology. Plant ecology deals with the relationship among the plants and relationship between plants and environment. Basically plant ecology describes about the vegetational and floristic composition of a particular area. Animal ecology, on the other, describes the relation between animals and their environment and also the animal behavior, population dynamics, population distribution etc. Since, animals are bound to depend upon plants for survival (both for food and shelter), therefore, animal ecology and plant ecology are interlinked.

- **Ecological Perspectives:**

The ecological perspective views all living organisms within their social and physical environments and examines the factors and matters that people exchange with their environments (Gitterman, 2009). Applying ecology to human beings in social settings involves holding a perspective to observe how humans interact with their physical, social, and cultural environments. Physical environments include the natural world as well as the built world, which entails buildings and structures designed and made by human beings. Social environments include the interactions with friends and family, social and community networks, such as colleagues or through membership or involvement with organizations or the community, and the societal structures that shape the way in whichthe environment operates and orders itself, such as through political, legal, and economicstructures. The cultural aspect of the environment involves those values, norms, beliefs, and language that shape the individual's views, perspectives, and expectations. On the other hand, most importantly, the political aspect of the environment deals with the resource allocation structure, pattern and also the power holding to manipulate the nature.

An ecological perspective can considerably enlarge the horizon of sociology and social anthropology.Here, in this chapter, we will discuss about two ecological perspectives- i) Cultural perspective and ii) political perspective.

- **Cultural Perspectives of Ecology:**

Cultural ecology is based on the interaction of culture, man and environment. it talks about human adaptation to social and physical

environment. Here, human adaptation basically means both biological and cultural processes that enable human beings to survive in a particular environment. It also talks about how human beings cope up with their changing environment.Ecology is a science that deals with the study of the living-organisms and their physical milieus. To be simplified ecology is the study of structure and dynamics of nature, mankind being the part of nature (Olum, 1975:1).

The dualism that separates the study of 'natural environment' from 'human environment' had fruitfully worked to isolate natural science from social science. Cultural observation of ecology is a holistic approach that is capable of including human activitiesand this is the reason why it has gained wide acceptance.

Anthropologist Julian Stewardcoined the term 'envisioning cultural ecology' for the first time. He initiated this term as a methodology to understand the typical human nature that allows human beings to adapt to any variety of environment. The central argument for the cultural perspective of ecology is that it represents the ways in which cultural change is induced by continuous adaptation to its environment. Historically, cultural change in its part embraces technological changes, changes in practices, changes in knowledge which allow people to adjust with any changing or given environment. Hence, we can come to a conclusive notion that environment can influence human nature to a greater range but it cannot determine human nature all alone.

Regarding cultural perspective, we see 'environment' in some sociological theories too. Marx, Durkheim and Goldblatt observed the relationship between natural world and human societies as a central cause for any historical change. He did not emphasize on economic and demographic impact on ecology. In fact classical sociological theories often emphasized on how pre-modern societies had been hindered by their natural environment. They did not pay attention to how increasing industries in modern societies led to environmental degradation.

David Pepper's view is that Man-Nature dialectic is central to Marxist notion(Chaudhury 2014: 74). Man often transforms nature by means of labor. The process of transformation or the process of changing is a social process. Human beings shape their own society and also their social relationship with other members of the society by shaping their own nature. In order to change the nature, they first try to know the nature. In this process of knowing the nature, they transform themselves to a higher intellectual order (Pepper 1986).

Giddens observed that no one among Durkheim, Marx and Weber has seen degrading consequences of industrial work upon human beings. He said that no one could foresee that 'forces of production' would lead to large-scale destructive effect in natural as well as material environment. He concludes to say that, 'Ecological concerns do not brook large in the traditions of thought incorporated into sociology, and it is not surprising that sociologists today find it hard to develop a systematic appraisal of them' (Giddens 1990:8).

Steward's concept of cultural ecology got widely accepted among archaeologists and anthropologists in the mid-20th century. His main focus was on the interrelation between culture and environment. Steward's objectives for initiating this method of understanding human adaptation were-

- To have a proper documentation of tools and technologies used to exploit the environment in order to get a life out of it.
- To observe the pattern of human behavior or pattern of cultural change within its concerned environment.
- To assess the influence of behavior pattern of human being on other cultural aspect (for instance, in drought-prone areas the prime concern is the concern for rainfall which in turn becomes a practice of religious belief system where water and rainfall become strong figures for that particular belief; but this sort of religious belief may not appear in those areas where availability of water is taken for granted or where the practice of irrigation is prevalent. Steward recognized that the principle difficulty in usingthe cultural factor in ecological studies was the lack of clear objectivesfound in the

biological use of ecology. Steward proposed the use of an explanatoryor causal method with cultural ecology and an operational toolrather than as an end in itself.

- **Political Perspective of Ecology**

The roots of political ecology in ecological and social science are described by Paulson. The ground from which political ecology first emerged in the 1970s (the first use of the term is often traced to Wolf, 1972) was defined by the confluence of cultural ecology (formulated by Steward) which linked human strategies of ecological success to cultural adaptation, with community ecology, cybernetics and systems theory (Odum, 1970; Bateson, 1972). Despite important differences, these areas of study shared a focus on flows of matter, energy, technology and information within integrated humanenvironmental systems. Political ecology was also influenced by the hazards school with its focus on perception, adjustment and management of environmental hazards. Political ecology focuses on how human beings relate to the biophysical world. Political ecologists have investigated the many environmental challenges that vulnerable communities across the world must face. These include the unequal impacts of global warming on different societies, the health effects of environmental toxics in food, air and water, the environmental crimes of corporations and syndicates, tropical deforestation, wars based on control over natural resources, land grabbing, acquisition of land and urban environmental injustice etc. Political ecology has been important in explaining such phenomenon, and particularly the social and political inequities both causing them and mediating their impacts (Bryant, 2015).

Political ecology emphasizes environmental problems and human vulnerabilities to see inequalities in power. Political ecologists observethe human struggle for resource allocation and healthy environment. They also see how this struggleis strongly influenced by the power a society or individuals hold and how they use it.

Inequalities in 'access to natural resources' is a central theme of political ecology. While it is a matter of power structure and ideology of

power to hold or possess resources, it always focuses on weak and sometimes corrupt governance, outdated and undemocratic land tenure rules, as well as divided communities who are poor and vulnerable to demands for land. It also talks about the effect on rural women, who lack a political mandate to speak out collectively.

Methodologically, political ecologists use a wide range of approaches, to illustrate exactly how political and economic activities influence the fate of ecosystems and local cultures, and how institutional arrangements and organizations are (or have been) responsible for these outcomes. Geographer Piers Blaikie and colleagues were the originators of a distinctive 'regional PE' approach which analyses processes that operate at different scales, but are interlinked. Blaikie identified a "chain of explanation" linking soil erosion to changes in land use practices, caused not by poor local land management but by poverty and denial of access, even arguing that "soil erosion in lesser developed countries will not be substantially reduced unless it seriously threatens the accumulation possibilities of the dominant classes" (Blaikie, 1985: 147).

Theorists including Karl Marx and Michel Foucault, show how inequalities are embedded in capitalism, and in the subjugation and control of entire populations through monitoring and categorizing. There are rational underpinnings to environmental struggles that create winners andlosers. Feminist political ecology sees power as gendered, focusing on the marginalization of women but also their vital role in maintaining livelihoods and in struggling for access to resources.

- **Importance of the Study of Ecology and Society**

The study of ecology is essential for human beings to manage the things in life for better living. Human beings know they are inevitably linked to their environment. The air they breathe, the water they drink, the food they consume and the products they use bind them to their environment to the local and global ecosystems. Ecology helps people to deal with changing nature of environment and its challenges.

- In order to achieve maximum food production, man has eliminated stable and complex ecosystems and replaced them with fragile and simplified single-species ecosystems in which the energy flow is directed to crops(Myneni, 2008).
- Man has shortened food chains by selecting and breeding domestic livestock that produces milk, meat or wool by converting grasses directly into products useful to man (Myneni, 2008).
- Ecology helps a person to understand that successful agriculture requires ecological adaptation of crop plants and domestic animals to environmental condition. It also requires genetic capability of plants to respond to agricultural practices like fertilization.
- Through life experience people become concerned about how overgrazing of grasslands and mismanagement of crop fields may lead to soil erosion.
- Different approaches of ecology help us to realize he power over natural resources in order to get development and it can directly highlight the necessity of the species which are economically desirable in the environment.
- Regarding Fish-biology, the management and exploitation of the fish population needs a thorough knowledge about the essential bio-physical aspects of the environment.

Ecology reveals that environmental pollution represents a short-circuiting of the biosphere cycles in nature. The chemical fertilizers and pesticides threaten the survival of organisms like birds. Too much sulphur dioxide in the atmosphere can kill and injure plants and animals. Atmospheric pollutants on the other hand, are responsible for a distinct rise in cases of chronic bronchitis, nasal and eye irritations and lung cancer (Myneni, 2008).



CHECK YOUR PROGRESS

Q1: How does an eco-system act like stabilizer in environment?

Q2: Why organisms in ecology are called to be 'physico-chemical' mechanism?

Q3: Name two theorists who focused on inequalities embedded in capitalism regarding political ecology.

Q4: What is political ecology's subject matter?

Q5: What does feminist ecology focus on?



1.6 LET US SUM UP

- Ecology is the study of the interaction of living organisms and the natural environment.
- The word 'environment' refers to the surroundings, especially the material and spiritual influences which affect the growth, development and existence of a living being.
- Environment is of two types: Man-made and Natural or Physical and Biological.
- Steward's main focus regarding cultural perspective was on the interrelation between culture and environment.
- An ecosystem is a basic functional unit of variable size consisting of both biotic and abiotic components interacting with each other to sustain the life upon earth.
- Political ecology emphasizes environmental problems and human vulnerabilities to see inequalities in power. Political ecologists observe the human struggle for resource allocation and healthy environment.
- Feminist political ecology sees power as gendered, focusing on the marginalization of women but also their vital role in maintaining livelihoods and in struggling for access to resources.



1.7FURTHER READING

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1.8 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No 1: An ecosystem acts as a stabilizer of the changes and fluctuations that occasionally occur in the environment. An ecosystem has self-regulating mechanism of checks and balances that helps to achieve this stability.

Ans to Q No 2: In ecology, organism is the self-regulating or self-perpetuating mechanism which is always in a process to maintain equilibrium with its environment and living organisms have the ability to respond to the environmental stimuli. Therefore, they are called 'physico-chemical' mechanisms.

Ans to Q No 3: Karl Marx and Michel Foucault

Ans to Q No 4: Political ecology emphasizes environmental problems and human vulnerabilities to see inequalities in power. Political ecologists observe the human struggle for resource allocation and healthy environment. They also see how this struggle is strongly influenced by the power a society or individuals hold and how they use it.

Ans to Q No 5: Feminist political ecology sees power as gendered, focusing on the marginalization of women but also their vital role in maintaining livelihoods and in struggling for access to resources.



1.9 MODEL QUESTIONS

Short Questions (Answer each question in about 150 words)

Q1: What is an Eco-system?

Q2: What do you understand by the word 'Environment'?

Q3: Write about the organizations that Ecology mainly focuses on.

Q4: Write about Steward's objectives to initiate cultural overview of ecology.

Q5: Write about the characteristics of an eco-system.

Long Questions(Answer each question in about 300-500 words)

Q1: Differentiate between cultural perspective and political perspective of ecology.

Q2: Discuss the importance of the study of Ecology.

*** ***** ***

UNIT 2: ENVIRONMENTAL SOCIOLOGY: AN INTRODUCTION

UNIT STRUCTURE

2.1 Learning Objectives
2.2 Introduction
2.3 Concept of Environmental Sociology
2.3.1 Why Environment is a Sociological Issue
2.3.2 Emergence of Environmental Sociology
2.3.3 Scope of Environmental Sociology
2.4 Environmental Sociology in India
2.5 Let us Sum Up
2.6 Further Reading
2.7 Answers to Check Your Progress
2.8 Model Questions

2.1 LEARNING OBJECTIVES

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

- understand the relationship between environment and society
- explain the role of social structure in allocating natural resources
- explain the role of social institutions towards environment
- discuss the emergence of Environmental Sociology in India
- analyse the scope of environmental sociology and its importance.

2.2 INTRODUCTION

In the previous unit, we have learned about the meaning of environment, ecosystem and ecology. Environmental Sociology, as the term indicates, is concerned with the reciprocal relationship between environment and society. It is also generally accepted that this is, in important ways, different to'sociology of the environment' based on the application of mainstream sociological concepts to environmental conflict, politics,movements and knowledge claims.Dunlap and Catton (1994) have argued that conceptualizing environmental sociology as the study of

environment-society relations enables a shift of analytical focus from the symbolic construction of environmental problems to material explanations of their causes, consequences and potential solutions. In this unit, we shall discuss about the emergence of Environmental sociology, its scope and importance. While reading this unit, we shall also get to know why Environment is a sociological issue. Further, this unit will also help us understand the emergence of environmental sociology in India.

The role of industrialism in generating environmental degradation; the structural and social origins of environmental movements, the environmental implications of urbanization and globalization, the problem of securing sustainable development and wider theoretical issues such as possible conflict between non-exploitative approach to nature and the continuous commitment towards enlightenment-values such as democracy, human rights and the pursuit of progress are some unavoidable dimensions of our life that should be dealt with sociological consideration. The resource allocation (mainly water, land, fisheries, pastures, forest and minerals), their use and their exploitation or abuses are some inevitable phenomena in every social structure. Social relations based on environmental resource allocation process always have a good story to be depicted within society. The way demographic transition is affecting natural environmental fabric and the way environment is affecting the human relationship, should be viewed in a critical lexicon. The 'global risk society' always talks about the global order of our security that includes ecological risks which previous generations did not experience at all. The increasing populations that threaten the ecosystem with inadequate fertilization, deforestation, depletion of resources, pollution, unequal consumption, poverty, global warming, 'extreme weather', competition among different groups for resource, technological advancement for faster production, new technological tools of agricultural production process, congestion, overdevelopment, rapid rise of cities and metropolis, growth of individualization and also individualism, breakdown of family structure as a consequence of urbanization and capitalism, massive climate change etc. often leave a gloomy risky future for the next generation.The relation among population, health and environment has also become a matter

for great concern. The need to create the awareness among socially and economically backward groups about the benefits of utilizing the health care services is highlighted in many discussions that often require environmental structure and developmental stage and goals related to growth. Thus all these issues helps one understand why it is very important to understand the relationship between environment and society and the need to study environment in a societal context.

2.3 CONCEPT OF ENVIRONMENTAL SOCIOLOGY

Environmental sociology or 'environmentally oriented sociology' suggests that the inclusion of 'ecological infrastructure' at the base of broad categories of sociologist's 'model of society'- such as economy, social structure, polity, and arranged in a pyramid fashion will incorporate ecology.Environmental sociologists have had a long held ambition to transform sociology - to outgrow our sub-disciplinary niche and redefine the mainstream. Many sociologists strongly believe that environmental sociology requires us to rethink the foundational principles of sociology and indeed the very concept of 'social sciences'. Theybelieve that rethinking is critical to the ongoing relevance of the social sciences in an era of global environmental change.

There is little doubt that environmental problems will be one of humanity's major concerns in the twenty-first century, and it is becoming apparent that sociologists can play an important role in shedding light on these problems and the steps that need to be taken to cope with them. While the study of environmental issues is an inherently interdisciplinary project, spanning the natural and social sciences as well as humanities, the crucial role of the social sciences in general and sociology in particular are increasingly recognized.

2.3.1 Why Environment Is A Sociological Issue

It is a matter of concern that why environment has become a great concern for the sociologists. One may question that 'Isn't the impact of human beings on nature a physical one, created by modern technologies of

industrial production?' Yes, but modern industry and technology have come into being in relation to distinctive social relations.

- Rescuing the global environment will thus mean social as well as technological change. Given the vast global inequalities that exist, possibility is very less that the poor countries of the developing world will sacrifice their own economic growth because of environmental problems created largely by the rich countries. Yet, the earth does not have sufficient amount of resources for everyone on the planet to offer a living standard in the industrialized societies which is often taken for granted. Hence, if the impoverished sections of the world have to catch up with the richer sections, then the richer people should have a revision of their expectations about constant and rigorous economic growth. Some 'green' authors suggest that people from rich countries must react against consumerism and they have to return to simpler ways of living if ecological disaster has to be stopped.
- The most threatening problem faced by humanity today is population growth. Thomas Malthus has told regarding it that population growth tends to outstrip the resources to support it. Until and unless people control the sexual urge and limit their frequency of sexual intercourse,excessive population growth will ensure a future of darkness and misery.
- Prior to industrialization, both birth and death rates were high. During the beginning of industrialization, because of the decrease in the death rates, population growth happened. Birth rates took longer to decline. Finally equilibrium situation was reached with low birth-rates balancing low death rates.
- There are many sources of environmental threat, for instance, air pollution, acid rain, water pollution, unrecyclable solid waste, depletion of renewable natural resources, reducing biodiversity etc.
- Most environmental issues are closely connected with risk because they are the result of the expansion of science and technology. Global warming, acid rain, carbon footprintetc. are some such examples.

- Genetically modified crops are produced through the manipulation of a plant's genetic composition. Genetically modified foods or genetically engineered foods or bioengineered foods are those foods produced from organisms whose DNA has been altered through genetic engineering. GM foods are controversial: it may have benefits for the immediate relief of hunger and malnutrition, but the new technology can carry huge risks for human lives and natural environment.
- Eco-efficiency refers to technologies that generate economic growth at minimal cost to the environment. Ecological modernization is the belief that industrial development and ecological protection are not incompatible.

These issues clearly show how human society is related to environment, thereby making environmental a sociological issue.

2.3.2 Emergence of Environmental Sociology

In contrast to the larger society, mainstream sociology in the 1970s was almost the least concerned about the significance of environmental problems. Earlier, people neglected environmental matters in social settings. For example, Durkheim has emphasized on social phenomena while explaining 'social facts'. In that period, people mostly focused on biological and geographical 'determinism' that had led sociologists to ignore the biophysical world. To legitimize society as a discipline, it was quite essential to move away from traditional explanations; for example, racial and cultural differences in terms of biological and geographical factors respectively. It was supposed to be replaced with 'socio-cultural determinism'. To defy an environmental phenomena, only geographical and biological variable are not sufficient but 'social variables' should also be considered.

This disciplinary tradition got strengthened by sociology's emergence during an era of unprecedented growth and prosperity, which made limits to resource abundance and technical process unimaginable. Moreover, increased urbanization reduced direct contact with the natural environment. Due to the increasing emergence of industrialization and modernization,

sociology has come to assume that the exceptional features of homo-sapiens (i.e., language, technology, science and culture) have made the societies 'exempt' from the natural constraints and, thus, reluctant to acknowledge the societal relevance of ecological limits.

The concern for environmental sociology stems from growing awareness of the fact that environmental problems are fundamental social problems. They result from human social behavior; they are viewed as problematic because of their impact on humans and because their solution requires societal effort. It is, therefore, not surprising that sociologists have shown growing interest in environmental issues in recent decades and that environmental sociology has become a recognized field. Yet sustained sociological investigation of environmental problem did not come easily, and is a relatively recent development in the field.

Although there was scattered sociological attention to both urban problems and natural resources prior to the 1970s, environmental sociology developed in that decade as society's own response to the emergence of environmental problems on the public agenda. At first, sociologists tended to limit their attention to analyze societal response to environmental problems, rather than examining the problems themselves. But as sociologists gradually paid attention to environmental issues, some began to look beyond societal awareness of environmental problems to examine the underlying relationships between modern, industrial societies and the biophysical environment they inhabit. The result was the emergence of environmental sociology as a field of inquiry.

2.3.3 Scope of Environmental Sociology

Ecological methods have been employed successfully in many branches of Sociology, for example, in the study of social evolution and adaptation.Through the development of some social theories, the ecological approach seems to become gradually significant.RadhakamalMukerjee, in his essay 'Ecological Approach', has mentioned about the balance between natural environment and the vegetables andalso the animal environment, including the human.It is maintained by chains of actions and interactions,

which link man with the rest of his living realm, reaching up and down and all around as his invisible biological and social destiny.We can discuss about some inevitable concepts that clearly talk about human-environment relationship, as part of the scope of Environmental Sociology.

- **Deep ecology:** The concept of 'deep ecology' was initiated by Norwegian philosopher Arne Naess. It talks about human beings with their values and well-being as essential part of ecology where non-humans also have similar values. There is always a diversity and richness of life forms. Ethically human beings have no right to reduce this richness and diversity except to satisfy the food chain for survival. Currently, human beings are found interfering excessively with the non-human world. Therefore, non-humans must be protected through some changes in the policies. In return, it will be fruitful in economic, technological and ideological structures in the long run. We shall read in details about this in Unit 4.
- **Climate change:** Anthony Giddens in his book ThePolitics of Climate Change has explained the environmental problem, particularly leading to global warming and massive climate change. The green thinkers are lamenting on excessive growth models, resource depletion and pumping toxicity. They disagree with the model of Gross National Product (GNP) as an indicator of welfare. On the one hand, the prices of oil and gas are growing up gradually, whereas at the same time there is intensified global warming and climate change. Therefore, a greater attention is required for responsibility and accountability of the policy-makers.
- **Limits to Growth:** Many people have been worried by the harmful impact of human beings on the natural world. Public concern about the environment has led to the emergence 'green' movements and 'green' parties (for example, Friends of the Earth and Greenpeace) that campaign around environmental issues.

  The basic idea of the 'Limits to Growth' was that there are both social and natural influences limiting how far the earth can absorb continuing economic development and increasing population growth.

The rise of the 'green' movements can be traced back to a famous report first published in the early 1970s-'The Limits to Growth' published by the club of Rome. The 'green' philosophers suggest that economic development should be severely curtailed in order to protect the environment. Anthony Giddens also supported the idea of limits to growth while he discussed about climate change.

- **Eco-feminism:** It talks about the interrelationship between ecology and feminism. It sees the oppression from patriarchal outlook. It sees the connection between women and nature since in patriarchal society both women and nature have faced oppression in general and in western countries in particular. It says that scientific knowledge is controlled by men; they provided the concept of medicalization of child birth which is dependent on specialized technologies and experts. Agriculture of today's era is also totally dependent on technological input including industrially produced seeds and fertilizers. Here the patriarchal structure justifies the dominance through religious and scientific orientation. Women have a special connection with environment; particularly in small-scale societies they worship trees and they nurture them also. Local knowledge should be given priority in order to sustain the productivity for which eco-femiinism is more effective. Eco-feminism will be discussed in details in Unit 3.
- **Sustainable development:**There is a clear relation between ecology and culture in human societies. Specifically, in small-scale societies, this relation is more clear and particular. Sustainable development means that growth should , at least ideally, be carried on in such a way as to recycle physical resources rather them deplete them, and to keep levels of pollution to a minimum(Giddens). The term 'sustainable' development' was first introduced in a 1987 report commissioned by the United Nations, 'Our common future'. This report is known as Brundtland Report' since the report was chaired by Mrs. G. H. Brundtland. Sustainable development was defined as

the use of renewable resources to promote economic growth, the protection of animal species and biodiversity, commitment to maintaining clean air, water and land.

Sustainable development has come as a sigh of relief in the light of large-scale of forest cover. Brundtland Commission firmly puts forward that all must ensure that sustainable development meets the needs of the present without compromising the ability of future generations to meet their needs.We shall be able to learn more about sustainable development in Unit 6.

Poverty is antithetical to sustainable development. As poverty increases, the environment is degraded. When environment is degraded prospect for further livelihood decreases. Environmental degradation generates more poverty, thus accelerating the cycle.

- **Green party:** It is an urbanized political party based on principles of green politicssuch as social justice, grass-roots democracy, non-violence and environmentalism. Green party is a group of philosophers who emphasize on environmental causes and they believe that for establishing world peace, the ideology of people towards environment should be taken into consideration so that resources are allocated without harming others.
- **Ecological significance of Caste:** The Indian caste system, has mostly talked about human where the social relationship is based on hierarchical structure. It also discusses the endogamous orthodoxy of caste system on natural environment. The methods of allocating resources by the tribal and caste groups play a significant role in traditional knowledge about ecology and environment. The traditional practices of land ownership and production and also allocation of the resources always depict a picture of 'resource partitioning' everywhere in Indian society. The endogamous nature of caste emphasizes on territorial exclusion. Competitive exclusion in terms of geographical distribution through land ownership is very prevalent among the caste societies. Moreover, we can see the impact of modernization on caste system to see environmental

impact on it. The collapse of the resource base, the replacement of the old traditional system of production and subsistence economy by modern money economy, has led to a destroyed social relationship among various castes in the Indian society. The persistence of the caste system, with loss of its traditional complementarity has, therefore, led to an increasing level of conflict among different castes.

The spatial scope of various movements related to environment ranges from being local to almost global.

2.4 ENVIRONMENTAL SOCIOLOGY IN INDIA

Sociology, being a very young discipline in India compared to economics and political science, has embraced ecology and environment as a younger sub-field. In India, the picture of this emerging discipline traces the origins and contours of environmental sociology mainly to the social protest movements. In India, the concern for 'sociology of environment', 'ecological anthropology' or 'environmental sociology' or 'social ecology' can be traced to recent developments.Ramchandra Guha (1994), a social historian who must be credited for firmly establishing and fostering this field in India, chooses to follow an illustrious sociologist, Radhakamal Mukerjee, in calling this field 'social ecology' (Baviskar: 2014).

In the 1920s, it was Radhakamal Mukerjee who proposed a specific 'region' which allows a synthetic study of sociology and ecology. According to Mukerjee, "any human group must be considered in relation 'not merely to temperature, humidity, sunshine, altitude, etc but also to their indirect effects, the interwoven chain of biotic communities to which it is inextricably linked, the plants that it cultivates, the animals it breeds and even the insects which are indigenous to the region." He defines 'the region' as 'at once an ecological aggregation of persons, an economic framework and a cultural order'.

While Radhakamal Mukerjee was the first Indian scholar to highlight the links between the social and the biophysical worlds, his footprints on the

sands of Indian sociology are rather faint. Patrick Geddes, a remarkable urban planner who brought ecological sensitivities to bear on the development of towns such as Indore, Lucknow, Patiala, Dacca, was a Professor of Sociology and Civics at Bombay University in the 1920s.

Initially, Indian sociologists basically shared an understanding of the links between environment and development. Most of them were engaged with the enterprise of social and economic reconstruction for an independent India. In fact, Guha said that the first decades after independence were an age of 'ecological innocence' and that is how intellectual and political life got little significance to environmentally-oriented thoughts. Guha said that they had to wait till the 1970s for a systematic development of environmental sociology. But one can go back to the 'Bishnoi movement' (1700), led by Amrita Devi along with Bishnoi villagers, who rescued the sacred trees.

The revival of interest in environmental sociology in the 1970s happened due to the emergence of various environmental movements. An environmental movement can be defined as that movement that favors the sustainable management of natural resources. This often stresses the protection of the environment via changes in public policy. It is worth mentioning that ecological concerns in India emerged in opposition to development priorities. For example, in Chipko and the Silent Valley, there was a sharp distinction between those who supported 'development' over 'environment' and those who supported 'environment' over 'development'.The Silent Valley power project was promoted by the Government of Kerala- and was given up by the Centre because it threatened tropical rainforests. 'Chipko movement' (1973), was led by SundarlalBahuguna, Gaura Devi, Sudesh Devi, Chandi Prasad Bhatt, Govind Singh Rawat,, DhoomsinghNegi, Shamsher Singh Bisht and GhanashyamRaturi in Chamoli and Tehri-Garhwal district of Uttarkhand.Their objective was to protect the trees on the Himalayan slopes from the axes of contractors of the forest. There was another movement called 'Jungle Bachao Andolan'(1982), led by the tribals of Singhbhum district of Bihar. They fought against Government's decision to replace the natural sal forest with teak.

We can mention about 'Appiko movement' (1983) in Uttara Kannada and Shimoga districts of Karnataka. Pandurang Hegde helped in launching the movement. They were against the commercialization of natural forest and the ruin of ancient livelihood. Then we can talk about 'Narmada Bachao Andolan' (1985) at Narmada River which flows through Gujarat, Madhya Pradesh and Maharashtra, led by MedhaPatkar, Baba Amte, human right activists, adivasis and farmers. They led a social movement against a number of large dams being built across the Narmada River. We can mention about 'Tehri dam conflict' (1990), led by Sundarlal Bahuguna on Bhagirathi river near Tehri in Uttarakhand. The protest was against the displacement of town inhabitants and environmental consequence of the weak ecosystem. It is expected that environmental sociology in India would contribute to our understanding of the ecological dimension s of the transition from a system based on state-led public investment to a liberalized economy. Although Ramchandra Guha and Madhav Gadgil have pioneered the broad study of ecological impact on economic development, there have been no detailed study on ecological impact on national economic development. But neither Guha nor Gadgil was directly from a sociological background. Gadgil was an ecological scientist and Guha was a historian.

Gadgil and anthropologist K C Malhotra should be credited for their attempt to offer an ecological analysis to the Indian social structure. They basically focused on caste system and environmental relation to caste system in India. In one of their essays, they have described caste system as a set of tropic levels in which different castes occupy ecological niche marked by division of labour and resource partitioning. But their account was criticized because of its strong functionalism and has been attacked for seeming to justify the caste system.

Development sociology in India has tended to concentrate on processes internal to the nation-state. The relationship between nation-states and global circuits of capital has not received much attention in India. Regarding environmental sociology, international processes and discourses have not been examined in much detail by Indian scholars even though

post-colonial Western discourses on population explosion, deforestation, genetic diversity and intellectual property rights, cultural rights of 'indigenous people' have been enormously influential in shaping Indian debates.

Although it is very young, Environmental Sociology is not a marginal specialization. It firmly holds the potential to change our perception about all the social phenomena. Sensitivity towards environmental factors does not limit us to a fragmented treatment of forests, water, soil, pastures, but compels us to rethink about the continuities in the practice of natural resource used differently among urban and rural people, men and women, and among adivasi and caste Hindu. Environmental sociology should study how ecological factors shape material practices. It is relevant to the entire field of sociology to study the ideas and practices with which people try to shape their surrounding environment.



CHECK YOUR PROGRESS:

Q 1: What is Chipko movement all about?

Q 2: What do the Green philosophers do?

Q 3: What do you understand by sustainable development?

Q 4: What is an environmental movement?



2.5 LET US SUM UP

- Environmental sociology is the systematic study of the reciprocal relationship between human being and the environment.
- Prior to industrialization, both birth and death rates were high. During the beginning of industrialization, because of the decrease in the death rates, population growth happened. Birth rates took longer to decline.

- Genetically modified crops are produced through the manipulation of a plant's genetic composition. GM foods are controversial: it may have benefits for the immediate relief of hunger and malnutrition, but the new technology can carry huge risks for human lives and natural environment.
- Eco-efficiency talks about human beings with their values and well-being as essential part of ecology where non-humans also have similar value. There is always a diversity and richness of life forms.



2.6 FURTHER READING

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2) Giddens, A. (2002). Sociology (4th ed.). Cambridge: Polity Press.
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2.7 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No 1: Chipko movement (1973) is a movement led by SundarlalBahuguna along with several renown people

for instance Chandi Prasad Bhatt etc and occurred in Chamoli district and later at Tehri-Garhwal district of Uttarakhand.. Their main aim was to protect the trees on the Himalayan slopes from the axes of contractors of the forest.

Ans to Q No 2: Green party is an urbanized political party based on principles of green politics such as social justice, grass-roots democracy, non-violence and environmentalism. Green philosophers believe that for establishing world peace, above mentioned issues are always interlinked.

Ans to Q No 3: Sustainable development means that we all must ensure that sustainable development meets the needs of the present without compromising the ability of future generations to meet their needs.

Ans to Q No 4: An environmental movement can be defined as that movement that favors the sustainable management of natural resources. This often stresses the protection of the environment via changes in public policy.



2.8 MODEL QUESTIONS

Short Questions (Answer each question in about 150 words)

Q 1: What is GM food?

Q 2: What do you understand by the term 'eco-efficiency'?

Q 3: How poverty is antithetical to environment?

Q 4: What is Narmada Bachao Andolan?

Long Questions(Answer each question in about 300-500 words)

Q 1: How can you justify environment as a sociological issue?

Q 2: What are the sources of environmental threat that lead to a darker future?

Q3: How did the concern for ecology grow in India?

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UNIT 3:APPROACHES TO THE STUDY OF ENVIRONMENTLISM

UNIT STRUCTURE

3.1 Learning Objectives
3.2 Introduction
3.3 Marxism
3.4 Gandhism
3.5 Ecological Marxists
3.6 Ecofeminism
3.7 Anthropocentrism
3.8 New Ecological Paradigm
3.9 Let Us Sum Up
3.10 Further Reading
3.11 Answers to Check Your Progress
3.12 Model Questions

3.1 LEARNING OBJECTIVES

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

- learn about different approaches or perspectives through which we can comprehend what environmentalism is
- understand about relevancy as well as applicability of these perspective in contemporary times
- Discussthe root causes of environmental problemsandways to resolve the environmental crisis.

3.2 INTRODUCTION

Environmentalism denotes a social movement that seeks to influence the political process by lobbying, activism, and education in order to protect natural resources and ecosystems. Environmentalism as a movement covers broad areas of institutional oppression. Examples of these oppressions are: consumption of ecosystems and natural resources into waste, dumping waste into disadvantaged communities, air pollution, water

pollution, weak infrastructure, exposure of organic life to toxins, mono culture, anti-polythene drive (jhola movement) and various other focuses.

It is important to mention here that the 1960s built strong cultural momentum for environmental causes, giving birth to the modern environmental movement. Widespread green consciousness moved vertically within society, resulting in a series of federal policy change in the 1970s. This period was known as the 'Environmental Decade' with the creation of the US Environmental Protection Agency and passing of endangered Species Act, Clean Water Act, and amendement to the Clean Air Act. Earth Day of 1970, celebrated by millions of participants, represented the modern age of environmental thought.

One may define environmental movement as organized social activity consciously directed towards promoting sustainable use of natural resources, halting environmental degradation or bringing about environmental restoration. India has wide diversity of environmental movements involving members of one or more categories of omnivores, ecosystem people and ecological refugees. In this multiplicity of movements one may discern seven major strands. Two strands of these are exclusively focused on nature conservation, one on aesthetics, recreational or scientific grounds and the other on the basis of cultural or religious traditions. However, the dominant strands in the Indian environmental movement are those that focus on the question of equity. These have largely arisen out of conflicts between omnivores who have gained disproportionately from economic development and ecosystem people whose livelihoods have been seriously undermined through a combination of resource fluxes biased against them and a growing degradation of the environment. Such movements most often tend to involve a small group of socially conscious omnivores working with larger number of ecosystem people or refugess.

These movements can be called as 'the environmentalism of the poor' to distinguish them from the environmentalism born out of affluence that is such a visible presence in the advanced capitalist societies of the West. There are four broad strands within these movements. The first emphasizes the moral imperative of checking overuse and doing injustice

to the poor, and largely includes Gandhians. The second emphasizes the need to dismantle the unjust social order through struggle, and primarily attracts Marxists (Gadgil and Guha, 1995). The third and fourth gives importance to reconstruction, employing technologies appropriate to the context and the times. We will discuss about all these strands below. Before the beginning of this discussion it is necessary to mention briefly about the emergence of environmental sociology which shares a close relationship with environmentalism.

Environmental Sociology is a scientific and academic production, arising out ofthe social protest movement that arose in the early 1960's and the evidence of the situation caused by the degradation of natural resources and industrial development. The birth of the environmental movement in the 1960s surprised sociologists, as they did not have theoretical modelsto guide their understanding of the relation between society and nature during that time. However the pioneers of classical sociology Marx, Weber and Durkheim had tangentially touched upon the question. Of course one possible source of inspiration for contemporary sociologists seeking to engage with environment is the canon of classical sociologists (Hannigan 1995). Apart from the contribution of classical sociological thinkers, it is important to have knowledge of other perspectives like Gandhism, Ecofeminism, Anthropocentrism etc.In the previous unit, we have discussed about the emergence and scope of Environmental Sociology. In this unit, we shall learn about the various approaches to study Environmentalism. Let us begin our discussion with the contribution of the pioneers of classical sociology.

3.3 MARXISM

The three major classical sociological pioneers Emile Durkheim, Karl Marx and Max Weber had an implicit environmental dimension to their work which had never been bought to the fore. Some commentators have definitely been subdued about the usefulness of their work. However, it is the idea and knowledge of Karl Marx which has elicited the most extensive response from the present day environmental interpreters. Even if Marx

and his collaborator Engle were marginally concerned with environmental degradation, their analysis of social structure and social has become the starting point for many theories on the environment.

Let us begin our discussion with Marx's contribution towards the relationship between man and nature. According to Marx and F. Engle the capitalist mode of production not only alienated the proletariats (working class) from their product which they produced, from the fellow beings and from himself but also from nature itself. Capitalist Agriculture puts a quick profit from the land ahead of the welfare of both human and the soil. As the industrial revolution proceeded through the eighteenth and nineteenth centuries, rural workers were removed from the land and driven into crowded, polluted cities while the soil itself was drained of its vitality. Therefore capitalism was held responsible for a wide range of social ills, from overpopulation and depletion of natural resources to the alienation of people from the natural world with which they were united. Because of the above mentioned affects of capitalism, Marx and Engel suggested for the overthrow of capitalism as a solution to all these problems. They argued for the establishment of a new relationship between man and nature. However it is not clear what form of such a relationship should be. In Marx's early work the concept of the humanization of nature is proposed. This suggest that human will develop a new understanding of and empathy with nature. A vital question here is that whether this new understanding would be used solely for human emancipation or whether it would take a more ecocentric form in which the powers and capacities of non-human species would be enhanced. In the former case, the humanization of nature might in fact be deployed to eliminate species and organisms that threaten human health.

Contemporary Marxist theory emphasizes not only the role of capitalism but that of the state in fostering ecological destruction. Hanningan says both elected politicians and bureaucrat administrators are depicted as being centrally committed to proposing up the interests of capitalists investors and employers. John Bellamy has pointed towards Marx's theory of metabolic rift . According to him, Marx was wrongly accused of providing little insight into ecological crisis. In fact Marx provided a powerful analysis of the main

ecological crisis of his day: the problem of soil fertility within capitalist agriculture -as well as commenting on the other major ecological crisis of his time like the loss of forests, the pollution of the cities, and Malthusian specter of overpopulation. He has also raised fundamental issues about antagonism of town and country, the necessity of ecological sustainability, and what he called the 'metabolic' relation between human being and nature (Foster 1999).

Marx used the concept of metabolism to describe the complex interaction between society and nature. He observed that metabolism constitutes the fundamental basis on which life is sustained and growth and reproduction become possible. But by 1860s, this organic relationship was being seriously undercut by the practices of capitalist agriculture. Because landowners became profit oriented and they used the land to the optimal extent with the use of fertilizer, pesticides etc, landowners were accused of spoiling the natural fertility of the soil. This, of course, is exactly still occurring where monoculture prevails (monoculture is cultivation of single variety of crop for commercial purpose). Marx describes this as metabolic rift- the estrangement of human being from the natural world of the soil. This paralleled the estrangement of workers from their labour and was attributable to the same source- capitalism (Hanningan 2006). For Foster the importance of Marx's theory of metabolic rift lies not just in his repatriation of Karl Marx as an advocate of organic agriculture but also in his successful application of sociological thinking to the ecological realm (Foster 1999).

It is important to mention here that Marx appears to be an early advocate of organic farming methods which is evident from the fact that he wrote extensively on the benefits of spreading manure on crop lands, even suggesting that human waste from the city be recycled as fertilizers rather than polluting the rivers and oceans.



CHECK YOUR PROGRESS

Q1: Define Environmentalism.

Q2: Name three claasical sociologists who have contributed towards environmental Sociology.

Q3: What do you meant by metabolic rift?

3.4 GANDHISM

The first strand,we have mentioned in the introduction itself which emphasizes the moral imperative of checking overuse and doing justice to the poor is called 'crusading Gandhian'. It actually relies heavily on moral/ religious viewpoint in its rejection of modern way of life. Environmental degradation is viewed above all as a moral problem, its origins lying in the wider acceptance of the ideology of materialism and consumerism. Because both of these ideologies draw humans beingsaway from natureand it encourages wasteful lifestyles. Crusading Gandhians argue that the essence of 'Eastern' cultures is their indifference, even hostility, to economic gain. Thus if India were to abandon its pursuit of Western model of economic development, it would only be returning to its cultural roots. Therefore, these environmentalists call for a return to pre colonial and pre capitalists village society , which they uphold as the exemplar of social and ecological harmony. Crusading Gandhians have worked hard in spreading their message of moral regeneration not only across the country but also across the globe. They have sharply attacked the strange hold of modernist philosophies -particularly those upholding rationalism and economic growth.-on the Indian intelligentsia. With the help of both written and spoken word, they propagate an alternative non modern philosophy whose root lies in Indian tradition.



CHECK YOUR PROGRESS

Q4: Mention the Gandhian view on Environmental degradation

3.5 ECOLOGICAL MARXISTS

The second trend is just opposite of the first trend, which we have discussed above.As we know that Marxists see the problems in political and economic terms, arguing that it is unequal access to resources, rather than the questions of values, which better explains the patterns and process of environmental degradation in India. In this stratified society, the rich destroy nature in the pursuit of profit, while the poor do so simply to survive. For Ecological Marxists, therefore the creation of an economically just society is a logical precondition of social and ecological harmony. In their practical emphasis, socialist activists concentrate on organizing the poor for collective action, working towards their larger goal of the distribution of economic and political power (Gadgil and Guha: 1995). Ecological Marxists are most closely identified with People's Science Movement, whose initial concern with taking 'science to the people' has been widened to include environmental protection.

3.6 ECOFEMINISM

Ecofeminism can be defined and described in many ways. According to Besthornand McMillen (2002), the term was coined in the seventies by the French author Francoise d'Eaubonne. For d'Eaubonne the term was meant to describe how the human race could be saved by women initiating an ecological revolutionas a way to counter the oppression of women that is one and the same as the oppression and destruction of nature. Phrased like this, ecofeminism is ecological because the preservation ofecosystems is a prime objective, and feminist because it offers up ways torecognize and counter male favoritism.

Ecofeminism as a school emerged in the West as a product of the peace, feminist and ecology movements of the late 1970s and the early 1980s. It has been already mentioned that the The term"Ecofeminism" was coined by the French writer Francoise d'Eaubonne in 1974. Itwas further developed by Ynestra King in about 1976 and became a movement in1980, with the organization, in the same year, of the first ecofeminist conference -

"Women and Life on Earth: Ecofeminism in the 80s", at Amherst, Massachusetts,US (Spretnak 1990).

According to ecofeminist Ynestra King: "Ecofeminism is about connectedness and wholeness of theory and practice (it sees) the devastation of the earth and her beings by the corporate warriors, and the threat of nuclear annihilation by the military warriors as feminist concerns. It is the same masculinist mentality which would deny us our right to our own bodies and our own sexuality and which depends on multiple systems of dominance and state power to have its way"(King 1983).

Whenever women protested against ecological destruction, threat of atomic destruction of life on earth, new developments in biotechnology, genetic engineering and reproductive technology, they discovered the connections between patriarchal domination and violence against women, the colonized non-western,non-White peoples and nature. It led to the realization that the liberation of women cannot be achieved in isolation from the larger struggle for preserving nature andlife on this earth.

Ecofeminism is based on certain fundamental claims that point to the existence of important connections between the oppression of women and oppression of nature. It is essential to understand the nature of these connections in order to understand the oppression of women and nature, and finally, every feminist theory must include an ecological perspective and vice versa (Warren 1987).

Ecofeminism can be defined as a "value system, a social movement, and apractice… (which) also offers a political analysis that explores the links between androcentrism and environmental destruction. It is an "awareness" that begins with the realization that the exploitation of nature is intimately linked to Western Man's attitude toward women and tribal cultures.

Some feminist scholars like Carolyn Merchant (1992) have categorized ecofeminist theory into liberal, radical or socialist frameworks. For the ecofeminists of the liberal mode (as for liberal feminists in general),environmental problems are a result of the rapid exploitation of natural resources accompanied by the lack of regulation of pesticides and

other environmental pollutants. This can be overcome by a social production that is environmentally sound. For this, one requires better science, conservation and laws. With equal educational opportunities, women can become scientists, natural resource conservators, lawyers, and so on like men. Thus, these ecofeminists attempt to change human relations with nature through the passage of new laws and regulations.

Ecofeminists with a radical bent analyzed environmental problems from within their critique of patriarchy and offered alternatives that could liberate both women and nature (Merchant 1990, p. 93).This perspective draws from the now famous article by Sherry Ortner, Is Female toMale as Nature is to Culture? (1974). The ecofeminists celebrate the relationship between women and nature through the popularization of ancient rituals centered on the Mother Goddess, the moon, animals and the female reproductive system. This prehistoric era, centered on goddess worship, was dethroned by an emerging patriarchal culture with male gods to whom the female deities were subservient. Nature was further degraded by the Scientific Revolution of the 17th century, that replaced the nurturing earth with the "metaphor of a machine to be controlled and repaired from outside...The earth is to be dominated by male developed and controlled technology, science and industry"(Merchant 1992, p. 191).

3.7 ANTHROPOCENTRISM

Anthropocentrism , in its original connotation in environmental ethics, is the belief that value is human-centered and that all other beings are means to human ends. Environmentally concerned authors have argued that anthropocentrism is ethically wrong and is at the root of ecological crisis. Since the early days of environmental ethics there has been discussion and debate about whether values in nature are anthropocentric (human centered) or ecocentric (non-human cenrered). Many have argued that anthropocentrism is inevitable and even benevolent for the aim of environmental protection. On the other hand the other group argues that anthropocentrism is inadequate for biodiversity conservation.

Let us begin our discussion with the definition of Anthropocentrism. According to Oxford English Dictionary Anthropocentrism is "regarding humankind as the central or most important element of existence". Human chauvinism is one aspect of anthropocentrism, not a new definition. One can either accept that other species and life processes have moral value (ecocentrism) or not (anthropocentrism). Anthropocentrism is a vague and perhaps in some ways misused term, meaning literally just human-centeredness,in common usage it refers to human centered values. As such, things can be human-centered in all sorts of ways. It is common in environmental ethics, biological conservation, and social science circles to conflate various meanings.

Author like Hayward says anthropocentrism means two things. First in discussing changing human actions, he is essentially advocating centering our efforts on humans, which is centrally a kind of anthropocentrism. Second he is promoting an ethics that does not include only human beings. It is important not to commit the fallacy of false equivalence by confusing the two.

John Passamore in 1974 in his book Man's responsibility of nature establishes himself as an early and prominent anthropocentric environmental ethicist. He dismisses claims that it would be intrinsically wrong to destroy a species, cut down a tree, clear wilderness" as merely ridiculous. Passamore's view define narrow anthropocentrism, which is characterized by an embrace of traditional human-centered ethics that isolate human from environment. Narrow anthropocentrism believes human alone posses value, human effort on behalf of non-human nature are driven by a desire to serve human needs.

Anthropocentrism as an ideology is egotistical and solipsistic, obsessed only with humans. Yet humans actually do love animals, trees, rivers and landscape and many indigenous cultures attributed values and respect to them. Anthropocentrism is clearly a significant driver of ecocide and environmental crisis, for society has been madly pursuing project 'human planet'without considering that humanity is fully dependent on nature. According to many environmental scientists, Anthropocentrism cannot lead

us to a sustainable future. Ecocentrism in contrast accepts that we are part of nature, and have a responsibility to respect the web of life and heal the damage caused by the ideological dominance of anthropocentrism.



CHECK YOUR PROGRESS

Q5: What is meant by ecofeminism?

Q6: Define anthropocentrism.

3.8 NEW ECOLOGICAL PARADIGM (NEP)

In the 1970s, scholars began recognizing the limits of what would be termed the Human Exceptionalism paradigm (HEP).The HEP captures the notion that humans, because of our exceptional characteristics relative to other species, were seen as being "exempt" from ecological constraints.In contrast they argued that within at least some work in environmental sociology one could discern an alternative paradigm or set of background assumptions. Dunlap etal (2002) mentions that by calling attention to the relevance of the physical environment and constraints that a finite planet poses for our species, the New Ecological Paradigm (NEP) offers a sharply contrasting image of human societies relative to that provided by the HEP. The HEP leads to a view of the environment as something to be controlled by human beings for their own ends, and of humans as having the ability to exert such control. It is certainly a stance traditionally taken by enginners whose role is to transform nature through the applications of science.

In contrast to the HEP, Catton and Dunlap's "new environmental paradigm" or 'new ecological paradigm" suggested a new perspective that took environmental variables into full account. They coined the New Ecological Paradigm, with assumptions contrary to HEP. The NEP leads adherents to view natural environment as an essential context of human social life, to see such environment as potentially fragile and limited in resources and also exercising constraints on the realization of human objectives. However, there is no doubt that whilethe NEP recognizes the innovative capacity of

humans, it also says humans are still ecologically interdependent as with other species. The NEP notes the power of social and cultural forces but does not profess social determinism. Instead, humans are impacted by the cause, effect, and feedback loops of ecosystems. The Earth has a finite level of natural resources and waste repositories. The NEP assumptions represents an argument that the fundamental features of human species is its biological relationship with nature.

The HEP/ NEP schema of Catton and Dunlop has had a curious influence on environmental sociology. On one hand their work has been widely read and often cited , especially on theoretical oriented papers, and is the point of departure for most important recent works in environmental sociology. In particular Catton and Dunlap's argument on the anthropocentric /unecological legacy of the classical sociological tradition is widely acknowledged by observers from a variety of theoretical stripes. On the other hand there has yet been relatively little fleshing out of board paradigmatic axioms of the NEP into more precise theoretical statements and hypotheses.

The other major application of the NEP in empirical sociological research has been in sample survey studies. In these studies the NEP is constructed not as set of domain assumptions that guide sociological inquiry, but rather as a set of cognitive beliefs held by segments of the public at large. The object of this research has been to develop empirical attitudinal indexes of the NEP and HEP and to examine the correlates of these beliefs and changes in beliefs.

The more that environmental sociologists and the world learn about current environmental conditions, the more the shift in stance towards the NEP. According to Dunlap and his colleagues yet the policy makers are endorsing the NEP. According to Olsen etal (1992) the resulting conflicts in perspectives provide a rich topic for sociological research



3.9 LET US SUM UP

- Environmentalism denominates a social movement that seeks to influence the political process by lobbying, activism, and education in order to protect natural resources and ecosystems.
- The three major classical sociological pioneers Emile Durkheim, Karl Marx and Max Weber had an implicit environmental dimension to their work which had never been bought to the fore.
- Marx used the concept of metabolism to describe the complex interaction between society and nature. He observed that metabolism constitutes the fundamental basis on which life is sustained and growth and reproduction become possible.
- The first strand in environmental movement which emphasizes the moral imperative of checking overuse and doing justice to the poor is called 'crusading Gandhian'. Environmental degradation is viewed above all as a moral problem, its origins lying in the wider acceptance of the ideology of materialism and consumerism. Because both of these ideologies draw human beings away from nature and encourage wasteful lifestyles.
- For Ecological Marxists, the creation of an economically just society is a logical precondition of social and ecological harmony.
- According to Besthorn and McMillen (2002), the term ecofeminism was coined in the seventies by the French author Francoise d'Eaubonne.
- For d'Eaubonne the term was meant to describe how the human race could be saved by women initiating an ecological revolution as a way to counter the oppression of women that is one and the same as the oppression and destruction of nature.
- Ecofeminism as a school emerged in the West as a product of the peace, feminist and ecology movements of the late 1970s and the early 1980s.

- Ecofeminism is based on certain fundamental claims that point to the existence of important connections between the oppression of women and oppression of nature.
- Ecofeminism can be defined as a "value system, a social movement, and a practice… (which) also offers a political analysis that explores the links between androcentrism and environmental destruction.
- Ecofeminists with a radical bent analyzed environmental problems from within their critique of patriarchy and offered alternatives that could liberate both women and nature (Merchant 1990, p.
- Anthropocentrism , in its original connotation in environmental ethics, is the belief that value is human-centred and that all other beings are means to human ends.
- Environmentally concerned authors have argued that anthropocentrism is ethically wrong and is at the root of ecological crisis.
- The HEP captures the notion that humans because of our exceptional characteristics relative to other species, were seen as being "exempt" from ecological constraints.
- The HEP leads to a view of the environment as something to be controlled by human beings for their own ends, and of humans as having the ability to exert such control. It is certainly a stance traditionally taken by engineers whose role is to transform nature through the applications of science.
- The NEP leads adherents to view natural environments as an essential context of human social life, to see such environment as potentially fragile and limited in resources and also exercising constraints on the realization of human objectives.



3.10 FURTHER READING

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3.11 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No 1: Environmentalism denotes a social movement that seeks to influence the political process by lobbying, activism, and education in order to protect natural resources and ecosystems. Environmentalism as a movement covers broad areas of institutional oppression. Examples of these oppressions are: consumption of ecosystems and natural resources into waste, dumping waste into disadvantaged communities, air pollution, water pollution, weak infrastructure, exposure of organic life to toxins, mono culture, anti-polythene drive (jhola movement) and various other focuses.

Ans to Q No 2: Karl Marx , Max Weber and Emile Durkheim.

Ans to Q No 3: Marx used the concept of metabolism to describe the complex interaction between society and nature. He observed that metabolism constitutes the fundamental basis on which life is

sustained and growth and reproduction become possible. But by 1860s, this organic relationship was being seriously undercut by the practices of capitalist agriculture. Because landowners became profit oriented and they used the land to the possible extent and the use of fertilizer, pesticides etc. Landowners were accused of spoiling the natural fertility of the soil. This is of course, is exactly still occurring where monoculture prevails (monoculture is cultivation of single variety of crop for commercial purpose).Marx describes this as metabolic rift- the estrangement of human being from the natural world of the soil.

Ans to Q No 4: The perspective on environmentalism, which emphasizes the moral imperative of checking overuse and doing justice to the poor is called 'crusading Gandhian'. It actually relies heavily on moral/ religious viewpoint in its rejection of modern way of life. Environmental degradation is viewed above all as a moral problem, its origins lying in the wider acceptance of the ideology of materialism and consumerism.

Ans to Q No 5: Ecofeminism can be defined as a "value system, a social movement, and a practice… (which) also offers a political analysis that explores the links between androcentrism and environmental destruction. It is an "awareness" that begins with the realization that the exploitation of nature is intimately linked to Western Man's attitude toward women and tribal cultures.

Ans to Q No 6: Anthropocentrism , in its original connotation in environmental ethics, is the belief that value is human-centred and that all other beings are means to human ends.



3.12 MODEL QUESTIONS

Short Questions (Answer each question in about 150 words)

Q 1: Write a brief note on Ecological Marxists.

Q 2: Distinguish between HEP and NEP.

Long Questions ((Answer each question in about 300-500 words)

Q1: Write a note on major strands in Indian Environmentalism.

Q2: Evaluate the works of Karl Marx in understanding the relationship between environment and society.

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UNIT 4: DIFFERENT TYPES OF ENVIRONMENTALISM

UNIT STRUCTURE

4.1 Learning Objectives
4.2 Introduction
4.3 Concept of Environmentalism
4.4 Deep Ecology
4.4.1 Principles of Deep Ecology
4.4.2 Environmental Values: Religious Sources
4.4.3 Respect towards Environment
4.5 Social Ecology: Meaning and Concept
4.6 Radical Ecology
4.7 Let Us Sum Up
4.8 Further Reading
4.9 Answers to Check Your Progress
4.10 Model Questions

4.1 LEARNING OBJECTIVES

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

- understand the concept of Environmentalism in an elaborate way
- understand the concept of deep ecology
- explain the concept of social ecology
- discuss the concept of radical ecology.

4.2 INTRODUCTION

Awareness of our delicate relationship with our habitat likely arose among early hunter-gatherers when they saw how fire and hunting tools impacted their environment. Anthropologists have found evidence of human-induced animal and plant extinctions from 50,000 BCE, when only about 200,000 Homo sapiens roamed the Earth. We can only speculate about how these early humans reacted, but migrating to new habitats appears to

have been a common response.Some of the earliest human stories contain lessons about the sacredness of wilderness, the importance of restraining our power, and our obligation to care for the natural world.

According to Del Mar (2014), environmentalism explores recurring tensions between science and emotion, protection and conservation. The former establishes a sensible, sustainable way of interacting with nature which provides humans with basic necessities from building materials to fresh air. Environmentalism is not an attempt to solve specific problems and its not an attempt to protect nature from unnecessary destruction. Environmentalism is a political doctrine. It is an expression of worldview of certain groups. Sociologists have been studying environmentalism since 1970s.The early study was on the radical and conservative form of environmentalism and documented the social basis of environmental concern. In recent years sociologists have tended to set the analysis of environmentalism with broader study of social movements.

The last few decades have witnessed serious concerns at all levels local-regional,national and international regarding the environmental degradation and its cruel impact onboth the human and non-human habitat. The sustainability factor of planet earth hasbecome a point of debate and there has been a reiteration of reviving the local culturesand customs that are eco-friendly. Numerous debates have been on the rise about environmental values, duties and rights. These debates are crucial in the backdrop offast eroding natural resources and the possible debilitating impact on the ecology. Today this relation has taken a strenuousturn, thus leading to pollutions of all kinds- air, water, soil, land etc. Further, there hasbeen an increasing level of consciousness towards environmental protection and saving the planet earth. Several conventions, conferences, debates etc., are being held todiscuss issues related to pollution, environmental degradation, soil erosion, deforestationand so on. Almost all the sections of society like the environmental groups, academicians and policy makers are now showing active interest in restoring the natural habitat. In the previous Units, we have already discussed in brief the concept of Environmentalism.In

this Unit, we shall further elaborate the concept of Environmentalism. We shall also discuss the different types of Environmentalism

4.3.1 Concept of Environmentalism

We have already learned in the previous unit that Environmentalism is a political and ethical movement that seeks to improve and protect the quality of the natural environment through changes to environmentally harmful human activities; through the adoption of forms of political, economic, and social organization that are necessary treatment of the environment by humans; and through a reassessment of humanity's relationship with nature. Environmentalism states that the living things other than humans, and the natural environment as a whole, deserve consideration in reasoningthe morality of political, economic, and social policies.

Environmentalism can also be defined as a theory that views environment rather than heredity as the important factor in the development especially cultural and intellectual development, of an individual or groupand an advocacy of the preservation, restoration, or improvement of the natural environmentespecially the movement to control pollution.

Environmentalism or environmental rights is a broad, philosophy, ideology, and social movement concerning environmental protection and improvement of measures that seeks to incorporate the impact of changes to the environment on humans, animals, plants and non-living matter. Environmentalism focuses more on the environmental and nature-related aspects of green ideology and politics. Ecology is more commonly used in continental European languages while 'environmentalism' is more commonly used in English but the words have slightly different connotations.

Environmentalism advocates the preservation, restoration and/or improvement of the natural environment and critical earth system elements or processes such as the climate, and may be referred to as a movement to control pollution or protect plant and animal diversity. Environmentalism strives to balance relations between the humans and natural systems on which they depend in a sustainable way.

4.4 DEEP ECOLOGY

The concept of deep ecology, it may be noted according to the Wikipedia, is a contemporary ecological philosophy that recognizesan inherent worth of other beings, aside from their utility. It also states that unlike other branches of sciencesthat view ecology more as a biological science, 'deep ecology seeks a more holistic view of the world humans live in and seeks to apply to life the understanding that separate parts of the ecosystem (including humans) action as a whole'.

The term 'deep ecology' was coined by the Norwegian philosopher Arne Naess, who did not believe in the relative ranking of the beings, such as humans having more claims than other beings in their existence. To him, all have an equal right to life, a right that is universal in nature. No single being or species can claim specific rights to live, while depriving or denying it to others.Similar views have been propounded by Bill Devall and George Sessions in their workon Deep Ecology (1985). Holding the view that everything is connected to everything else, they observe the changing trends of emerging deep ecological consciousness that goes beyond anthropocentrism.Deep ecology contends that the self should identified with all living beings as everything and every being is created by the creator of the universe,the Supreme Being. It is a process of self-realisation and re-connecting with the plant,animal and ecosystem all together. The Indian culture and civilisation has been very much in harmony with this concept if we understand the real meaning of deep ecology. Our ancestors believed in the harmonious co-existence of nature and human beings and had better realisation as to what the ill-effects of the disharmony are, when it arises.

4.4.1 Principles of Deep Ecology

Devall and Sessions elucidated the principles of deep ecology in their mentioned work Deep Ecology (1985). They forward the views of the proponents of deep ecology who believe that the world is not freely available to the human beings to indulge in over-exploitation of resources. The eight-tier platform, as they call it, is given as under:

- The well-being and flourishing of human and nonhuman life on earth have value in themselves (synonyms: intrinsic value, inherent value). These values are independent of the usefulness of the nonhuman world for human purposes.
- Richness and diversity of life forms contribute to the realization of these values and are also values in themselves.
- Humans have no right to reduce this richness and diversity except to satisfy vital human needs.
- The flourishing of human life and cultures is compatible with a substantial decrease of the human population. The flourishing of nonhuman life requires such a decrease.
- Present human interference with the nonhuman world is excessive, and the situationis rapidly worsening.
- Policies must therefore be changed. These policies affect basic economic, technological,and ideological structures. The resulting state of affairs will be deeply different from the present.
- The ideological change is mainly that of appreciating life quality (dwelling in situationsof inherent value) rather than adhering to an increasingly higher standard of living.There will be a profound awareness of the difference between big and great.
- Those who subscribe to the foregoing points have an obligation directly or indirectly to try to implement the necessary changes.

4.4.2 Environmental Values: Religious Sources

While much has been debated and discussed on the role of governmental, nongovernmental,judicial and other agencies, inadequate attention has been paid to the role and responsibility of the citizens towards environmental values and behaviour. Some of the environmental threats include excessive emission levels, heavy usage of the energy consuming gadgets, littering one's surroundings, unsustainable consumption levels, increased domestic waste including e-waste and dumping of harmful and hazardous medical waste. Thematerialistic consumption is now being calculated as the measuring standard of human development, leaving behind

the basic issues of health care, sanitation, and hygiene,which are much more crucial to human health. Most importantly, the environmental values are being inadequately inculcated in the present times and generation.

Almost all the religions of the world have, in a direct or indirect manner, referred to the protection of environment as a fundamental duty of the mankind. The philosophy and way of life, especially in ancient India, was 'living in tandem with nature'. The guidelines were based on the Hindu philosophy that enshrined the principles of worshipping nature (other religions were unknown during the ancient times) including rivers, forests, earth, sky, air, water,plants and animals. The cutting of trees, air, water and land pollution were considered as evil acts and the natural calamities like floods, droughts, and earthquakes were considered as violent forms of anger manifested by the gods and goddesses. While worshipping of trees and plants was regarded as bestowing of prosperity, purity of word, thought and action, respect to animals and birds were considered as sacred duty for these were taken as the mounts of gods and goddesses. Violence was also forbidden to animals and other creatures emphasising the principle of equality of all living creatures. Consequently,these acts have taken religious connotations but carried the undertones of utility and medicinal values apart from creating a sense of spirituality.

Christianity underlines the importance of nature and God alone is considered as the sole owner of the nature. As in other religions, Islam too acknowledges God's creation as the foundation of life on this earth. The harmony and balance need to be maintained not only between individuals but also with other creatures. Man is only a guardian of nature, which is God's creation; he is definitely not the owner. Any alteration to God's creation is unacceptable in this religion and is considered as sinful.

4.4.3 Respect towards Environment

Science and Technology have changed the course of our lives in an unprecedented manner. While it is perceived as the cause of the current state of environmental degradation,it is also viewed as an effective way to combat the environmental degradation through environmental-friendly

technology. There is a need for a change in the way 'individualsthink about and interact with their environment. 'If respect for environment is to beachieved an ecological crisis has to be averted'.

4.5 SOCIAL ECOLOGY: MEANING AND CONCEPT

Social ecology studies relationships between people and their environment the interdependence of people, collectives and institutions. Social ecology, which evolved out of biological ecology, human ecology, systems theory and ecological psychology, takes a broad, interdisciplinary perspective that gives greater attention to the social, psychological, institutional, and cultural contexts of people-environment relations.

Social ecology as a concept was introduced in 1965. Social ecology gives an ethical content to the natural core of society and humanity that takes on the responsibility of suggesting and elaborating about man and environment. The philosophical base of social ecology lies in the idea that the real background on which the ecological future of the planet will be decided is clearly a social one. Social ecology rests on the awareness of the interdependence of the biophysical and socio-cultural domains. The significant position of social ecology lies in the association it establishes between society and ecology, the social conceived as a fulfilment of the latent dimension of freedom in nature, and the ecological conceived as the organising principle of social development-in short, the guidelines for ecological society humanity.

An emphasis on small-scale economic structures and the social dimensions of the ecological crisis also is a feature of the school of thought known as social ecology, whose major proponent was the American environmental anarchist Murray Bookchin. Social ecologists trace the causes of environmental degradation to the existence of unjust, hierarchical relationships in human society, which they see as endemic to the large-scale social structures of modern capitalist states. Accordingly, they argue that the most environmentally sympathetic form of political and social

organization is one based on decentralized small-scale communities and systems of production.

The basic categories of social ecology are; culture, polity, social structure, economy and ecological infrastructure. The power of social ecology lies in the association it establishes between society and ecology, the social conceived as fulfilment of the latest dimension of freedom in nature, and the ecological conceived as the organising principle of social development-in short, the guidelines for an ecological society. Social ecology offers a different analysis to understand the development of technology. The comprehensive theory developed by Albert Borgmann (1984) has been recognised by the contemporary scholars for its theoretical significance.

Borgmann's theory of technology argues that every daily life is characterized by events and activities that are attached with significance. They provide focal points from which we evaluate and orient rest of our lives. These focal activities, and other activities to varying degrees, are embraced by contexts that include, depending on individual circumstances, social, cultural, political, economic, spiritual, and ecological factors. In Borgmann's view the contemporary pattern, namely technology, threatens the stability and viability of these practices and contexts. Some of the social ecologists view technology as a force that determines human relationship, ways of life and all the more it is the liberation from technological overinfluence that would ensure freedom. Borgmann and Bookchin have provided certain measures. Borgmann suggests having a reform strategy with a two-sector economy. In this, local community based economy is elevated to a point where large-scale industrial activity serves the interests of local economies. Bookchin suggests 'proposal of flourishing alternative technologies' to overcome this influence and should ensure that any social function should be considered as part of the ecological processes. Murray Bookchin" Critique of Social Ecology The theoretical analysis of 'social ecology', based on social anarchism, has been severely criticised, especially due to its 'too rigid dogmatic approach' to the Marxian ideology.

4.6 RADICAL ECOLOGY

Radical environmental activism is a distinct form of environmental policy that emerged in the late 1970s and 1980s. Radical environmentalists protest the methods and policies are conservative and accepted to government and industry and their failure to achieve environmental goals. Radical environmentalists are people who are willing to use direct-action tactics to obstruct and prevent state sanctioned activities that they perceive as being environmentally harmful. Some of the radical organizations are Earth First, Environment Liberation Front and Sea Shepherd Conservative Society.

There is now one dominant global culture, an ever expansionist and predatory industrial capitalism, valuing profit above life. A system that reduces the entire natural world like mountains, forests, oceans, plants and animal species (including human beings) into resources to be ordered, controlled, used and exploited in the pursuit of material growth and economic development - this ever more suffocating technocratic system is destroying the ecology of life. Radical ecology points out that solutions to a crisis of this scale involve far more than technological fixes or market incentives. How can there be market based or consumer driven solutions unless we realise that an economic system that regards the natural world as so many resources to be bought, sold, and co-modified is deeply irreconcilable with a truly ecological sensibility? How can we hope that legislation and regulation will be adequate while our political systems continue to support the disempowerment of the majority of humankind, and drift inexorably towards life boat authoritarianism?

Compared to both deep ecology and social ecology, radical ecology searches for a sustainable and social world from the transformation of the various factors that exist both within our individual consciousness and which are inscribed in our social-economic, political-judicial and technological systems, in a way that highly determines our lives.Radical ecology is a critical encounter, a working out through thought and praxis, of how we can really envision, embody and realise both methods to resist the destructive

march due to growth of industry for increase in socio-economy, and effects that change for a new way of living with the natural world. It includes work and experiments in non-hierarchical social forms, new economics, process oriented science, and a revitalised spirituality. Its visionary nature inspires many people forming the anti-globalisation movement and practitioners of direct action, as well as many working in mainstream political fields, ecological conservation, the organic agriculture and perm culture movements and many fighting for the rights of indigenous people.



CHECK YOUR PROGRESS

Q1: What is environmentalism theory?

Q2: Who started environmentalism?

Q3: What are the chief concerns of environmentalism?

Q4: What is the purpose of environmentalism?

Q5: What are the distinguishing characteristics of environmentalism?



4.7 LET US SUM UP

- In this Unit we have learned that, shallow environmentalism is human-centred. It views humans as somehow above or outside nature, the pinnacle of evolution, as the source of all value, and ascribes only instrumental or 'use' value to nature which humans are variously entitled to dominate, control or (in slightly softer terms) steward. In this way it perpetuates many of the fundamental world views which have fuelled our collision course with ecological disaster. Deep ecologists also claim that humans need to regain a "spiritual" relationship with nonhuman nature. By understanding the interconnectedness of all organisms including humans in the ecosphere and empathizing with nonhuman nature, they argue,

humans would develop an ecological consciousness and a sense of ecological solidarity.

- Deep ecology asks ever deeper questions about the very foundations of our modern, scientific, industrial, growth-oriented, materialistic worldview and way of life. It challenges this paradigm from an ecological perspective: from the perspective of our profound interconnectedness with one another, with future generations, and to the web of life.
- Social ecology augments deep ecology with its analysis of the way in which patterns of social organisation such as patriarchy, capitalism and imperialism are central to the current ecological crisis. Social ecologists have pointed out how the exploitation of nature has gone hand in hand with the exploitation of other humans in various hierarchical, militaristic, capitalist and industrialist forms. They point out that social transformation does not simply lead from a change of consciousness, but also requires radical restructuring of the socio-economic system.



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2) (https://www.merriam-webster.com/dictionary/environmentalism).

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4.9 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No 1: A theory that views environment rather than heredity as the important factor in the development, especially cultural and intellectual development, of an individual or group;advocacy of the preservation, restoration, or improvement of the natural environment especially: the movement to control pollution.

Ans to Q No 2: The environmental movement began to take shape in North America when John Muir, one of the earliest environmentalists, convinced the U.S. congress to create the Yosemite National Park to preserve the beautiful valley.

Ans to Q No 3: Concepts dealing with environmental issues include the management of natural resources, overpopulation, commercial logging, urbanization and global warming. The effects of human

development ad activity have harmed and altered the earth's natural state.

Ans to Q No 4: Environmentalism is mainly concerned about creating awareness about the importance of the environment to humans. It aims to: (a) change how people treat the environment, (b) protect the environment through public policy, and (c) make people aware of how they affect the environment.

Ansto Q No 5: Environmentalism is a broad philosophy, ideology, and social movement regarding concerns for environmental protection and improvement of the health of the environment, particularly as the measure for this health seeks to incorporate the concerns of non-human elements.



4.10 MODEL QUESTIONS

Short Questions (Answer each question in about 150 words)

Q1: What is meant by Deep Ecology?

Q2: Elaborate the principles associated with deep ecology.

Long Questions (Answer each question in about 300-500 words)

Q1: What are the different religious sources that enumerate the environmental values?

Q2: Describesocial ecology and radical ecology with examples.

Q3: Describe radical ecology and its significance for environment.

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UNIT 5: CULTURE, GENDER AND ENVIRONMENT

UNIT STRUCTURE

5.1 Learning Objectives
5.2 Introduction
5.3 Culture-Environment Relationship
5.3.1 Environmental Determinism
5.3.2 Environmental Possibilism
5.3.3 Cultural Ecology
5.3.4 Cultural Materialism
5.4 Social Structure and Natural Resources
5.5 Eco-Feminism
5.6 Women and Protection of the Commons
5.7 Let Us Sum Up
5.8 Further Reading
5.9 Answers to Check Your Progress
5.10 Model Questions

5.1 LEARNING OBJECTIVES

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

- understand the relationship between culture and environment
- explain the relationship between social structure and natural resources
- discuss the role of women in the protection of the commons.

5.2 INTRODUCTION

Culture describes patterns of learned human behaviour that form a durable template by which ideas and images of one generation can be transferred to another generation. Culture- environment relationship or nature-society interface, in the recent years has tended to be relegated to the fringes of discussions, as post-modernism and culturalist perspectives have dominated the centre stage of theoretical developments in the social

sciences generally There are a number of reasons why this theme is now in the forefront of the public agenda, one of them being the ongoing changes in the culture-environment relationship, with sociologists is getting an opportunity to use their competence to address debated environmental issues such as the mechanisms of a sustainablemode of livelihood in non-industrial societies, the scope and status of indigenous or traditional knowledge and techniques of resource management, the ideological foundations of conservationist movements, the challenges coming up in the wake of climate change etc.In this unit, we will be basically studying and understanding of the culture-environment relationship.

5.3 CULTURE-ENVIRONMENT RELATIONSHIP

The environment refers not to biophysical context, but also to human interaction with, and interpretation of that context which is culturally perceived; the environment, therefore, is not just a set of things to which people adapt, but also a mutual adaptation between culture and material context. According to Anderson (1977), in common usage, studies that deal in any way with man-environment relations are labelled 'ecological'. Ecology is the study of relationship between living organisms and their natural environment. Anderson pointed out that it is not equivalent to environment, although it is frequently used in this sense. It does not, in any strict sense, refer to the unforeseen consequences of many of man's activities, as in the phrase 'ecological disaster'; neither it is synonymous with conservation, narrowly construed. He preferred to define ecology as 'the study of entire assemblages of living organisms and their physical milieus, which together constitute integrated systems'. This definition in his view has the advantage of providing a framework that includes the study of all species. Moreover, environment in this view is seen not as external, but as an integral component of the total system- the 'givens' of the system.

5.3.1 Environmental Determinism

According to the theory of environmental determinism, environmental features have a direct impact on the features of human behaviour, and thus,

on human society. It is based on the belief that the patterns of human culture and societal development are determined by the environment (most notably its physical factors such as landforms and/or climate). The German scholar Friedrich Ratzel was impressed by the influence of the natural setting on the ways of life of peoples and held the view the habitat of a people cannot be neglected in assessing those influences that play on the formation and functioning of culture. However, his followers changed this to a more rigid formulation, which held that the habitat is the determining factor in shaping a way of life, which is called environmental determinism.

5.3.2 Environmental Possibilism

The early work of American anthropologists like that of Goldenweisser (1937) was characterised by a stress on historical and cultural descriptions, which focused on the uniqueness of human groups. Environment acts as an inert force that narrows human options and no dynamic role was played in surfacing of observable human traits or institutions. In The Mind of Primitive Man (1911), Boas noted that the environment furnishes the material out of which people shaped and developed the artefacts of daily life.Out of these basic works, thus, grew the theory of environmental possibilism or the particularist position that cultures, environments and histories are so variable that any generalisation is difficult. The development of social and cultural patterns, was recognized by the theory recognizes and it has paid sufficient attention to variation- the extent to which human beings has altered his environments and how subsistence patterns were moulded by social organisation and belief.

5.3.3 Cultural Ecology

We have already read about the concept of Cultural Ecology in Unit 1. In this section we shall be discussing about the concept of cultural ecology in greater details. During the 1950s, scholars witnessed one of the seminal works regarding the relationship between culture and environment, which remains to this day, a legacy that informs the dominant stream of interactional- analytical thinking on this issue. This was Steward's basic

notion of 'adaptive interaction', which is the basis for his Cultural Ecology. His theory of Cultural Ecology stands intermediate between the deterministic and possibilist position and refers to 'a reciprocal or interactional phrasing of man-environment relations neither which assumes that man nor environment is necessarily. Steward developed Cultural Ecology as a framework for causal explanation of cultural differences and similarities. He seized on ecological considerations and environmental influences as a remedy to cultural relativism and 'the fruitless assumption that culture comes from culture'. Steward was generally familiar with the ecological and biological principles of his time and felt that the principal meaning of Ecology was adaptation to environment. Steward framed his approach in terms of adaptation and the adaptive processes through which a historically derived culture is modified in a particular environment, arguing on analytical and empirical grounds that over the millennia, cultures in different environments have changed tremendously, and these changes are basically traceable to new adaptations required by changing technology and productive arrangements. Thus, the method of Cultural Ecology developed by him stressed on technology, asserting that the key to the adaptation of a culture is its technology. Steward was concerned with cross-cultural comparisons and with the causal connection between social structure and modes of subsistence. The crucial focus in his approach was neither on environment nor culture. Rather, the process of resource utilisation, in its fullest sense, was research priority. The cultural ecological approach proposed by him involved both a problem and a method. The problem was to test whether the adjustment of human societies to their environments required specific type of behaviour or whether there is considerable latitude to human responses. The method, according to him, involved three procedures:

- To analyse the inter-relationship of exploitative or productive technology and environment.

  To analyse the behaviour patterns involved in the exploitation of a particular area by means of a particular technology.

- To ascertain the extent to which the behaviour pattern entailed in exploiting the environment affect other aspects of culture.

According to Moran (1984), the value of Cultural Ecology lies in the fact that from the broad generalities of the environmental determinists and the detailed inductive findings of the possibility, Steward proposed a research method that paid both careful attention to empirical details that causally linked the cognized environment, social organisation, and the behavioural expressions of human resource use.

5.3.4 Cultural Materialism

Cultural materialism is a theoretical framework and research method for examining the relationships between the physical and economic aspects of production and built society, social organization and social relations, and the values, beliefs, and worldviews that predominate that society.Marvin Harris attempted to explain ecology and culture by developing an explicit and systematic scientific research strategy, which is called as cultural materialism. Harris and his students applied this research strategy to explain arbitrary religious beliefs and customs in terms of ecological adaptation. He argued that one must take this whole system into account if one wants to understand why cultures differ from place to place and group to group, why certain cultural products like art and consumer goods (among others) are produced in a given place, and what their meaning is to those who use them.

Later, Raymond Williams, a Welsh academic, further developed the theoretical paradigm and research method, and in doing so, helped create the field of cultural studies in the 1980s. Embracing the political nature of Marx's theory and his critical focus on power and the class structure, Williams's cultural materialism took aim at how culture and cultural products relate to a class-based system of domination and oppression. Williams built his theory of cultural materialism using already existing theoretical critiques of the relationship between culture and power, including the writings

of Italian scholar Antonio Gramsci and the critical theory of the Frankfurt School.

5.4 SOCIAL STRUCTURE AND NATURAL RESOURCES

The conception of social structure as rules and resources is now distinctly associated with Anthony Giddens, who elaborates his meaning of structure as 'Structures can be analysed as rules and resources, which can be treated as 'sets' in so far as transformations and mediations can be identified between the reproduced properties of social systems'. Social structure consistsof those patterns of relationships that Giddens refers to as social systems.According to Giddens, such patterns of relationships do not themselves constitute social structure rather; the structure consists of the rules and resources associated with those relationships. The structure refers to the actual organization of society - the distribution of income, the division of labor, etc., whereas for Giddens, structure refers to an organizing principlebehind the actual organization, namely rules and resources.

Resources provide us with our final conceptual link between social activity in organizations and the surrounding social structure. Resources similarly can be distinguished according to whether they derive from the organization itself or from the surrounding social structure. Organizational resource are the kind most familiar to organizational sociologists access to funds, information, communication channels, and institutionalized means of enforcing compliance with decisions. These resources are available to groups in organizations on the basis of their functional role position. To the degree that class distinctions are synonymous with functional distinctions in an organization, organizational resources will be synonym with another dimension of resources those that derive from the broader society." This second range of resources is available to groups in organizations on their position in the class structure. The mobilization of either type of resource is an important determinant of the outcome of conflicts and thus the course of change in organizations.Resources are the one that is critical in linking structures of authority in organizations to historical changes in social structure. Large scale changes in social structure shift the availability of a

wide range of resources to classes represented in an organization. These resources are any variety of social or material factors which can be brought t o bear on class relations for the purpose either of changing or maintaining them. This can include simple property ownership, recourse t o a large pool of liquid assets,access to organized means of coercion, and even possessionof skills or education all of which can be used t o maintain or change existing relations. The control over various factors of production land, labor,capital is a prime example of a kind of resource crucial inshaping group relations the availability of which shifts with large-scale changes in social structure.

5.5 ECO-FEMINISM

We have discussed about Eco-Feminism in the previous unit. But an elaborate understanding of Eco-feminism is required in this context to understand the relationship between gender and environment. Here we shall learn about Cultural Eco feminism, Social Eco feminism so on and so forth. Eco-feminism as a theory is a combination of ideas that support the fight for women's empowerment and that of a viable, sustainable environment. Braidotti (1994) defines eco-feminism as 'the feminist position most explicitly concerned with environmental degradation'. Thus, eco-feminism is an association between women and nature. Francoise d'Eaubonne, the French feminist credited with the emergence of the idea of eco-feminism as both women and nature are mistreated and subjugated. She suggests that the only way to save the environment is through the destruction of male power by women. Yet, eco-feminism is much more than a mere disapproval and destruction of the male power. It is very much embedded in the way women are closely associated with the environment in the multiple ways in which they are perceived.

Eco-feminism emerged due to various reasons: Firstly, the nature is viewed in terms of feminine principle. Through ancient ages, women in general are considered as an inseparable part of nature. At one level, nature is symbolised as the embodiment of the feminine principle, and at another, she is nurtured by the feminine to produce life and provide sustenance the

world derives its activity and diversity manifest in the form of life on earth, mountains, trees, rivers, animals etc. The human being is to live in consonance with nature. Unfortunately, man's attitude towards nature has turned into that of a dominant force, who can subjugate nature to the maximum extent. This symbolises man's eternal urge to demonstrate domination over woman. She credits women with producing and reproducing life not merely biologically but also in terms of providing sustenance, more so a social role.

Eco-feminism was coined as a term in 1974 when Frenchwoman Francoise d' Eubonne called for an ecological revolution to be led by women in order to save planet Earth. Eco-feminism has evolved both as an analysis of society-nature relations and as a prescription for how these relations can be transformed. Broadly, these analyses fall within two areas: cultural eco-feminism and social eco-feminism. Cultural eco-feminism indentifies a powerful and positive link between women and nature, particularly through such female reproductive functions as childbirth and menstruation. This connection between women and nature is used to argue that women are better placed than men as advocates of nature.

Social eco-feminism argues that because women and nature have both been subjugated by a society dominated by men, women, through the roles they play, are in a better position than men to speak for nature, because of this shared experience of domination. Social eco-feminists contest that there is anything more natural in a woman's body than in man's and disagree with cultural eco-feminists' belief that there is something which constitutes a woman's essence. The cultural eco-feminists basically attempt to reverse the traditional hierarchy of male domination over women demonstrating the positive side of those characteristics previously held to be inferior and stressing the importance of women-nature links to the survival of nature. On the other hand, social eco-feminist perspective argues that it is the social role ascribed to women which identifies women more closely with nature. Women's closeness to nature, they argue, is more out of the social construction through generations. It is because of this that the women find

themselves unable to distance themselves from nature and experience subjugation and discrimination based on their socially ascribed caring role. These two perspectives are often incorporated in the eco-feminist arguments with ecological and social analysis. Eco-Feminism as a broad, diverse, world-wide movement unique eco-feminist approaches Liberal eco-feminists who seek reform from within existing political and economic structures. Radical eco-feminists who wish to dismantle those very structures through direct action.

Women and Environment, Women and Peace Socialist eco-feminists who draw on neo-Marxist philosophies to focus on the relationship between production and reproduction and on women's work in the continued biological and social reproduction of life on Earth. Ecological eco-feminists who strive to show the respects in which eco-feminism and the science of ecology (specifically eco-system ecology) share vital similarities. The Eco-feminist perspective(also referred to as the Women, Environment and Development perspective) holds that there is a natural link between women and environment as both are involved in creation of life. The post-colonial developmentexploited both nature and women's labour which is the characteristic of capitalism and patriarchy. As a result of this linkage and dual exploitation, women have a greater interest in ending domination over nature and their own lives.Eco-feminists see the patriarchal dominance of women by men as the prototype of all domination and exploitation in various hierarchical, militaristic, capitalist, and industrialist forms.

5.6 WOMEN AND PROTECTION OF THE COMMONS

Ivan Illich states the environment as commons from the environment as resource.Common property resource is defined from an economic point of view as 'a property on which well defined collective claims by and exclusive group are established, the use of the resource is subtractive, having the characteristic of a public good such as indivisibility shall be termed as common property.' This definition has two distinct features, first the nature of the resource is that of a public good and second, it should have an

association with a community or a user group in a specific way, with collective claims (hence governance). The idea of the 'Commons' expresses a broader conception of property, referring to social goods-lands, territories, forests, meadows and streams, or communicative spaces-which a community, not the state or any individual, collectively owns, manages, and controls. As Uzma observes, women are in direct and daily contact with environment through their use of resource (food, fuel and water) and through their efforts to maintain secure and healthy environment for their families. They have a major role in managing natural resources- soil, water, forests and energy. Their tasks in agriculture and animal husbandry as well as in the household make them daily managers of the family living environments.

Women are said to have more capacity than men in meeting environmental challenges, the crisis that emanates during natural calamities or other forms of environmental degradation like pollution of all sorts. They work harder than men in keeping the entire household and surroundings clean and maintain hygiene. In the urban settings, the task is all the more arduous because in lower income groups, the families often end up living in slums and unhygienic conditions, making the task of women all the more difficult. The task of fetching water is more or less similar in the roles of urban and rural women. While in rural areas, women go as far as seven or ten kilometres to fetch water, in urban areas, it varies from 20-100 metres distance. In both the cases, by spending so much time on these activities, women give an extra time to fulfil these household duties. Water is one natural resource that has become scarce in nature and over which many conflicts have arisen.

Fuel is another resource for which women struggle to meet their ends. Bina Agarwal observes that, "the gathering of food alone demands an elaborate knowledge of the nutritional and medicinal properties of plants, roots and trees, including a wide reserve knowledge of edible plants not normally used but critical for coping with prolonged shortages during climatic disasters". It is women who have kept alive these traditional resource management and knowledge and have greatly contributed to devising coping

up mechanisms during any kind of disasters. The caring of nature has thus a gender-specific dimension, wherein women are often taken as surviving any calamity and responsible for restoration of nature to its originality.

The role of women in various environmental movements is highly recognised and lauded. They have been at the forefront preventing the destruction of environment and saving the surrounding ecology and as well as inhabitants. Two prime examples in our country include The Chipko Movement (literally meaning hug the Trees Movement) and Narmada Bachao Movement (Save Narmada Movement). While the former prevented the felling of trees in the Himalayan region for commercial purposes, the latter sought to rehabilitate and provide adequate compensation to those displaced due to flooding of the villages because of dam construction. In both the cases, women have taken lead to protect and preserve the natural environment. A striking feature of environmental movements in modern India,has been the crucial role played by women. They have taken to the streets to protest forest felling, unregulated mining, displacement, and overfishing. They have also taken the lead in programs of environmental restoration; in the planting up of bare hillsides, in the conservation of local sources of water supply, and in the promotion of energy-efficient technologies. In India as way back as the 1970s a wave of environmental movements spread thanks to the dedicated involvement of women fighting to safeguard their environment and resources. The most famous of these was the Chipko Movement that gathered steam in the hills of India affecting village after village.

Another very significant example of women's involvement in the fight against human and environmental injustice is the infamous Bhopal gas tragedy occurred in 1984. A mass movement of women gasvictims in response to the indiscriminate and avoidable death ofaround 4000 people to gas poisoning from the Union Carbide factory. It is these stories of courage and activism that have inspired feminists andenvironmental activists around the world. These movementsinspired eco-feminists to fight for the rights of women and theenvironment.



CHECK YOUR PROGRESS

Q1: How does culture affect the environment?

Q2: What is the difference between culture and environment?

Q3: What is environmental culture?

Q4: What is the role of gender and environment?



5.7 LET US SUM UP

- Gender refers to the social classification of men and women into masculine and feminine and reflects the existing power relationship in any given society. It is a socio-cultural phenomenon. Women have been historically given a lower socio-economic and political status in society and this continues in modern society.
- Democracy and development are two main areas by which the state has to progress in order to modernise the state, society and institutions in order to guarantee equal and legal rights to both men and women. In this respect women too have put their effort in the movement for restoration of democracy aid subsequent development.
- In this Unit, you have learnt about the women's contribution to the field of environment and how traditionally as well as in modern times, they have come to be identified as nurturers of nature.
- The Unit also highlights the eco-feminism. It also highlights the outstanding contribution of some of the women throughout history and in the contemporary times by citing some example and looks at the importance of an ideology that aims to bring togetherthe shared causes of women and the environment.



5.8 FURTHER READING

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5.9 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No 1: People have the greatest impact on the environment in the ways that they exploit natural resources and dispose of waste. Different human cultures have had varying effects on their environments. Some cultures, particularly hunter-gatherer and small-scale agricultural societies, have little environmental impact.

Ans to Q No2: The difference between environment and cultureis that environment is the surroundings of, and influences on, a particular item of interest while culture is the arts, customs, and habits that characterize a particular society or nation.

Ans to Q No 3: A cultural environment is a set of beliefs, practices, customs and behaviours that are found to be common to everyone that is living within a certain population. Culturalenvironments shape the way that every person develops, influencing ideologies and personalities.

Ans to Q No 4: Men and women relate to the environment in different ways, and environmentalchanges have different impacts on their lives. Women play a critical role in sustaining communities and managing natural resources, but their contributions are often undervalued and neglected.



5.10 MODEL QUESTIONS

Short Questions (Answer each question in about 150 words)

Q1 : Write short notes on the following:

a. Environmental Possibilism

b. Environmental Determinism

c. Cultural Materialism

Q2: Explain the relationship between culture and environment.

Q3: Write a brief note om women and protection of the commons.

Long Questions (Answer each question in about 300-500 words)

Q1: What are the key aspects of Julian Steward's theory of Cultural Ecology?

Q2: Explain eco-feminism. Examine the various aspects associated with it.

Q3: Explain how women are related to nature and culture?

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UNIT 6: SUSTAINABLE DEVELOPMENT

UNIT STRUCTURE

6.1 Learning Objectives
6.2 Introduction
6.3 The Concept of Sustainable Development
6.4 Indicators of Sustainable Development
6.5 Various Acts for Protection and Preservation of the Environment
6.6 Let Us Sum Up
6.7 Further Reading
6.8 Answers to Check Your Progress
6.9 Model Questions

6.1 LEARNING OBJECTIVES

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

- understand the concept of sustainable development and some related issues
- explain the history of the emergence of Sustainable development
- discuss the provisions and significance of the acts, which are related to the protection of environment like water prevention and protection act, wild life protection act etc
- analyse the importance and applicability of the concept of sustainable development in the contemporary times.

6.2 INTRODUCTION

We have already learned in this previous units that man has been continuously been changing the forms and modes of his interaction with the environment. Secondly, human population on earth is increasing and simultaneously the technological revolution and developmental activities have accelerated in such a manner that they have threatened the environment. The degradation of environment due to developmental activities and industrial and other discharges into atmosphere and hydrosphere has caused great

concern and has given rise to the concept of sustainable development. Sustainable development has been initiated with the concern for the environment. However, in recent times, it has been enriched with an economic and a social dimension. In the beginning, sustainable development was meant to be the solution to the ecological crisis caused by heavy industrial exploitation of resources and continuous environmental deterioration. Its main goal was to preserve the quality of the environment. At present, the concept of sustainable development also embraces the quality of life both from the economical and the social perspectives.

Sustainable development is a concept based on the integration of economic, environmental, and social concerns. Environmental protection responds to the single goal of trying to preserve environmental quality. Sustainable development, however, is more complex. It recognizes that social and cultural factors play an important role in sustainable development, in addition to economic and environmental factors. It, as well, it seeks to ensure quality of life over the long term. In this unit, we shall discuss in details the concept of sustainable development.

6.3 THE CONCEPT OF SUSTAINABLE DEVELOPMENT

Before going to the core meaning of the concept of sustainable development, let us give a brief history of the emergence of the concept of sustainable development. The concept of sustainable development has a long historical background. In ancient Indian writings, 'nature' has been considered as the controller of all human activities. They accorded the status of the almighty God to all the components of environment like air, water etc. Inspite of the fact that there was no need for conservation, the concept of their protection has been put forward by all religions of India. In Greek writings, there is a reference of Ge as the Goddess of Earth-the mother figure of natural replenishment. In fact, that was a time when population was limited and there was mutual adjustment between man and environment. It was only after the industrial revolution followed by transport revolution and

urbanization that degradation of environment started,which gave rise to the concept sustainable development.

Sustainable development as a concept has materialized during decades, within the framework of thorough international scientific debates, and has assumed political potential through globalisation. Concern about environment as a central issue in the development began to grow in the 1960s and the 1970s. The idea was again incorporated into development and environment debates by international organizations.It is important to mention here that the idea of sustainable development was pushed effectively by scientists like Sir Julian Huxley, first director of UNESCO.

The relationship between mankind and the environment became a matter of great concern for the international community at the first United Nations Conference on the Human Environment (Stockholm, 1972). Then, in the year 1981, the concept of "sustainable development" appeared for the first time. It was enshrined in the title of a key document -World Conservation Strategy: Living Resource Conservation for Sustainable Development, published by the International Union for Conservation of Nature and Natural Resources (IUCN), the World Wildlife Fund (WWF) and UN Environment Programme (UNEP). According to the Strategy's definition, "for development to be sustainable it must take account of social and ecological factors, as well as economic ones; of the living and non-living resource base; and of the long term as well as the short term advantages and disadvantages of alternative actions" (Starke 1990: 8-9).

In 1983, the United Nations set up the World Commission on Environment and Development (WCED) headed by Gro Harlem Brundtland, Prime Minister of Norway, as an independent body. Its objective was to re-examine the critical environment and development problems on the planet and to formulate realistic proposals to solve them and to ensure that human progress will be sustained through development without bankrupting the resources of the future generations. The WCED published its report titled "Our Common Future" inthe year 1987. This conference is usually considered as a watershed in the emergence of sustainable

development.The Commission Report, entitled Our Common Future, was presented by G. H. Brundtland in 1987 and provided the first accepted (and often quoted) definition of sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs".

The central principles behind sustainable development are equity and fairness among countries and generations, the long-term vision on the development process, systemic thinking and interconnection between economy, society and the environment.

Four key objectives that have been established based on the major principles of sustainable Development are as follows:

- Environmental protection through measures that allow the separation of economic growth from negative environmental impacts;
- Social equity and cohesion through observance of fundamental human rights, cultural diversity, equal chances and elimination of all forms of discrimination;
- Economic prosperity through the promotion of knowledge, innovation and competitiveness with an aim to ensure higher living standards and full high-qualityemployment;
- Meeting EU's (European Unions) international responsibilities through the promotion of democratic institutions in the interest of peace, security and freedom and of the principles and practices of sustainable development.

Sustainable development is linked with the concept of quality of life and pursues three objectives: economic welfare, social stability and environmental protection.

- Economic welfare: It aims at generating a maximum income flow through maintaining the capital that has brought benefits;
- Stability of social and cultural systems:It ensures the human capital that is necessary for any form of development, reducing destructive conflicts;

- Environmental protection: Sustainable development aims at preserving the biological and physical stability of natural systems.

The minimal requirements for sustainable development are the following:

- Redimensioning economic growth for reasonable resource allocation and high production quality;
- Poverty eradication through meeting the essential needs of the population: job, food,energy and water supply, a place to live in and health;
- Acceptable population growth (controlled demographic increase)
- Natural resource preservation and increase through maintaining ecosystem diversity and monitoring the impact of economic activities upon the environment;
- Technological shifting and the control of technological resources;
- Government decentralization, active involvement in the decision-making process;
- Corroborating national and international decisions regarding environment and development;
- Global unification of decisions on the environment and economy.

The main concern of sustainable development strategy is the human community inspace and time and the creation of a cohesive system that is able to cover the costs generatedby economic-social growth, pollution prevention and its negative effects.

6.4 INDICATORS OF SUSTAINABLE DEVELOPMENT

Two classes of metrics are in development to indicate the state and performance of the system which are popularly known as indicators. It has been already mentioned that sustainable development is multidimentional as it covers economic, environmental and socio-cultural aspects. Therefore the indicators of sustainable development are also vast. Researchers have attempted to measure improvements in terms of three groups of indicators corresponding to the three aspects of sustainability.We have different

indicators for each and every aspect of sustainable development like eco-efficiency metrics, socio-ecological metrics and socio-economic metrics. Three dimensional metrics can be obtained from the intersection of all three aspects which could be called true sustainability metrics.

Energy is the prime driver of economic growth and if non renewable always has an ecological impact through the emission of pollutants and greenhouse gases, and, since limited does affect future generation. It would appear that non renewable energy is inherently a three dimensional indicator. Pollutant dispersion is a three dimensional indicator as it represents environmental impact, has economic cost associated with it and frequently has a bearing on the health of the people and eco system of the neighborhood of the manufacturing units. The cost of manufacturing is a reflection of the nature of technology and affordability for public consumption (societal value), thus socio-economic indicator.

As we have learned that the aim of sustainable development is to maximize human well being or quality of life without hampering the life support system,the measures of sustainable development may be different in developed and developing countries according to their level of technological and economic development. Developing countires like India can focus attention on following measures.(Saxena, 2006).

- Ensure clean and hygiene, i.e., living and working conditions for the people.
- Sponsor research on environmental issues pertaining to the region.
- Ensure safety against known and proven industrial hazards.
- Encourage afforestation. Ensuring environmental education as a part of school and college curriculum;
- Encourage use of non-conventional source of energy
- Need for socialization and humanization of all environmental issues.

6.5 VARIOUS ACTS FOR PROTECTION AND PRESERVATION OF THE ENVIRONMENT

In this section, let us discuss about the various Acts and Provisions that have been implemented for the protection and preservation of the environment:

- **Environmental (Protection) Act, 1986 :** This act was passed by Indian Parliament in order to fulfill constitutional obligations as provided under article 48 A and also to show its commitment towards Stockholm declaration of 1972, in which it was suggested that all governments must evolve necessary laws to protect and improve the flora and fauna, non -renewable resources, wildlife and human health.The world community's resolve to protect and enhance the environmental quality found expression in the decision taken at the United Nations Conference on Human Environment held in Stockholm in June 1972. The government of India participating in the conference strongly voiced the environmental concerns.While several measures have been taken for environmental protection both before and after the conference, the need for a general legislation to further implement the decisions of the conference has become increasingly evident.

This act is a special law that extends to the whole nation . It was passed in March 1986 and came into force on 19th November 1986. The act consists of 26 sections divided into four chapters. Seven schedules dealing with emission standards of air, noise effluents etc. have also been appended to it. Various rules including the Environmental Protection rules have been provided with it. They are as follows:

- Hazardous Wastes (Management and Handling) Rules 1989
- Hazardous microorganism Rules
- Manufacture, Storage and Import of Hazardous Chemicals rules, 1989
- Chemical Accidents (Emergency Planning, Preparedness and Response), Rules 1996
- Bio- Medical Water (management and Handling Rules)

- Municipal Solid Wastes (management and Handling) rules 2000.
- Recycled plastic manufacture and usages rues 1999
- Noise pollution (regulation and Usages rules)1999

In addition , according to Section 2(a) of the act, environment includes: Firstly Water air and land, secondly the interrelationship which exists among and between water, air, land, human being,living creatures,plants and micro-organisms including property. Thus,it includes both animate and inanimate objects and their interrelationship.

Let us now come to section 2 (b, c, d) which discusses some important concepts. According to Section 2 (b) "Environmental pollutant" means any solid, liquid or gaseous substance present in such concentration as may be, or tend to be injurious to environment".And2(c) defines environmental pollution as the presence in the environment of any environmental pollutant.

Further Section 2 (d) is about 'handling', in relation to any substance, means the manufacture, processing, treatment, package,storage,transportation,use, collection,destruction, conversion,offering for sale ,transfer or the like of such substances.

Section 3 is about power of central government to take measures to protect and improve environment; Section 4 authorises central government to appoint offices with proper designation; and Section 5 empowers the central government to issue direction to any person/officer/appointed under section 4 of the act.

Sections 7-17are related to prevention, control and abatement of environmental pollution.

After going through the provisions of this Act, it can be said that this act is a comprehensive document on environment protection in India (Saxena 2006).

- **Water (Prevention and Control of Pollution) Act, 1974:** The main objective of this Act of 1974 is to maintain or restore the wholesomeness of water and to prevent, control and abate water pollution. To achieve this, the act has provided various provisions, which are very comprehensive.The

sub section 2 (e) with sections 17 and 18 of this act, the fundamental objective of the statute is to provide clean water to citizens. Section 2 of the act has also defined certain basic terms used in the act. The act defines water pollution as follows:

"Pollution means such contamination of water or such alternation of physical, chemical or biological properties of water or such discharge of any sewage or trade effluent or of any other liquid, gaseous or solid substances into water as may or is likely to , create a nuisance or render such water harmful or injurious to the public health or safety, or to domestic, commercial,industrial, agricultural or other legitimate uses or to the life and health of animals or plants of aquatic organism" (section 2e).

Therefore, water pollution implies

- Contamination of water
- Alteration of physical chemical or biological properties of water
- Discharge of sewage or trade effluent or
- Any other solid,liquid or gaseous substances, which may or likely to create a) nuisance b) render such water harmful to public health, to domestic , commercial, industrial, agricultural or other legitimate uses.

In addition the act has used two terms in relation to water pollution. The stream here includes a) river b) water courses c) inland water d)subterranean water and e) sea water.

- **Air (prevention and Control of Pollution) Act, 1981:** This act was passed by Indian Parliament under article 253 of the Indian constitution. The major aims and objectives are as follows:

It is well known to us that India has participated at UN Conference on Human Environment held at Stockholm in 1972 to take appropriate steps for preservation of natural resources which also includes the preservation of quality of air. Therefore the Act of 1981 aims to achieve the following objectives:

- To provide for the prevention, control and abatement of air pollution;

- For the establishment of Board with a view to carry out the above-mentioned purpose.
- To confine on and assign to such board powers and functions relating to prevention, control and abatement of air pollution and other matters connected thereof.
- To lay down the standard to maintain the quality of air.

The term 'air pollution' refers to the presence of any pollutant in the atmosphere. Air pollutant like water pollutant refers to the presence of any solid, liquid or gaseous substance present in atmosphere in such concentration that may be or tend to be injurious to human being including other living creatures. Let us give some examples: smoke, soot, fly ash, suspended particle matter, noise, radio active substance etc.

Sections 3- 15 of this act provide for the constitution of a Board , qualifications of its members, terms and conditions of their services, meetings, vacations of seats, and temporary association of persons with the board.

- **Wildlife (Protection) Act, 1972 :** In the year 1972 Indian parliament passed another significant national law, the Wild Life protection act of 1972 with the objective of protecting wildlife.Apart from prohibiting hunting, it has created protected areas and controls trade in wild life products. For the successful achievement of its objectives, the act has created aseparate and independent authority to protect and improve wildlife. Some important purpose of this act are as follows:

- Protect the habitat of wild animals for which various national sanctuaries have been established.
- Some special provisions to preserve endangered species.

  Hunting of wild animal has been prohibited but the chief wildlife warden has been authorized to grant permission to hunt under some circumstances like when wild animal become dangerous to human life, is disabled and diseased or beyond recovery. The act has made certain provisions to protect specified plants of sanctuaries,national parks, forest or areas specified by notification. All the specified plants or parts have been therefore declared to be property of the state government.

The act also prohibits to:

- Willfully pick up , uproot, damage, destroy, acquire or collect or
- Possess, sell, offer for sale, or transfer by way of gift or transport any specified plants whether dead or alive.

- **Forest (Conservation) Act 1980 (with amendment made in 1988):**

The forest conservation act was passed by Indian Parliament on 25 0ctober, 1980 to provide for the conservation of forests and matters connected therewith or ancillary or incidental thereto. This law was extended to the whole of India except the State of Jammu and Kashmir.However, the act was amendedin 1988. The act of 1980 is a unique piece of legislation,and a regulatory mechanism that reflects the collective will of the nation to protect its rich biodiversity and natural heritage and that permits only unavoidable use of forestland for various development purpose. It embodies the firm commitment of the Government of India to balance the conservation of forest with sustainable development need of the country contributing to better environment, health and economy.

In order to protect the environment, the act puts restrictions on the de-reservation of forests or use of forestland for non-forest purpose. State government or any other authority even cannot make except with the prior approval of the central government, any order directing

- That any reserved forest (within the meaning of expression "reserved forest" in any law for the time being in force in a state) or any portion thereof, shall cease to be reserved.
- That any forest land or any portion thereof may be used for any non forest purposes.
- That any forest land or ant portion thereof may be cleared of trees which have grown naturally in that land , for the purpose of using it for afforestation.

Section 3(A) of the act also clearly menions the penalty for the contravention of the provisions of the act. In addition the act also conferred power upon central government to make rules for carrying out the provisions of the act.



CHECK YOUR PROGRESS:

Q1: Define Suatainable Development.

Q2: What do you meant by sustainable development indicators?

Q3: Mention major objectives of sustainable development.

Q4: Mention two minimal requirements for sustainable development.

Q5: Is sustainable development multidimensional?

Q6: In which year The Forest Conservation Act was passed?

Q7: Mention two objectives of Water Prevention and Control of Pollution Act?



6.6 LET US SUM UP

- Sustainable development is a concept based on the integration of economic, environmental, and social concerns.
- The central principles behind sustainable development are equity and fairness among countries and generations, the long-term vision on the development process, systemic thinking and interconnection between economy, society and the environment.
- The Commission Report, entitled Our Common Future, was presented by G. H. Brundtland in 1987, provided the first accepted definition of sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet heir own needs"
- Sustainable development is linked with the concept of quality of life and pursues three objectives : economic welfare, social stability and environmental protection.
- Two classes of metrics are in development to indicate the state and performance of the system which are popularly known as indicators.

- Sustainable development is multidimensional as it covers economic, environmental and socio-cultural aspects. Therefore the indicators of sustainable development are also vast.
- In order to show commitment towards Stockholm declaration of 1972, in which it was suggested that all governments must evolve necessary laws to protect and improve the flora and fauna, non - renewable resources, wildlife and human health, the government of India came up with acts like Environmental Protection Act, Water (Prevention and Control of Pollution) Act, 1974, Air (Prevention and Control of Pollution) Act 1981, Wildlife Protection Act and Forest Conservation Act.
- Environmental Protection Act was passed in March 1986 and came into force on 19th November 1986. The act consists of 26 sections divided into four chapters. Seven schedule dealing with emission standards of air, noise effluents etc. have also been appended to it. Various rules including the Environmental Protection rules have been provided with it.
- Water (Prevention and Control of Pollution) Act, was passed in 1974 with an objective to maintain or restore the wholesomeness of water and to prevent, control and abate water pollution.
- This act was passed by Indian Parliament under article 253 of the Indian constitution mainly to provide for the prevention control and abatement of air pollution;of course it has many more objectives related to the protection of air.
- In the year 1972 Indian parliament passed another significant national law, the Wild Life protection act of 1972 with the objective of protecting wildlife which has also created protected areas and controlled trade in wild life products.
- The forest conservation act was passed by Indian Parliament on 25 0ctober, 1980 to provide for the conservation of forests and matters connected therewith or ancillary.



6.7 FURTHER READING

1) ArturPaw?owski 2007.How Many Dimensions Does Sustainable Development Have?In Wiley Inter Science (www.interscience.wiley.com).

2) Orboi, Manuela-Doraetal. "Sociological Dimension of Sustainable Development" Research Journal of Agricultural Science, 42 (3), 20

3) Saxena , H.M.2006 . Environmental Studies.

4) Sikdar, Subhas. K .2003 Sustainable Development and Sustainability Metrics.in AISHE Journal, vol (49) , No.8.



6.8 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No 1: Sustainable development refers to the "development that meets the needs of the present without compromising the ability of future generations to meet their own needs"

Ans to Q No 2: Two classes of metrics are in development to indicate the state and performance ofthe system, which are popularly known as indicators of sustainable development.

Ans to Q No 3: The main objectives of sustainable development are as follows: economic welfare, social stability and environmental protection.

Ans to Q No 4: Two minimal requirements for sustainable development are : a) Redimensioningeconomic growth for reasonable resource allocation and high production quality; b) Poverty eradicationthrough meeting the essential needs of the population: job, food, energy and water supply, a place to live in and health;

Ans to Q No 5: Sustainable development can be considered as multidimensional because intitially it emphasized more on environmental protection but later it has covered up social and economic dimension in order to address each and every aspect of human life.

Ans to Q No 6: The Forest Conservation Act was passed in the year 1980.

Ans to Q No 7: To provide for the prevention control and abatement of air pollution.



6.9 MODEL QUESTIONS

Short Questions (Answer each question in about 150 words)

Q1: Mention the principles of Sustainable Development.

Q2: Write a note on Water (Prevention and Control of Pollution) Act, 1974.

Long Questions (Answer each question in about 300-500 words)

Q1: Define sustainable development and narrate the history of its emergence.

Q2: Sustainable Development is three-dimensional. Discuss.

Q3: Discuss the main objectives of wildlife protection act.

Q4: Discuss about the significance of environmental protection act in the contemporary times.

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UNIT 7: NATURAL RESOURCES AND THEIR UTILIZATION

UNIT STRUCTURE

7.1 Learning Objectives
7.2 Introduction
7.3 Natural Resource: Meaning and Types
7.4 Exploitation of Natural Resources
7.4.1 Common land
7.4.2 Water Resources
7.4.3 Forest Resources
7.5 Let Us Sum up
7.6 Further Reading
7.7 Answers to Check Your Progress
7.8 Model Questions

7.1 LEARNING OBJEVTIVES

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

- understand natural resources as a sociological concept
- learn about the three kinds of natural resources- land, water and forests
- discuss about the issues relating to the distribution, access and control over such resources.

7.2 INTRODUCTION

Environmental sociology and the sociology of natural resources are two key sub disciplines of the sociological study on the interactions between nature and human society. Natural resource simple means materials or substances occurring in nature which can be exploited for economic gain. In the previous unit, we have discussed about the concept of Sustainable development where we have learned that Sustainable development is a concept based on the integration of economic, environmental, and social concerns. We have also learned that the central principles behind

sustainable development are equity and fairness among countries and generations, the long-term vision on the development process, systemic thinking and interconnection between economy, society and the environment. In this unit we shall engage with the questions of equity and fairness in the context exploitation of natural resources. Here we shall discuss about the some of the vital natural resources and issues relating to their distribution, access and control.

7.3 NATURAL RESOURCE: MEANING AND TYPES

Natural resources are useful raw materials that we get from the Earth. They occur naturally, which means that humans cannot make natural resources. Instead, we use and modify natural resources in ways that are beneficial to us. The materials used in human-made objects are natural resources.

Types of Natural Resources

- **RENEWABLE RESOURCES:** Food, water, forests and wildlife are all renewable resources. For resource use to be sustainable, the consumption rate should be maintained within the capacity of the natural systems to regenerate themselves. Current rates of depletion of the Earth's stocks of renewable resources and levels of pressure imposed on their regenerative capacity by means of production and consumption might already be, in some cases, beyond this threshold.
- **NON-RENEWABLE RESOURCES:** Minerals, oil, gas and coal are non-renewable resources: their use as materials and energy sources leads to depletion of the Earth's reserves. However, the time period during which reserves can be available can be extended by recycling or improving the efficiency of use. Eventually, limitations to the extent to which more efficient processes may expand the use of non-renewable resources stocks will be reached, requiring substitution with renewable resources and restrictions on the volume of activities that can be sustained by existing stocks.

7.4 EXPLOITATION OF NATURAL RESOURCES

The modern economy is resource-based economy and the development of a country or a region is based on its resources, especially natural resources. Nature has given us abundant resources in the form of water, air, heat, natural vegetation, soil, wild animals, metals, fossil fuel etc., Man by his technical skill and knowledge has been using all these resources in some way or the other from the dawn of civilization. The Earth's natural resources are vital to the survival and development of the human population. However, these resources are limited by the Earth's capability to renew them. Freshwater, forests and harvesting products are renewable, provided that exploitation does not exceed regeneration. Fossil fuels and metal ores are non-renewable. Although many effects of over exploitation are felt locally, the growing interdependence of nations, and international trade in natural resources, make their demand and sustainable management a global issue. Any element of our natural environment such as soil, water, forest, wildlife, minerals, that man can utilize to promote his welfare, may be identified as a natural resource. It can be classified into two categories; inexhaustible and exhaustible.

In the next part we are going to discuss three types of natural resources, that is, land (common land), water and forests and the control, access and distribution of these resources.

7.4.1 Common Land

Common land is land owned collectively by a number of persons, or by one person, but over which other people have certain traditional rights, such as to allow their livestock to graze upon it, to collect wood, or to cut turf for fuel. A brief history of common land shows that governance systems are highly localized and dependent on custom and practice. Such a dependence suggests the need for governance which is based on the incorporation of stakeholders using consensus building approaches.

Contrary to Garrett Hardin's argument warning of "the tragedy of the commons," many scholars, such as Elinor Ostrom and Robert Wade, have

correctly identified the importance of communities and institutions at a local level as a system for preserving the local natural environment and other common-pool resources (CPR). The South Asian experience since the colonial period supports their claim. While policies to manage forests by excluding local people from their management generally led to failures in conservation, the government's attempts to entrust forest management to local communities have tended to contribute to conservation. We are going to take up forests separately in a later section.

Long-term economic fluctuation in the pre-industrial world has been a major concern of economic historians. Recently, scholars have explored this phenomenon by linking population growth and environmental constraints. This approach, which can be called the Extended Malthusian Approach, provides an intuitively clear and very powerful explanation. However, empirical investigation needs to be done to deepen our understanding of how these variables interact with each other and generate long-term changes in the resources available to human beings.

A considerable number of studies assert that common-pool resources (CPR), or simply commons, can be well conserved when they are managed collectively by local people. Some consensus has already been reached about the attributes of resources and resource users for successful commons management. However, the process by which local people actually build a collective management system has rarely been studied. Such a study is indispensable for areas facing the rapid destruction of natural resources that need to know how local people become involved in such a collective process. The situation is especially serious in many developing countries.

The world is on the edge of an environmental crisis-close, very close to a situation which we have come to associate with Garrett Hardin's 1968 article, "The Tragedy of the Commons," especially when he concluded that the population growth of the less developed countries was central to the phenomenon we recognize as free-riding. However, such a perception needs to be re-examined.

When a large number of people make joint use of a certain resource, they often compete with one another. Resources can be beneficial to human beings, but there are often disputes and friction over how to acquire, maintain and manage them. For example, the questions of who should take the initiative, have priority rights, and have a say in the management and use of resources have always been of great concern to people living close to the resources.

In 19th-century South India, a significant portion of village land was not cultivated, but used by villagers to graze livestock and collect fuelwood, fodder, manure, and so on. In this sense, such uncultivated land supported agricultural production as village common land, although it was often classified as "waste land" by the colonial administration. The area of such common land was remarkably reduced from the middle of the 19th century through the 20th century mainly as a result of the reclamation of "waste" land.

Large and growing populations combined with rapid industrialization and urbanization place enormous pressures on natural resources, many of which are scarce and located in places of high biodiversity. The key themes are community and the commons. One key research question is how communities can effectively manage commonly held resources that are often limited and contested. It is imperative to examine the community and the commons as they pertain to population increases, state relations, and the influence of "environmentalism" and environmental policy.First it is necessary to challenge the general idea that common pool resource (CPR) management is naturally part of indigenous people's lives (i.e., they possess an innate conservation ethic). In actuality, CPR institutions are of relatively recent origin, most having emerged in the last few hundred years in response to specific resources pressures, especially population growth. Case studies from South Korea and Thailand, portray that local communities did draw on traditional cultural norms, especially Buddhism, to create consensus and cooperation. But these were largely adaptations to growing resource

pressures. Many CPR arrangements have endured across time and been relatively stable and effective. Yet in some cases,rapid change has also occurred. It is important to examine these changesand how local communities have adapted their resource practices.

One significant shift has been the movement away from hierarchicalto egalitarian social structures, leading to changes in resource ownership. It is important to examine the more recent and dramatic socialshifts that have occurred with the emergence of the modern state.This has greatly increased regulatory and financial (tax) pressures onrural communities. However, in certain occasions political pressures actually strengthened CPR institutions.The role of the state needs to be explored further. Environmental policy and the spread of environmental ideas or "environmentalism" should be assessed.

Case studies of Bhutan and Thailand notethat is difficult to generalize about government policies and popular reaction to them because this relationship has changed over time.These changes are highly contingent on region-specific historical, social, political, economic, and natural conditions.The international environmental community recognizes Bhutan and Thailand as having "pro-environmental" policy agendas. But in both cases these policies have placed greater restrictions on resource use, making resource access and development more difficult for many rural communities. The result has been greater tension between the state and communities. These two cases reveal environmentalism is still far from a universally accepted ideal. As such, the sustainable development ideal of harmonizing environmental policy with development remains a considerable challenge.

Another theme is the impact of the commercialization of natural resource, namely the development of timber and cash crop economies, and the growth of non-agrarian employment. The impact of these changes on rural societies is still not clear. While greater efficiency of commercial

land use may reduce some resource pressures, it may also create new problems. Non-agrarian workers potentially will weaken CPR arrangements because they might have less investment, hence less interest, in these institutions.

7.4.2 Water Resources

Access to clean water is one of the most fundamental of human rights, but currently more than one billion city-dwelling people lack access to clean water. Generally, it is not because water supplies are insufficient. Rather, this crisis is due to an inability to organize supply properly to meet demand. This failure is particularly frustrating in that nature contains the necessary mechanisms to provide clean, healthy water, including the filtering effect provided by healthy forests in watersheds. Yet in many parts of the world environmental mismanagement has led to a critical shortage of freshwater.

- **SUPPLY AND DEMAND:** Water is, in theory, a quintessentially renewable resource. Water covers most of the world's surface, and over much of the world it falls unbidden from the skies. Yet because of the carelessness and profligacy with which water resources have been used, the speed of human population growth and the increasing demands for water, the provision of adequate, safe supplies of water is now a major source of concern, expense and even international tension.

The poorest members of society, unable to afford safe water, suffer the greatest impacts. One in five people in the developing world lives without a reliable water supply. Lack of clean water has dire short- and long-term health impacts including increased infant mortality and impaired ability to work, which reduce industrial productivity and put pressure on already overstretched health services. On the other hand, access to clean water can have dramatic positive health impacts. For instance, it is estimated that when clean water is available the risk of early death is reduced by 23 percent in Uganda and 30 percent in Cameroon (UNDP, 2006).

Today, around half the world's population lives in towns and cities, and of these people one-third live without clean water or adequate sanitation

(United Nations Human Settlement Programme, 2003). Municipal authorities have a variety of ways of supplying drinking-water, depending on where they are located, the resources available, social and political issues and the willingness of the population to conserve water. Most cities rely on the collection and diversion of existing surface and underground freshwater sources. Only minor amounts, on the global scale, are extracted directly from rainwater or from the seas. Until recently, the main focus of efforts to improve urban water supply has been within the cities themselves, including better distribution systems, treatment plants and sewage disposal. However, many authorities are now increasingly looking at land management systems that can help maintain pure water at the source.

- **WATER QUANTITY, QUALITY AND REGULARITY:** People have settled historically in areas rich with natural resources, and today most of the world's population lives downstream of forested watersheds (Reid, 2001). Societies have created strong cultural links with forests, and it is widely assumed that forests help to maintain a constant supply of good-quality water. Conversely, loss of forests has been blamed for problems ranging from flooding to aridity.
- **WATER RESOURCE MANAGEMENT:** Water resource management is the activity of planning, developing, distributing and managing the optimum use of water resources. It is a sub-set of water cycle management. Ideally, water resource management planning has regard to all the competing demands for water and seeks to allocate water on an equitable basis to satisfy all uses and demands. As with other resource management, this is rarely possible in practice.

Much effort in water resource management is directed at optimizing the use of water and in minimizing the environmental impact of water use on the natural environment. The observation of water as an integral part of the ecosystem is based on integrated water resource management, where the quantity and quality of the ecosystem help to determine the nature of the natural resources.

As a limited resource, water supply sometimes supposes a challenge. This fact is assumed by the project DESAFIO (the acronym for Democratisation of Water and Sanitation Governance by Means of Socio-Technical Innovations), which has been developed along 30 months and funded by the European Union's Seventh Framework Programme for research, technological development and demonstration. This project faced a difficult task for developing areas: eliminating structural social inequity in the access to indispensable water and public health services. The DESAFIO engineers worked on a water treatment system run with solar power and filters which provides safe water to a very poor community in the state of Minas Gerais.

Successful management of any resource requires accurate knowledge of the resource available, the uses to which it may be put, the competing demands for the resource, measures to and processes to evaluate the significance and worth of competing demands and mechanisms to translate policy decisions into actions on the ground.

For water as a resource, this is particularly difficult since sources of water can cross many national boundaries and the uses of water include many that are difficult to assign financial value to and may also be difficult to manage in conventional terms. Examples include rare species or ecosystems or the very long term value of ancient groundwater reserves.

- **AGRICULTURE:** Agriculture is the largest user of the world's freshwater resources, consuming 70 percent. As the world population rises it consumes more food (currently exceeding 6%, it is expected to reach 9% by 2050), the industries and urban development's expand, and the emerging biofuel crops trade also demands a share of freshwater resources, water scarcity is becoming an important issue. An assessment of water resource management in agriculture was conducted in 2007 by the International Water Management Institute in Sri Lanka to see if the world had sufficient water to provide food for its growing population or not . It assessed the current availability of water for agriculture on a global scale and mapped out locations suffering from water scarcity. It found that a fifth of the world's people, more

than 1.2 billion, live in areas of physical water scarcity, where there is not enough water to meet all their demands. A further 1.6 billion people live in areas experiencing economic water scarcity, where the lack of investment in water or insufficient human capacity make it impossible for authorities to satisfy the demand for water.

The report found that it would be possible to produce the food required in future, but that continuation of today's food production and environmental trends would lead to crises in many parts of the world. Regarding food production, the World Bank targets agricultural food production and water resource management as an increasingly global issue that is fostering an important and growing debate. The authors of the book Out of Water: From abundance to Scarcity and How to Solve the World's Water Problems, which laid down a six-point plan for solving the world's water problems. These are: 1) Improve data related to water; 2) Treasure the environment; 3) Reform water governance; 4) Revitalize agricultural water use; 5) Manage urban and industrial demand; and 6) Empower the poor and women in water resource management. To avoid a global water crisis, farmers will have to strive to increase productivity to meet growing demands for food, while industry and cities find ways to use water more efficiently.

- **MANAGING WATER IN URBAN SETTINGS:** As the carrying capacity of the Earth increases greatly due to technological advances, urbanization in modern times occurs because of economic opportunity. This rapid urbanization happens worldwide but mostly in new rising economies and developing countries. Cities in Africa and Asia are growing fastest with 28 out of 39 megacities (a city or urban area with more than 10 million inhabitants) worldwide in these developing nations. The number of megacities will continue to rise reaching approximately 50 in 2025. With developing economies water scarcity is a very common and very prevalent issue.Global freshwater resources dwindle in the eastern hemisphere, and with the majority of urban development millions live with insufficient fresh water.This is caused by polluted freshwater resources, overexploited groundwater resources, insufficient harvesting capacities in the surrounding

rural areas, poorly constructed and maintained water supply systems, high amount of informal water use and insufficient technical and water management capacities.

In the areas surrounding urban centres, agriculture must compete with industry and municipal users for safe water supplies, while traditional water sources are becoming polluted with urban runoff. As cities offer the best opportunities for selling produce, farmers often have no alternative to using polluted water to irrigate their crops. Depending on how developed a city's wastewater treatment is, there can be significant health hazards related to the use of this water. Wastewater from cities can contain a mixture of pollutants. There is usually wastewater from kitchens and toilets along with rainwater runoff. This means that the water usually contains excessive levels of nutrients and salts, as well as a wide range of pathogens. Heavy metals may also be present, along with traces of antibiotics and endocrine disruptors, such as oestrogens.

Developing world countries tend to have the lowest levels of wastewater treatment. Often, the water that farmers use for irrigating crops is contaminated with pathogens from sewage. The pathogens of most concern are bacteria, viruses and parasitic worms, which directly affect farmers' health and indirectly affect consumers if they eat the contaminated crops. Common illnesses include diarrhoea, which kills 1.1 million people annually and is the second most common cause of infant deaths. Many cholera outbreaks are also related to the reuse of poorly treated wastewater. Actions that reduce or remove contamination, therefore, have the potential to save a large number of lives and improve livelihoods. Scientists have been working to find ways to reduce contamination of food using a method called the 'multiple-barrier approach'.

This involves analysing the food production

- **FUTURE OF WATER RESOURCES:** One of the biggest concerns for our water-based resources in the future is the sustainability of the current and even future water resource allocation. As water becomes more scarce, the importance of how it is managed grows vastly. Finding a balance between

what is needed by humans and what is needed in the environment is an important step in the sustainability of water resources. Attempts to create sustainable freshwater systems have been seen on a national level in countries such as Australia, and such commitment to the environment could set a model for the rest of the world.

The field of water resources management will have to continue to adapt to the current and future issues facing the allocation of water. With the growing uncertainties of global climate change and the long term impacts of management actions,the decision-making will be even more difficult. It is likely that ongoing climate change will lead to situations that have not been encountered. As a result, alternative management strategies are sought for in order to avoid setbacks in the allocation of water resources.

7.4.3 Forest Resources

For centuries, communities in Asia and the Pacific have established an intricate and dependent relationship with forests. They serve as a repository for natural wealth and play a significant role in social and economic development. Today, the Asian and Pacific Region's forests are under pressure from a rapidly expanding population, the need for development and the pressure for land from agriculture. In recent years however, there has been an emerging recognition of the wider values (direct and indirect) of forests. Such values include the appreciation of traditional and customary practices for forest management, the link between forests and climate change, the critical role of forests in providing environmental stability and quality, the conservation of biological diversity, the protection of groundwater resources and the multiple uses of forest resources.

- **DISTRIBUTION AND DIVERSITY OF FORESTRY RESOURCES :** In 1995, world forest resources, including natural forests and plantations, were estimated at 3 454 million hectares (ha) or 26.6 per cent of the total land area of the world (FAO 1997). The Asian and Pacific Region accounts for 16 per cent of the global forests. Of the seven countries which contain more than 60 per cent of the world's forests, two, namely People's Republic of China and Indonesia, are in the Asian and Pacific Region. Within the

region, Southeast Asia has the largest forest area followed by Northeast Asia, South Pacific and South Asia respectively.

A comparison of forest area per capita in 1995, shows that at least 15 countries within the region exceeded the world average of 0.6 ha per capita, while 6 countries fell within the regional average of 0.17 ha per capita. Temperate and tropical forests are two of the major forest types in the Asian and Pacific Region. The 1995 Forest Resource Assessment (FRA) estimated that 40 to 45 per cent of the forests in the region are located in temperate areas of Australia, New Zealand, Japan, Democratic People's Republic of Korea, Republic of Korea, Mongolia and in some areas of People's Republic of China.

In addition, the temperate countries have at least 60 per cent of the region's plantation resources which account for more than 16 per cent of the forest area in the Temperate Zone, but only 7 per cent in tropical countries. With respect to natural forests, Southeast Asia is particularly important, as it has 40 per cent of the region's total forest resources. Based on the data classification used by the World Conservation Monitoring Centre (WCMC), the major forest ecosystems in the region are mangroves, tropical forests, non-tropical, and sparse trees and parkland (Iremonger 1997). In addition to these classifications, frontier forest can be identified which are forest areas large enough to support their biodiversity and ensure the long-term survival of their plant and animal species. Using the World Resources Institute (WRI) (WRI 1997) set of criteria for frontier forest, Indonesia and Papua New Guinea have the majority of the world's remaining frontier forest.

- **CAUSES OF FOREST LOSS AND DEGRADATION:** Deforestation and forest degradation is caused by a number of factors. These include natural factors, such as fire, disease and weather-induced stress, but more often than not, are factors exacerbated by human activities, such as land clearing for agriculture, overgrazing, over-extraction of timber and harmful logging practices. The direct causes of deforestation and degradation, however, are obscured by the underlying causes of poverty, inequitable resource tenure, population pressures, corruption, misguided policies, and

institutional failures. A major direct cause of deforestation in the Asian and Pacific Region is the clearing of forests, both planned and unplanned, for permanent cropland and pasture. Poor forest harvesting practices, followed by encroachments, once concession operations have ceased, contribute significantly to the degradation of the remaining forests. In many cases, shifting cultivation and overgrazing have caused widespread degradation of forests in the region, and even complete deforestation in extreme instances. The estimated number of people involved in shifting cultivation in the region varies between 25 million and 40 million. Although the destruction of forests directly attributed to felling of industrial timber is extensive, it is difficult to accurately estimate the actual extent. The harvesting operations for logging concessionaires are usually defined by government regulations and codes of practice, which in some areas, particularly in Southeast Asia will include a reforestation programme. However, the limited resources of governments often prohibit adequate monitoring of the logging practices of concessionaires. In recent years, fires have caused serious damage to forests in the region. It is reported that in India, fires affect about 53 per cent of the forest area, or about 35 million ha, each year. In People's Republic of China, 43 690 ha were burnt in 1999; in Mongolia more than 3 million ha were burnt in 1996 and in Indonesia, 3.2 million ha were burnt in 1982-1983, and 160 000 in 1994. The period 1997-1998 was the worst for forest fires in the region. The wild fires that raged in Indonesia, Papua New Guinea, Australia and Mongolia prompted their respective governments to declare national disasters and seek international support to fight the fires. In Indonesia alone, the 1997-1998 fires burned an estimated 2 million ha in Sumatra and Kalimantan. Large quantities of smoke generated by slow burning ground fires affected human health both in situ and in the neighbouring countries. The smoke also interfered with transportation systems and disrupted the multimillion dollar tourism industry (see Box 17.3). The fire was exacerbated by the drought associated with the El Nino weather pattern, which turned most forests into drier habitats, and increased the flammability of forest vegetation. Severe outbreaks of insects, pest and diseases can potentially

be environmentally devastating with costly economic repercussions, in particular for plantation forestry (with a reduced diversification of species). The causes of pests and diseases vary, depending largely on a host of factors that include climate, human interference, destruction of habitats of the pest's natural predators, or even the introduction of exotic plant species that are vulnerable to insect pest and disease attacks.

➢ **CONSEQUENCES OF FOREST LOSS AND DEGRADATION:**

The costs and negative effects of deforestation are well documented. Where deforestation occurs in an unplanned and wasteful manner, the economic losses can be substantial, particularly from the loss of timber and other commercial resources. At community forest level, deforestation causes severe hardships and social disruptions for forest-dwelling and forest-dependent people. While the effects of deforestation are relatively simple to identify, the effects of forest degradation are subtler. Degradation can lead to a host of problems including loss of soil fertility and nutrient recycling capability, reduction in productivity and growth, decline in species richness, erosion of genetic diversity, decline in stock density and crown cover, reduction in the economic value of timber crops, and decreases in wildlife populations. Another serious negative impact of deforestation and degradation is the loss of wildlife habitat. Forests, particularly natural forest areas, are the single most important repositories of terrestrial biological diversity.



CHECK YOUR PROGRESS

Q1: What are natural resources? What are the two types of natural resources?

Q2: What is Water Resource Management?

Q3: What are some of the human activities which cause deforestation and forest degradation?

Q4: What is argument about Common Pool Resources(CPR) which challenges G. Hardin's argument on 'tragedy of commons'?

Q5: Which sector is the largest user of world's fresh water resources?



7.5 LET US SUM UP

- Natural resource simple means materials or substances (resources) occurring in nature which can be exploited for economic gain.
- Types of natural resources- renewable and non-renewable.
- Contrary to Garrett Hardin's argument warning of "the tragedy of the commons," many scholars, such as ElinorOstrom and Robert Wade, have correctly identified the importance of communities and institutions at a local level as a system for preserving the local natural environment and other common-pool resources (CPR).
- Because of the carelessness and profligacy with which water resources have been used, the speed of human population growth and the increasing demands for water, the provision of adequate, safe supplies of water is now a major source of concern, expense and even international tension.
- Lack of clean water has dire short- and long-term health impacts including increased infant mortality and impaired ability to work, which reduce industrial productivity and put pressure on already overstretched health services.
- Today, around half the world's population lives in towns and cities, and of these people one-third live without clean water or adequate sanitation (United Nations Human Settlement Programme, 2003).
- Water resource management is the activity of planning, developing, distributing and managing the optimum use of water resources.
- Agriculture is the largest user of the world's freshwater resources, consuming 70 percent.
- In the areas surrounding urban centres, agriculture must compete with industry and municipal users for safe water supplies, while traditional water sources are becoming polluted with urban runoff.
- The Asian and Pacific Region's forests are under pressure from a rapidly expanding population, the need for development and the pressure for land from agriculture.

- Deforestation and forest degradation is caused by a number of factors. These include natural factors, such as fire, disease and weather-induced stress, but more often than not, are factors exacerbated by human activities, such as land clearing for agriculture, overgrazing, over-extraction of timber and harmful logging practices.
- The costs and negative effects of deforestation are well documented. Where deforestation occurs in an unplanned and wasteful manner, the economic losses can be substantial, particularly from the loss of timber and other commercial resources.



7.6 FURTHER READING

1) Tragedy of the Commons (1968), byGarrett Hardin
2) Community, Commons and Natural Resource Management in Asia. Edited by Haruka Yanagisawa
3) Managing forests for cleaner water for urban populationsby S. Stolton and N. Dudley



7.7 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No 1: Natural Resources are materials (resources) occuring in nature which can be used by humans for living a fullfilling life on one hand and make economic gains on the other.

Ans to Q No 2: Water resource management is the activity of planning, developing, distributing and managing the optimum use of water resources.

Ans to Q No 3: Deforestation and degradation are caused human activities such as land clearing for agriculture, overgrazing, over-extraction of timber and harmful logging practices.

Ans to Q No 4: The argument which challenges Hardin's idea of 'tragedy of commons' is that common-pool resources (CPR), or simply commons, can be well conserved when they are managed collectively by local people.

Ans to Q No 5: Agriculture is the world largest user of the world's fresh water resources (70 percent)



7.8 MODEL QUESTIONS

Short Questions (Answer each question in about 150 words)

Q1: Write a short note on constraints on water supply in the context of urban areas.

Q2: Write a short note on distribution of forest resources in the global context.

Long Questions (Answer each question in about 300-500 words)

Q1: What are the causes and consequences of forest loss and degradation?

Q2: Discuss the importance of communities and institutions at a local level as a system for preserving the local natural environment and other common-pool resources (CPR).

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UNIT 8: ENVIRONMENTAL ISSUES AND PROBLEMS

UNIT STRUCTURE

8.1 Learning Objectives
8.2 Introduction
8.3 Contemporary Environmental Problems
8.3.1 Pollution
8.3.2 Deforestation
8.3.3 Urban Waste and Solid Waste disposal
8.3.4 Slums
8.3.5 Sanitation
8.3.6 Technological Waste
8.4 Let Us Sum Up
8.5 Further Reading
8.6 Answers to Check Your Progress
8.7 Model Questions

8.1 LEARNING OBJECTIVES

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

- understand the contemporary environmental problems like pollution, deforestation so on and so forth
- explain the causes behind the environmental problems
- analyse the threat posed by the environmental problems

8.2 INTRODUCTION

Any country's environmental problems are related to the level of its economic development, the availability of natural resources and the lifestyle of its population. Rapid growth of population, poverty, urbanization, industrialization and several related factors are responsible for the rapid degradation of the environment. Environmental problems have become serious globally, and hence cannot be ignored. In this unit, we shall discuss about some of the major environmental problems of the time.

8.3 CONTEMPORARY ENVIRONMENTAL PROBLEMS

8.3.1 Water pollution

Water pollution can be defined as the presence of any foreign substance (organic, inorganic, biological and radiological) in water which tends to damage the quality of water so as to constitute a hazard, or impairs the usefulness of water. Courts of law explain water pollution as "any impairment of water quality that makes it unsuitable for beneficial use".

Water pollution is developing as a threat to all mankind. Water quality refers to the physical, chemical and biological characteristics of water. Water is vital to our lives. Water is said to be polluted, when its quality is lowered directly or indirectly by man's activity such that it becomes less fit for drinking, domestic, agricultural or any other purpose. Water pollution is the adulteration of water bodies (e.g. lakes, rivers, oceans, aquifers and groundwater), digging of minerals from rocks, human actions (industrial waste, harmful chemical fertilizers from agriculture, household and urban waste). Soil erosion, decaying of organic matter are natural sources of water pollution. Water pollution occurs when pollutants (particles, chemicals or substances that make water contaminated) are discharged directly or indirectly into water bodies without enough treatment. Pollutants get into water mainly by human causes or factors. Water pollution is the second most vital environmental concern along with air pollution. Water is a very important resource for people and the environment. Water pollution affects drinking water, rivers, lakes and oceans all over the world.

In many developing countries, one of the foremost causes of death is drinking from polluted water sources.

8.3.2 Deforestation

Deforestation occurs due to many reasons: trees are cut down to be used or sold as fuel (sometimes in the form of charcoal) or timber, while

cleared land is used as pasture for livestock, plantation ground for commodities and settlements. The removal of trees without ample reforestation has given rise to destruction of habitat, biodiversity loss and aridity. It has hostile impacts on bio sequestration of atmospheric carbon dioxide. Efforts to prevent or slow down deforestation have been tried for many centuries because it has long been acknowledged that deforestation can cause environmental damage enough in some cases to cause societies to fall. The term is used today to refer to the destruction of forests by human beings and their replacement by agricultural systems.

Deforestation is clearing Earth's forests on a massive scale, often causing damage to the quality of land. Forests are cut down for various reasons, but most of them are associated to money or to people's requirement to provide for their families. Deforestation has also been used in war to dispossess an enemy of cover for its forces and also vital resources. Deforested regions typically experience significant adverse soil erosion and often degrade into wasteland. The chief cause of deforestation is agriculture. Farmers clear forests to make available more room for planting crops or grazing livestock. Often many small farmers will each clear a few acres to sustain their families by cutting down trees and burning them in a process known as "slash and burn" agriculture. Not all deforestation is intentional. Some are caused by a blend of human and natural factors like wildfires and subsequent overgrazing, which may thwart the growing of new trees. Deforestation has numerous negative impacts on the environment. The most vivid impact is a loss of habitat for millions of species. Seventy percent of Earth's animals and plants live in forests, and several cannot survive the deforestation that destroys their homes.

Deforestation also leads to climate change. Forest soils are moist, but if there is no protection from sun-blocking tree cover they rapidly dry out. Trees also help perpetuate the water cycle by releasing water vapor back into the atmosphere. Without trees to play these roles, many former forest lands can rapidly become barren deserts. Removing trees denies the forest of portions of its canopy, which prevents the sun's rays during the day and

holds in heat at night. This disruption leads to more extreme temperature swings that can be injurious to plants and animals. Trees also play a serious role in absorbing the greenhouse gases that fuel global warming. Fewer forests imply larger amounts of greenhouse gases entering the atmosphere-thus resulting in extreme global warming.

The fastest solution to deforestation would be to simply refrain from cutting down trees. Though deforestation rates have reduced a bit in recent years, financial realities make this unlikely to follow. A more workable solution is to carefully manage forest resources by removing clear- cutting to make sure that forest environments remain unharmed. The cutting that does happen should be balanced by the planting of enough young trees to substitute the older ones felled in any given forest. The quantity of new tree plantations is rising each year, but their total still equals a minute fraction of the Earth's forested land. Deforestation causes extinction, desertification, changes to climatic conditions, and displacement of populations as observed by current conditions and in the past through the fossil record.

As per the United Nations Framework Convention on Climate Change (UNFCCC) secretariat, the overwhelming direct source of deforestation is agriculture. Subsistence farming is liable for 48% of deforestation; commercial agriculture is liable for 32% of deforestation; logging is liable for 14% of deforestation and fuel wood cutting makes up 5% of deforestation. Experts do not agree on whether industrial logging is a significant contributor to global deforestation. Some argue that poor people are more expected to clear forest because they have no options, others say that the poor donot possess the ability to pay for the materials and labour needed to clear forest. One study found that population increases due to high fertility rates were a crucial driver of tropical deforestation in only 8% of cases. Other causes of contemporary deforestation may include the inequitable distribution of wealth and power, corruption of government institutions, population growth and overpopulation, and urbanization.

Another principal cause of deforestation is globalisation, although there are instances where the impacts of globalization (new flows of capital,

labor, commodities, and ideas) have encouraged localized forest recovery. Deforestation can arise from "a mix of population pressure and stagnating social, economic and technological conditions." Deforestation is still happening and is shaping climate and geography.

A major reason for global warming is deforestation and is often viewed as one of the major causes for the enhanced greenhouse effect. About 20% of world greenhouse gas emissions is a result of tropical deforestation. Deforestation, mainly in tropical areas, could account for up to one-third of all anthropogenic carbon dioxide emissions according to the Intergovernmental Panel on Climate Change. Deforestation leads to carbon dioxide to linger in the atmosphere. As carbon dioxide accumulates, there is a formation of a layer in the atmosphere that traps radiation from the sun. The radiation transforms to heat which leads to global warming, which is better known as the greenhouse effect. Plants take away carbon in the form of carbon dioxide from the atmosphere through the process of photosynthesis but release some carbon dioxide back into the atmosphere through normal respiration. Only when actively growing can a tree or forest remove carbon, by storing it in plant tissues. Deforestation may also lead to carbon stores held in the soil to be released. Forests can be either sinks or sources subject to environmental circumstances. In deforested areas, the land heats up sooner and reaches a higher temperature, leading to localized upward motions that enhance the formation of clouds and ultimately generate more rainfall. However, according to the Geophysical Fluid Dynamics Laboratory, the models used to explore remote responses to tropical deforestation showed a broad but mild temperature increase all through the tropical atmosphere.

The water cycle is also impacted by deforestation. Trees extract groundwater through their roots and discharge it into the atmosphere. When part of a forest is destroyed, the trees no longer transpire this water, causing a much drier climate. Deforestation decreases the content of water in the soil and groundwater as well as atmospheric moisture. The dry soil leads to lower water intake for the trees to absorb. Deforestation lessens soil

cohesion so that erosion, flooding and landslides ensue. The decrease in forest cover lessens the landscape's capacity to intercept, retain and transpire precipitation. Instead of trapping precipitation, which then percolates to groundwater systems, deforested areas become sources of surface water runoff, which moves much faster than subsurface flows. That faster transportation of surface water can translate into flash flooding and more localized floods than would occur with the forest cover. Deforestation also adds to decreased evapotranspiration, which lessens atmospheric moisture which in some cases affects precipitation levels downwind from the deforested area, as water is not recycled to downwind forests, but is lost in runoff and returns directly to the oceans.

Soil erosion is generally increased by deforestation, by increasing the amount of runoff and reducing the protection of the soil from tree litter. In excessively leached tropical rain forest soils, this can be a benefit. Deforestation has led to a decline in biodiversity and is known to have caused the extinction of many species. The removal or destruction of areas of forest cover has caused in a degraded environment with reduced biodiversity. Forests support biodiversity, providing habitat for wildlife; moreover, forests foster medicinal conservation. With forest biotopes being an irreplaceable source of new drugs (such as taxol), deforestation can destroy genetic variations (such as crop resistance) irretrievably. Rapidly growing economies also have an effect on deforestation. Then deforestation rates accelerate (HFHD, high forest cover - high deforestation rate), and forest cover is reduced (LFHD, low forest cover - high deforestation rate), before the deforestation rate slows (LFLD, low forest cover - low deforestation rate), after which forest cover stabilizes and eventually starts recovering.

Global deforestation severely augmented around 1852. There are several methods that are appropriate and reliable for cutting down and keeping a check on deforestation. One method is the "visual interpretation of aerial photos or satellite imagery that is labour-intensive but does not entail high-level training in computer image processing or extensive computational resources". Deforestation is classically measured by

quantifying the amount of area deforested, measured at the present time. From an environmental lens, quantifying the damage and its possible consequences is a more important task, while conservation efforts are more dedicated to forested land protection and development of land-use alternatives to avoid continued deforestation. Deforestation rate and total area deforested have been commonly used for monitoring deforestation in several regions, including the Brazilian Amazon deforestation monitoring by INPE. Monitoring deforestation is a very complicated process, which becomes even more complicated with the increasing needs for resources.

8.3.3 Urban Waste And Solid Waste disposal

Solid waste can be categorized into different types depending on their source. Municipal solid waste is not collected at all. 70% of the Indian cities lack the satisfactory capacity to transport it and there are no sanitary landfills to dispose off the waste. The existing landfills are neither well prepared nor well managed and are not lined properly to safeguard against contamination of soil and groundwater. (a) Household waste is normally termed as municipal solid waste. This type of waste mostly consists of household waste, sanitation waste, waste from streets, and demolition waste from construction work. (b) Industrial waste which in the majority of cases is termed as Hazardous waste. This type of waste is a waste that is quite dangerous as they consist of toxic substances that are of chemical nature. This type of waste is highly dangerous to human, plants, animals and the overall environment. (C) Hospital waste or biomedical waste is that quiet infectious. It is generated from hospitals, clinics, research centers and health care centers. This type of waste is most infectious and can spread diseases and other types of viral and bacterial infections among humans and animals.

8.3.4 Slums

Rapid urbanization has brought alarming unmanageable, inevitable and persistent difficulties of slums in almost every city of the world. Slum life has not only a problem in developing countries but also developed ones.

The distinctive character of the slum areas are substandard, dingy houses of soaring density and congestion, unclean conditions overcrowding, dearth of basic amenities such as water supply, drainage and sewerage and dumping of waste. It has been perceived that immigration to industrial centres is greater where large working manpower is required. Thus slums co-exist with industrial urban centres.

Slums have continuously assumed a fundamental component of the urbanization procedure. This is the site original migrants are assimilated and naturalized into the urban framework. Indian scheme makers require to map for urban places that will presume alike part in the new sharp urban communities.

- **Causes behind growth of Slums:**

- Shortages of housing: If there are insufficient spots for individuals to live, at that point somebody needs to do without and the individuals who are barred are by and large the poorest individuals.
- Privilege to land: People raise transient safe houses as a substitute of being homeless. Squatters usually construct short asylums at the first place, however, after some time these settlements are given hard shape and turn out to be extra settled.

8.3.5 Sanitation

Sanitation is the clean resource of promoting wellbeing through avoidance of human make contact with with the hazards of harsh environment as well as dealing with proper removal of sewage wastewater. Hazards can be physical, microbiological, biological or chemical agent of disease. Sanitation generally refers to the provisions of facilities and services for the safe disposal of human urine. Insufficient cleanliness is a major reason of infection world-wide and getting better sanitation is known to have an important useful impact on health both in households and across communities. The word sanitation also refers to the maintenance of hygienic conditions, through services such as garbage collection and waste water disposal. Poor sanitation leads to many diseases such as trachoma and

soil transmitted Helminthiases, diarrhoea. Children suffering from diarrhoea are more vulnerable to become underweight. Sanitation is a severe matter that is disturbing most parts of the world particularly the developing countries. On the global scale, the most affected are children who in most cases lose their life due to diseases caused by poor sanitation. In many housing and rural areas, households are not connected on the road to sewers. They discharge their water waste into septic tanks or another type of on-site sanitation. On-site systems include drain fields which require a significant area of land. The reuse of untreated waste water in irrigated agriculture is common in developing countries. Ecological sanitation is sometimes presented as a radical alternative to conventional sanitation systems. Ecological cleanliness is based on composting or parasites composing toilets where an additional division of urine and faeces at the foundation for cleanliness and recycling has been done. The significance of the separation of waste lies in an effort to avoid diseases which can be transmitted through individual waste, which cause problems to both developed countries as well as developing countries to at varing degrees. It is estimated that up to 5 million people die each year from preventable water-borne diseases; as a result of inadequate sanitation and bad hygiene practices.

8.3.6 Technological Waste

Industrial waste, Electronic waste, e-waste, e-scrap or electronic-disposal, electrical and electronic equipment describe discarded electrical or electronic devices. Informal dispensation of electronic ravage in developing countries may be at the root of some health and pollution problems, though these countries are also most possibly to recycle and repair electronics. Electronic misuse may be distinct as excess computers, office electronic equipment, leisure device, electronic mobile phones, television sets and refrigerator. The USA throws-out 30 million computers every year and 100 million phones are disposed of in Europe each year. The environmental protection agency estimates that only 15-20% of e-waste is recycled and the rest of the technological wastes go directly into landfills and incinerators.

The system of dismantling and disposing of electronic ravage in the third world planet show the way to a numeral of environmental impacts.

- **IMPORTING WASTE:** Importing waste means that wastes like household waste, solid waste and technological waste are imported to India from other developed countries. These wastes are harmful to our environment and health. Mainly the technical waste contains toxic and other damaging components. International waste shipments (IWS) also known as trans boundary shipments of desecrate are movements of ravage between countries. Waste shipment control classified the waste into two main classes that are; Green list waste and Notifiable waste..Green list misuse is measured as a low menace to the environment. Notifiable waste which needs authorization from the regulatory authority before it can be imported or exported. It is considered hazardous or harmful to the environment.

  The major green list waste for disposal is incineration without energy generation, landfill and permanent storage of waste. While the world is marching with the technological revolution; countries like India are facing a forthcoming danger; technological waste of developed countries. Such as the US disposes their waste to India and other Asian countries. The major reasons for importing of waste are cheap labour and lack of environmental standards in Asia. European community regulation is on shipments of waste 1013/2006. European legislation provides the framework for control onimporting waste.

  Hazardous wastes are from time to time shipped from or to other countries for treatment, disposal, or recycling. The vast bulk of this waste operate occurs with Canada and Mexico, but the US also engages in dangerous waste trade with other countries. Importers and exporters of dangerous wastelands must comply with related domestic laws and regulations, which include set of laws under the Resource Conservation and Recovery Act (RCRA).

- **EXPORTING WASTE:** The last few decades have seen a phenomenal increase in the development and use of electronic and all technological goods, of course with this comes an equally sensational increase in electronic waste (e-waste). The throwing away of this e-waste has become a main global trouble and it hasn't happened suddenly. In the late 1980s, the world was heated to learn of 'toxic traders', organisations that were shipping hazardous waste to developing countries where recycling methods were dangerous and unregulated. Despite over 150 countries ratifying the Basel Convention, exporting e-waste to unregulated recycling centres in developing countries is still a major issue worldwide. The Basel Action Network and the Silicon Valley Toxics Coalition released the frightening report Exporting Harm: The Techno-Trashing of Asia. The report found that 50 to 80% of e-waste composed for recycling in the United States is exported to developing nations such as China, India and Pakistan, where the environment is being contaminated and local men, women and children are being exposed to toxins.



CHECK YOUR PROGRESS

Q1: According to UNFCCC what is one of the major causes of deforestation?

Q2: What are the characteristic features of slums?

Q3: What are the reasons for fast growing technological waste?

Q4: What are the different types of urban wastes?

Q5: What is ecological sanitation?



8.4 LET US SUM UP

- Rapid growth of population, poverty, urbanization, industrialization and several related factors are responsible for the rapid degradation of the environment.

- Water pollution is the contamination of water bodies (e.g. lakes, rivers, oceans, aquifers and groundwater), very often by human activities (industrial waste, harmful chemical fertilizers from agriculture, household and urban waste). Water pollution occurs when pollutants (particles, chemicals or substances that make water contaminated) are discharged directly or indirectly into water bodies without enough treatment to get rid of harmful compounds.
- Deforestation is clearing Earth's forests on a massive scale, often resulting in damage to the quality of the land. Forests are cut down for many reasons.
- Deforested regions typically incur significant adverse soil erosion and frequently degrade into wasteland.
- The biggest driver of deforestation is agriculture.
- Deforestation has many negative effects on the environment. The most dramatic impact is a loss of habitat for millions of species.
- Deforestation also drives climate change. Deforestation is a contributor to global warming, and is often cited as one of the major causes of the enhanced greenhouse effect.
- The water cycle is also affected by deforestation.
- Deforestation generally increases rates of soil erosion.
- Solid waste can be classified into different types depending on their source- household waste, industrial waste and hospital waste.
- Rapid urbanization has brought alarming unmanageable, inevitable and persistent problems of slums in almost every city of the world.
- Poor sanitation leads to many diseases such as trachoma and soil transmitted Helminthiases, diarrhoea.
- Informal processing of electronic waste in developing countries may cause serious health and pollution problems, though these countries are also most likely to reuse and repair electronics.



8.5 FURTHER READING

1) Fearnside, P. M., & Laurance, W. F. (2004). Tropical Deforestation and Greenhouse-Gas Emissions Author (s): Philip M . Fearnside and William F . Laurance Published by?: Wiley on behalf of the Ecological Society of America Stable URL?: https://www.jstor.org/stable/4493598 REFERENCES Linked referen, 14(4), 982-986.

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3) Koop, S. H. A., & van Leeuwen, C. J. (2017). The challenges of water, waste and climate change in cities. Environment, Development and Sustainability, 19(2), 385-418. https://doi.org/10.1007/s10668-016-9760-4

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8.6 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No 1: According to the United Nations Framework Convention on Climate Change (UNFCCC) secretariat, the overwhelming direct cause of deforestation is agriculture.

Ans to Q No 2: The characteristic features of the slum areas are substandard, dingy houses of high density and congestion, overcrowding, insanitary conditions, absence of basic amenities like water supply, drainage and sewerage and disposal of garbage.

Ans to Q No 3: Rapid changes in technology changes in media, falling prices and planned obsolescence have resulted in a fast-growing surplus of electronic waste around the globe.

Ans to Q No 4: Different types of urban wastes are household waste, industrial waste and hospital waste.

Ans to Q No 5: Ecological sanitation is based on composting or vermin composing toilets where an extra separation of urine and faeces at the source for sanitation and recycling has been done.



8.7 MODEL QUESTIONS

Short Questions (Answer each question in about 150 Words)

Q1: Mention the reasons behind growth of slums.

Q2: How is the water cycle effected by deforestation?

Long Questions (Answer Each Question In About 300-500 Words)

Q1: Discuss some of the consequences of deforestation.

Q2: Define technological waste. Explain importing and exporting waste.

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UNIT 9: GLOBAL WARMING AND CLIMATE CHANGE

UNIT STRUCTURE

9.1 Learning Objectives

9.2 Introduction

9.3 Global Warming and Climate Change

9.3.1 Climate Change: Meaning and Definition

9.3.2 Global Warming: Meaning and Causes

9.4 Impact of Global Warming and Climate Change

9.4.1 Projections of Future Changes in Climate

9.4.2 Examples of Impact of Global Warming

9.4.3 Projected Future Impacts of Global Warming and Climate Change

9.5 Ways to Mitigate and Tackle Global Warming Induced Climate Change

9.6 Let Us Sum Up

9.7 Further Reading

9.8 Answers to Check Your Progress

9.9 Model Questions

9.1 LEARNING OBJECTIVES

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

- define the concept of Climate Change and Global Warming
- explain the nature of the particular challenges posed by climate change and Global Warming
- discuss their consequences on human life and the planet
- discuss ways to mitigate and to tackle Climate Change and Global Warming.

9.2 INTRODUCTION

In the previous unit, we have already discussed about some of the the contemporary environmental problems. In this unit, we shall discuss two major environmental concerns of our time i.e Global Warming and

Climate Change. Tackling climate change and Global Warming are two major challenges facing the world. They are also intimately related. Human activities fundamental to development - industry, land use, energy generation and transport - are root causes of anthropogenic climate change. Conversely, climate change impacts hold the greatest threat for the livelihood activities and development prospects of poor and marginalized people.

Our understanding of the origins of global warming comes from the work of Jean-Baptiste Joseph Fourier, a French scientist, who in the early part of the nineteenth century calculated the energy that reaches the earth from the sun, in the form of sunlight, which is absorbed and then reflected back. When he calculated the amount of energy reaching the earth and then reflected back from the earth surface he got the finding that the earth should be frozen. Therefore he made the conclusion that the atmosphere of the earth acts like a mantle, keeping a portion of the reflected energy and heat, which makes the planet habitable. He speculated that CO2 acted as the mantle in the earth's atmosphere.

Later scientists working on global warming tried to find out which atmospheric elements trapped the sun energy and heat. They concluded that the major gases like Nitrogen and Oxygen that composes the atmosphere offers no barrier to the heat loss. So therefore those gases that trapped the heat, which later came to be termed as the 'greenhouse gases', were found to be carbon dioxide, nitrous oxide, hydrofluorocarbons, sulphur hexafluoride, methane and water vapour which were present in relatively small amounts in the atmosphere. The scientists came up with the calculation of 'parts per million' (ppm) to measure the level of greenhouse gases in the atmosphere, since there proportion are so small. The tiny proportion of these gases manages to keep the temperature suitable for habitation, therefore the greenhouse gases created by human industry can have a severe effect on the climate.

Over the past 150 years or so, greenhouse gases in the atmosphere have progressively increased with the expansion of industrial production. The average world temperature has increased by 0.74 degrees since 1901.

We know from geological studies that world temperatures have fluctuated in the past, and that such fluctuations correlate with CO2 content in the air. The evidence shows, however, that at no time during the past 650,000 years has the CO2 content of the air been as high as it is today. It has always been below 290ppm. By early 2008, it had reached 387ppm and is currently rising by some 2ppm each year.

9.3 GLOBAL WARMING AND CLIMATE CHANGE

The terms global warming and climate change sometimes appear to be used interchangeably. Strictly speaking, global warming is just one aspect of climate change, and is indeed an important driver of climate change. Apparently small increases in average global temperatures can lead to very large changes in other aspects of local and global climates. Changes in these other aspects of the climate - in averages in precipitation, winds, clouds, humidity, and in temporal and spatial variation and variability - may then have multiple impacts.

9.3.1 Climate change: Meaning and Definition

The term 'climate change' refers to change in the longer term pattern of behavior of the atmosphere over millennia or, more recently, as a result of natural processes or human activity. Climate is distinguished from weather, which is the specific behavior of the climate at a particular time. More particularly weather is the state of atmosphere at any given time denoting short time variation. There are many possible ways in which climate may be described. These are generally associated with averages or variability in temperature, precipitation, wind and cloud. Historically Earth's climate has never been static.

- **Climate Change: Definitions given by various Agencies**

  The distinction between natural and human caused climate change is reflected in the different definitions of climate change. Each definition points to climate change policy in a particular direction, which is a reflection of the particular agencies policy of reflecting climate change and its impact.

The Intergovernmental Panel on Climate Change (IPCC) definition on Climate change refers to a change in the state of the climate that can be identified (e.g. using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. It refers to any change in climate over time, whether due to natural variability or as a result of human activity.

In contrast, the United Nations Framework Convention on Climate Change (UNFCCC) refers to a change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods.

9.3.2 Global Warming: Meaning And Causes

Global warming is the slow increase in the average temperature of the earth's atmosphere because an increased amount of the energy (heat) striking the earth from the sun is being trapped in the atmosphere and not radiated out into space.

- **Causes of Global Warming**

  It is well established that global warming and climate change result from human activity (anthropogenic), Scientists attribute current atmospheric warming to human activities that have increased the amount of carbon containing gases in the upper atmosphere and to increased amounts of tiny particles in the lower atmosphere.

  Specifically, gases released primarily by the burning of fossil fuels and the tiny particles produced by incomplete burning trap the sun's energy in the atmosphere. Scientists call these gases "greenhouse gases" (GHGs) because they act like the wrong way reflective glass in our global greenhouse. Scientists call the tiny particles 'black carbon' (soot) and attribute their warming effect to the fact that the resulting layer of black particles in the lower atmosphere absorbs heat like a black blanket.

Scientists date the beginning of the current warming trend to the end of the 18th or beginning of the 19th century when coal first came into common use. This warming trend has accelerated as we have increased our use of fossil fuels to include gasoline, diesel, kerosene and natural gas, as well as the petrochemicals (plastics, pharmaceuticals, fertilizers) we now make from oil. Experts attribute the current warming trend to the use of fossil fuels because using them releases into the atmosphere stores of carbon that were sequestered (buried) millions of years ago. The addition of this "old" carbon to the world's current stock of carbon, scientists have concluded, is what is heating our earth which causes global warming.



CHECK YOUR PROGRESS

Q1: Which gases are the major component of 'Greenhouse gases'?

Q2: What did the scientist come up to measure the level of greenhouse gases present in the atmosphere?

Q3: How does different agencies define 'climate change'?

Q4: In what way does human activity impact climate change and global warming?

9.4 IMPACT OF GLOBAL WARMING AND CLIMATE CHANGE

Warming of the climate system is unequivocal and can now be firmly attributed to human activity. Numerous long-term changes in climate have been observed at continental, regional and ocean basin scales, including changes in arctic temperatures and ice, widespread changes in precipitation amounts, ocean salinity, wind patterns and aspects of extreme weather including droughts, heavy precipitation, heat waves and the intensity of tropical cyclones.

Impact of Global warming can be seen in the adverse impact of the following phenomenon:

- **Melting Glaciers:** Since the early twentieth century, with few exceptions, glaciers around the world have been retreating at unprecedented rates. Some scientists attribute this massive glacial retreat to the Industrial Revolution, which began around 1760. In fact, several ice caps, glaciers and ice shelves have disappeared altogether in this century. Many more are retreating so rapidly that they may vanish within a matter of decades.
- **Rising Sea Levels:** Sea-level rise is a major effect of climate change. It has drawn international attention, because higher sea levels in the future would cause serious impacts in various parts of the world. Shrinking land ice - glaciers, ice caps, and ice sheets contributed about half of the total global sea level rise between 1972 and 2008, but its contribution has been increasing since the early 1990s as the pace of ice loss has accelerated. Recent studies suggest that land ice loss added nearly half an inch to global sea level from 2003 to 2007, contributing 75 to 80 percent of the total increase during that period.
- **Flooding:** Heavy downpours are increasing in many parts of the world, especially over the last three to five decades. The heaviest rainfall events have become heavier and more frequent, and the amount of rain falling on the heaviest rain days has also increased. Since the 1990's, the amount of rain falling in very heavy precipitation events has been significantly above average.
- **Droughts:** Higher temperatures lead to increased rates of evaporation, including more loss of moisture through plant leaves. Even in areas where precipitation does not decrease, these increases in surface evaporation and loss of water from plants lead to more rapid drying of soils if the effects of higher temperatures are not offset by other changes (such as reduced wind speed or increased humidity). As soil dries out, a larger proportion of the incoming heat from the sun goes into heating the soil and adjacent

air rather than evaporating its moisture, resulting in hotter summers under drier climatic conditions.

- **Heat waves:** Heat waves are periods of abnormally hot weather lasting days to weeks. The number of heat waves has been increasing in recent years. This trend has continued in 2011 and 2012, with the number of intense heat waves being almost triple the long-term average. The recent heat waves and droughts in Texas (2011) and the Midwest (2012) set records for highest monthly average temperatures.
- **Increasing Tornados, Cyclones and Hurricanes:** A significant global increase (95% significance level) can be found in all storms with maximum wind speeds from 175 km/h. Storms of 200 km/h and more have doubled in number, and those of 250 km/h and more have tripled. Although some of the trends may be owing to improved observation techniques, this provides some evidence that a global increase in the most intense tropical storms due to global warming is not just predicted by models but already happening. There has been a substantial increase in most measures of Atlantic hurricane activity since the early 1980s, the period during which high quality satellite data are available. These include measures of intensity, frequency, and duration as well as the number of strongest (Category 4 and 5) storms. The recent increases in activity are linked, in part, to higher sea surface temperatures in the regions that hurricanes form in and move through. Numerous factors have been found to influence these local sea surface temperatures, including natural variability, human-induced emissions of heat-trapping gases, and particulate pollution.

The 100-year linear warming trend (1906-2005) was 0.74°C, with most of the warming occurring in the past 50 years. The warming for the next 20 years is projected to be about 0.2°C per decade. Continued greenhouse gas emissions at or above current rates would cause further warming and induce many changes in

the global climate system during the 21st century that would very likely be larger than those observed during the 20th century.

9.4.1 Projections of Future Changes in Climate

Projections of future changes in climate indicate the following:

- Increasing atmospheric carbon dioxide concentrations lead to increasing acidification of the oceans;
- Snow cover projected to contract, widespread increases in thaw depth over most perma frost regions;
- Sea ice projected to shrink in both the Arctic and the Antarctic, and arctic late-summer sea ice may disappear almost entirely by the latter part of the 21st century;
- Hot extremes, heat waves and heavy precipitation events very likely to continue to become more frequent;
- Changes in precipitation patterns, with increase being very likely in high latitudes, while decreases are likely in most subtropical land regions;
- Anthropogenic warming and sea level rise would continue for centuries due to the time scales associated with climate processes and feedbacks, even if greenhouse gas concentrations were to be stabilized.

Global warming leading to climate change has many adverse impacts on the earth. Warming is greater over land areas than over the oceans, and is higher at northern latitudes than elsewhere. Very recent studies show that the temperatures of the oceans are rising several times faster than was thought likely a few years ago. Higher temperatures produce more acidity in the water, which could seriously threaten marine life. Warmer seas release more CO2, accelerating the global warming effect.

9.4.2 Examples of Impact of Global Warming

A few Examples of Global Warming effect:

- **Melting Ice caps in the Artic:** Satellite data, available since 1978, show that the annual average Arctic sea ice coverage is shrinking

by nearly 3 per cent per decade, with larger decreases in the summer of over 7 per cent. The Arctic ice-cap is less than half the size it was 50 years ago. Over that time, average temperatures in the Arctic region have increased by about seven degrees, a result of a specific feedback cycle that exists there. The sun's rays strike the Arctic at a sharper angle than elsewhere over the summer, at a time when the ice is giving way to open water, which absorbs more solar radiation.

- **Gangotri Glacier receding:** Gangotri Glacier is situated in the Uttarkashi District of Garhwal Himalaya. Currently 30.2 kilometers (19 miles) long and between 0.5 and 2.5 kilometers (0.31 to 1.5 miles) wide, Gangotri glacier is one of the largest in the Himalaya. Gangotri has been receding since 1780, although studies show its retreat quickened after 1971. Over the last 25 years, Gangotri glacier has retreated more than 850 meters (930 yards), with a recession of 76 meters (83 yards) from 1996 to 1999 alone.
- **Floods in the U.S.A:** In the United States, floods caused 4,586 deaths from 1959 to 2005 while property and crop damage averaged nearly 8 billion dollars per year (in 2011 dollars) over 1981 through 2011. The risks from future floods are significant, given expanded development in coastal areas and floodplains, unabated urbanization, land-use changes, and human-induced climate change.
- **Bangladesh submergence of territories:** Almost one fourth of the total population of the country live in the coastal areas of Bangladesh, where majority of the population are somehow affected (directly or indirectly) by Coastal Floods / Tidal Surges, River-bank Erosion, Salinity, Tropical Cyclones etc. With the rise of Sea-level up to one meter only, Bangladesh could lose up to 15% of its land area under the Sea water and around 30 million people living in the coastal areas of Bangladesh could become Refugees because of Climate Change impacts.

9.4.3 Projected Future Impacts of Global Warming and Climate Change

As regards the projected impacts, more specific information is now available on the nature of these impacts, across a wide range of systems and sectors. Examples of projected impacts include:

- **Fresh water resources and their management:** Runoff and water availability are projected to increase at high latitudes and in some wet tropics, and decrease over much of the mid-latitudes and dry tropics, some of which are presently water-stressed areas. Drought-affected areas will probably increase, and extreme precipitation events, which are likely to increase in frequency and intensity, will augment flood risk. Hundreds of millions of people are projected to be exposed to increased water stress.

  Ecosystems: The following ecosystems are identified to be the most vulnerable, and are virtually certain to experience the most severe ecological impacts, including species extinctions and major biome changes:

  On continents: tundra, boreal forest, mountain and Mediterranean-type ecosystems;

  Along coasts: mangroves and salt marshes, due to multiple stresses;

  In oceans: coral reefs and the sea-ice biomes.

  The progressive acidification of the oceans is expected to have negative impacts on marine shell-forming organisms such as corals and their dependent species. An intensification and expansion of wildfires is likely globally, as temperatures increase and dry spells become more frequent and more persistent. Over the course of this century, net carbon uptake by terrestrial ecosystems is likely to peak before mid-century and then weaken or even reverse, thus amplifying climate change.

- **Food, Fiber and Forest products:** Moderate warming benefits cereal crops and pasture yields in mid- to high-latitude regions, but

even slight warming decreases yields in seasonally dry and tropical regions. Further warming has increasingly negative impacts in all regions. Increases in the frequency of droughts and floods are projected to affect local crop production negatively, especially in subsistence sectors at low latitudes. Regional changes in the distribution and production of particular fish species are expected due to continued warming, with adverse effects projected for aquaculture and fisheries.

Already rising temperatures at the equator have pushed such staple crops as rice north into once cooler areas, many fish species have migrated long distances to stay in waters that are the proper temperature for them. Different crops grow best at quite specific temperatures and when those temperatures change, their productivity changes significantly.

- **Health:** Projected severe climate change related exposures are likely to affect the health status of millions of people worldwide, particularly those least able to adapt, such as the poor, the very young and the elderly.
- **Industry, Settlement and Society:** Areas most likely to be affected are the poorer, often rapidly expanding communities near rivers and coasts, which use climate sensitive resources and are prone to extreme weather. Where extreme weather events become more intense and or more frequent, their economic and social costs are predicted to increase.



CHECK YOUR PROGRESS

Q5: In which phenomenon(s) the adverse impact of Global warming can be seen?

9.5 WAYS TO MITIGATE AND TACKLE GLOBAL WARMING INDUCED CLIMATE CHANGE

- **Efforts of the United Nation:** The efforts to manage climate change has been a matter of high level diplomatic negotiations involving states and international organizations. The logic for this is that global climate change affects us all, but individual countries can manage only the activities that take place within their borders; to confront a global problem, we need a global solution. As the United Nations history of these negotiations begins: "Climate change is a global challenge and requires a global solution. Greenhouse gas emissions have the same impact on the atmosphere whether they originate in Washington, London or Beijing. Consequently, action by one country to reduce emissions will do little to slow global warming unless other countries act as well. Ultimately, an effective strategy will require commitments and action by all the major emitting countries."

  The global effort to manage climate change has been organized through what is called the United Nations Framework Convention on Climate Change (UNFCCC). The UNFCCC was launched at the 1992 Rio Earth Summit to achieve GHG concentrations. It also set voluntary GHG emissions reductions that countries did not meet.

  With the failure of the Rio initiatives, the then 191 signatories to the UNFCCC agreed to meet in Kyoto in 1997 to establish a more stringent regime. The resulting Kyoto Protocol created a global trading system for carbon credits and binding GHG reductions for ratifying countries. (The US did not sign; China and India were exempt as developing countries.) So-called Conferences of the Parties (COPs) were held almost annually thereafter in places such as The Hague, Cancun and Doha without progress being made. We shall discuss in details about these international initiatives in Unit 12.

  Some other ways of mitigating this crisis are:

- **Push for reduced methane emissions from fracked gas:** Methane is 84 times more powerful than carbon dioxide over a 20-year time frame. Leading scientists estimate this gas alone is responsible for one-quarter of the observed changes to Earth's climate. Recent research suggests that methane emissions from the oil and gas sector (mainly fracked gas) is a much greater problem than reported. Cutting methane emissions is one of the cheapest, easiest and most effective things that governments can do right now to tackle climate change.
- **Shift to Renewable Energy:** The global push for cleaner, healthier energy is on. With costs dropping every day, renewable energy is the best choice for the environment and the economy. The solution to reduction of greenhouse gas emissions is a worldwide commitment that must be enacted across nearly every sector of industry and personal choice. Fortunately, the technology to switch to renewable energy such as solar and wind is readily available, and is now cheaper in most places than energy coming from fossil fuels such as coal and gas. The switch to renewable energy will solve a large piece of the puzzle, if we can act fast enough to implement.
- **Addressing Deforestation:** Deforestation should be prevented and replaced with sustainable forestry and land-use practices. Because plants breathe in carbon dioxide and store it, they actually remove carbon dioxide from the atmosphere. By allowing forests and other natural systems to act as carbon sinks - which is what they naturally do. We can encourage this removal of greenhouse gases from the atmosphere by ending deforestation, ocean habitat destruction and promoting sustainable forestry.

  Cutting down trees not only releases the carbon stored in that tree and in the soil, but also prevents that tree from taking carbon dioxide out of the atmosphere during the course of its life. Sustainable forestry and land use lead to carbon dioxide being taken out of the atmosphere.

- **Sustainable Development:** The definition of sustainable development that has gained popularity, after the Brundtland report (WCED, 1987) was published, was that it is 'development which meets the needs of the present without compromising the ability of future generations to meet their own needs'. The concept of sustainable development can be interpreted in many different ways, but at its core is an approach to development that looks to balance different, and often competing, needs against an awareness of the environmental, social and economic limitations we face as a society.

  All too often, development is driven by one particular need, without fully considering the wider or future impacts. We are already seeing the damage this kind of approach can cause by viewing changes in global climate resulting from our dependence on fossil fuel-based energy sources.

- **Changing how industries are run:** Individuals need to exercise their rights both as citizens and as consumers by putting pressure on their governments and on companies to make the system-wide changes that are needed.

- **Government's role:** Governments can set effective regulations to reduce carbon emissions by introducing legislation such as a carbon tax. A wide variety of national policies and instruments are available to governments to create the incentives for mitigation action.

- **Consuming moderately:** The need to check our carbon footprint to address the changes necessary for us as individual to make in order to play our part in curbing emission of GHGs in tackling global warming induced climate change. From dietary pattern to addressing the growing birth ratios, all falls under the individual's responsibility.

- World as a common forum for addressing the issue: The failure of the various international level commitments should not be seen a hindrance, rather the world needs to learn from the mistakes of the past and come together under one umbrella.



CHECK YOUR PROGRESS

Q6: What are the reasons behind the difficulties in managing climate change?

Q7: In what way can Governments around the world help in mitigating climate change and tackling global warming?



9.6 LET US SUM UP

- Global Warming induced Climate change represents a fundamental threat to human survival, as it is clear that development which involves large-scale emissions of GHGs, by humans, is not sustainable.
- The climate system does not have the capacity to absorb large amounts of GHGs without substantial changes in the climate, changes which undermine global natural and economic systems on which we currently depend. These include our water supplies, food systems, health, infrastructure and settlements.
- Understanding these threats requires an understanding of the science of climate change, impacts of different human activities on climate change and impacts of climate change on human activities and welfare.
- Major areas of human activity and welfare to consider here are agriculture, energy generation, transport, industry, settlement, water supplies, health, food supplies, lifestyles and vulnerabilities, and responses to disasters.



9.7 FURTHER READING

1) Giddens, A. (2009). The Politics of Climate Change. Cambridge, U.K : Polity Press

2) Weart, S. R. (2003). The Discovery of Global Warming. Cambridge, U.S.A. : Harvard University Press



9.8 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No 1: Carbon dioxide, nitrous oxide, hydrofluorocarbons, sulphur hexafluoride, methane and water vapour are the major components of 'Greenhouse gases'.

Ans to Q No 2: The scientist came up with the calculation of 'parts per million' (ppm) to measure the level of greenhouse gases in the atmosphere, since there proportion are so small.

Ans to Q No 3: The Intergovernmental Panel on Climate Change (IPCC) definition on Climate change refers to a change in the state of the climate that can be identified (e.g. using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer.

In contrast, the United Nations Framework Convention on Climate Change (UNFCCC), where climate change refers to a change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere

Ans to Q No 4: Scientists attribute current atmospheric warming to human activities that have increased the amount of carbon containing gases in the upper atmosphere and to increased amounts of tiny particles in the lower atmosphere. Specifically, gases released primarily by the burning of fossil fuels and the tiny particles produced by incomplete burning trap the sun's energy in the atmosphere

Ans to Q No 5: Experts attribute the current warming trend to the use of fossil fuels because using them releases into the atmosphere stores of carbon that were sequestered (buried) millions of years ago. The addition of this "old" carbon to the world's current stock of carbon, scientists have concluded, is what is heating our earth which causes global warming.

Ans to Q No 6: Managing climate change difficulties arise from two, related reasons: climate change management is viewed as expensive and it poses what we call a collective action problem.

Ans to Q No 7: Governments can set effective regulations to reduce carbon emissions by introducing legislation such as a carbon tax. A wide variety of national policies and instruments are available to governments to create the incentives for mitigation action.



9.9 MODEL QUESTIONS

Short Questions (Answer each question in about 150 words)

Q1: How does emission of GHGs lead to Global Warming and Climate Change?

Q2: How did the idea of Global Warming and Climate Change emerge?

Q3: Define Climate Change.

Q4: What is meant by Global Warming.

Long Questions (Answer each question in about 300-500 words)

Q1: How Global Warming induced climate change impact the planet? What are the various ways in which it has affected the earth? Give examples.

Q2: What are the various projections of future changes in climate? How will it impact human life?

Q3: What are the various ways to mitigate the effects of Global Warming? How can individuals play a part in tackling Global Warming?

Q4: What according to you is the biggest factor responsible for Global Warming induced Climate Change? Give justification.

Q5: According to you what has been the reason for failure to tackle emission of GHGs? What kind of role can Government play to address the issue?

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UNIT 10: ENVIRONMENT, DEVELOPMENT AND MODERNISATION

UNIT STRUCTURE

10.1 Learning Objectives
10.2 Introduction
10.3 Development and its Implications on the Environment
10.3.1 Construction of Roads, Buildings and Destruction of Greenery
10.3.2 Development, Modernisation and Threat to the Environment
10.3.2.1 Issues Pertaining to Air
10.3.2.2 Construction of Dams and its Effects
10.3.2.3 Role of MNCs
10.3.2.4 Issues Pertaining to Soil
10.3.2.5 Bio-Diversity Conservation
10. 4 Let Us Sum Up
10.5 Further Reading
10.6 Answers to Check Your Progress
10.7 Model Questions

10.1 LEARNING OBJECTIVES

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

- understand the implications of developmental activities on environment
- discuss how developmental activities such as the construction of roads, bridges, dams are hampering the ecosystem
- analyse how Development and Modernisation are posing threat to the environment.

10.2 INTRODUCTION

In the previous units, we have discussed about various environmental problems. Most of these problems are caused due to exploitation of nature

by man. In this unit, we shall get to know in greater details how developmental activities of modern society have been hampering the environment. Development is a continuous and constant process. But, every development has some positive and negative results. While development is carried out for the benefits of the inhabitants, the environment is equally important. If development is carried out without considering the environment, it may have a negative impact on the environment. This, in turn, will cause harmful effects to the people.

In order to fully enjoy the benefits of development, protection of the environment is necessary. Though this fact has been neglected in prioritizing development, there has been an increase in awareness among human beings in recent times. By giving adequate significance to the environment, we all will be able to enjoy the benefits of development for a long time.

This unit presents the associated problems that arise due to various human activities along with the solution that can be used to realize a harmonic sustainable development that provides for the co-existence of man and natural life. It will offer a range of information regarding the relationship between the environment and development activities.

10.3 DEVELOPMENT AND ITS IMPLICATIONS ON THE ENVIRONMENT

Development has been the buzzword in the modern society. However various studies have revealed the negative side of the development activities and how it has led to the destrcution of the environment. In the subsections below, we shall get a better understanding of this .

10.3.1 Construction of Roads, Buildings and Destruction of Greenery

A road cuts over rainforest to give a community access to the city. A dam produces a reservoir to provide freshwater to a growing town. A platform that is miles from the shoreline provides access to oil reserves deep below the ocean floor. These are all instances of infrastructure-physical structures that offer the underpinnings for modern society. Infrastructure is an essential part of the development associated with a growing human population, but it

can also have shocking impacts on the environment. The road through the rainforest may fragment habitat or cut off the migration course for an endangered species. The dam may have sidetracked water from freshwater habitats already struggling through a drought. A spill from the oil platform may have destroyed marine organisms and left the shoreline polluted.

With the drive for economic growth, new roads are being made and older ones widened within ominously shrinking wild lands-including national parks and wildlife sanctuaries. A pervasive argument posited in favour of bullish road-building is that emerging economies such as India cannot afford to argue ecological concerns. We must inevitably push ahead with development; costs can be paid later. In fact, though negative fallouts of ill-conceived roads have misled several developed countries, which can financially afford damage control, to adopt more holistic evaluations of current and past road building, India would do well to learn from the infrastructure blunders of richer countries, revealed only in the long-term.

Although we limit the scope of this topic to ecological concerns, it is relevant to note that road building incorporates a range of issues ranging from health, to socio-economic inequality. It is essential therefore that the Indian government integrate expertise from interconnected fields such as conservation biology, sociology, and public health when planning road networks.

In the conservation topic, roads are "linear intrusions". Although appearing benign compared to large mines or dams, the total habitat lost or degradation over the total stretch of linear intrusions can be significant. Not surprisingly roads are a vital feature contributing to habitat loss and land-use change. A large global body of research on "road ecology" has studied the detrimental aspects of road-building on animals, plants and entire ecosystems.

From elephants to insects, the most obvious concern of roads is the wildlife killed by vehicular traffic, often compounded by human casualness and lack of compliance with prescribed speed limits. Nocturnal animals including tigers and leopards are mostly vulnerable. While some animals are attracted to openings-making them vulnerable to roadkill-other

animals entirely avoid roads. Roads through wildlife corridors can pose obstacles for animal movement, sometimes leading to population drops or localized extinctions even over short time scales.

Edges shaped by felling trees are a dominant process altering plant communities over much wider areas of forest than is apparent to the untrained eye. "Edge effects" sometimes spread over half a kilometer into forests, drastically eroding plant diversity. Edges also promote weeds and exotic species that out-compete native floras and alter animals' use of habitats.

Forests fragmented by edges additionally suffer deviations in ecological and ecosystem process such as pollination, seed dispersal, and carbon storage. Such forests are vulnerable to soil erosion and landslides, degradation of soil quality, and depletion of aquatic reservoirs and water catchments of rivers. A seemingly simple road can lead to multifaceted changes in natural habitats.

Importantly, roads make otherwise remote habitats easily reachable. Consequently, increased human settlement and fractal increases in grids of secondary roads can in turn increase illegal activities like poaching or logging, especially in regions where monitoring or enforcement is scarce or absent. In India, such occurrences will surely stretch an already overburdened Forest Department's field staff.

- **Considering alternatives:** The ill-effects of roads we outlined are neither novel nor inaccessible in the public domain. Much of this data has been submitted to the government as comprehensive guidelines by the National Board for Wildlife. Moreover, these topics have been raised during several project appraisals. Pointedly, the Wildlife (Protection) Act, 1972, Forest (Conservation) Act, 1980 and Environment (Protection) Act, 1995 evidently place limitations on roads through Protected Areas (hereafter PA) and other forests. Any road that could harm wildlife or its habitat needs clearance from the NBWL if within 10 km of PA, National Tiger Conservation Authority (NTCA) for Tiger Reserves, or Forest Advisory Committee (FAC) for other forests.

A few finest practices can go a long way in merging roads, indeed development in general, with conservation. Advocates of road-building must portray why the suggested location is the only possible place for the project not just from financial positions but also keeping the ecological perspectives in cosideration. Here, it is vital to have objective, well-researched and clear Environment Impact Assessments (EIA) that detail environmental and ecological consequences of the proposed road. Alternative sites and alignments should be provided, and inappropriately conceived projects shifted.

If it turns out very challenging to reorganize the road after due consideration, then the placement should be designed to cut through the minimum length of natural habitat, shifted to margins or already disturbed areas. A drop in canopy cover should be kept to a minimum-a good ballpark might be to guarantee that no unnatural canopy gap is created. Such projects will also have to mandatorily incorporate wildlife-friendly designs such as flyovers or underpasses suitable for local wildlife movement. Existing CAMPA funds could be utilized to provide additional finances for such design modifications.

With respect to PAs-covering a mere 5% of India's land, they hold the majority of the nation's remaining wildlife. Thus, the conservation implications of road projects through PA are more profound and extreme caution regarding the same is advisable. Placing new highways or expansion of existing roads within PA is best completely avoided.

- **The road to sustainable development:** For all this to be efficiently executed, it is important that government officials, ecologists, conservationists, and engineers have productive deliberations to arrive at win-win solutions. Elsewhere, such deliberations have resulted in accomplishment stories with near-zero ecological costs even in biodiversity hotspots. However, it currently seems that suggestions of any kind to modify structure or alignment are construed as roadblocks to progress.

Project advocates complain over recommended changes, complaining about cost acceleration. Simply put, developers have chosen convenience over compliance, still succeeded in gathering tremendous support for such a view. Profit-maximizing behaviour of private players is predictable. What is more worrisome is that our government is seemingly stepping down from its responsibility towards conserving biodiversity. While the data and know-how to search for alternative development paths exists, the political will to listen seems lacking or absent.

To say that India can only afford limited consideration of ecological implications seems a decidedly myopic way of thinking. Rather, we can forge new and novel development models where sustainable environment and wildlife conservation are given as much weight and importance as economic growth. Building an ethos of ecological sensitivity will allow for sustainable use of natural resources and help keep spaces for biodiversity.

10.3.2 Development, Modernisation and Threat to the Environment

10.3.2.1 Issues Pertaining to Air

Air pollution happens as a result of gases, dust particles, fumes (or smoke) or odour being brought into the atmosphere in a way that makes it injurious to humans, animals and plants. It is because the air becomes filthy (contaminated or unclean) as a result of certain manmade ativities. The Earth is surrounded by a blanket of air, made up of various gases, called the atmosphere. This atmosphere helps in protecting the Earth and allowing life to exist. Without it, the intense heat of the sun would burn us during the day and freeze us by the very low temperatures during night time. Any addition to this natural balance, be it gas, particles or odours that are introduced into the air (either by nature or human activity) can destroy this balance and can be called air pollution. That which pollute the air are called pollutants. Examples of pollutants include hydrocarbons, carbon monoxides, nitrogen oxides, sulphur oxides (usually from factories), sand

or dust particles, and organic compounds that can evaporate and enter the atmosphere.

Air pollution can result from both human and natural actions. Natural events that pollute the air include forest fires, volcanic eruptions, wind erosion, pollen dispersal, evaporation of organic compounds and natural radioactivity. Pollution from natural occurrences are not very often. Emissions from industries and manufacturing activities are human causes of air pollution. There are long chimneys erected high into the air, with lots of smoke and fumes coming out of it. Waste incinerators, manufacturing industries and power plants discharge high levels of carbon monoxide, organic compounds, and chemicals into the air. Lots of hydrocarbons are released into the air by petroleum refineries.

Post the industrial age, transportation has become an integral part of our lives. Cars, trains, heavy duty trucks, shipping vessels and airplanes, all burn a lot of fossil fuel to work. Emissions from automobile engines is a major cause of pollution, and one that is very difficult to manage. This is because humans depend heavily on vehicles and engines for moving people, goods and services. Fumes from cars' exhaust comprise of hazardous gases such as carbon monoxide, hydrocarbons, oxides of nitrogen and other particulates. They cause excessive health damage to people who breathe them. Moreover, they mix with environmental gases to generate further toxic gases. Crop dusting, household cleaning products or painting supplies, fumigating homes, over the counter insect/pest killers, fertilizer dust emit harmful chemicals into the air and cause pollution.

Chemical reactions involving air pollutants can create acidic compounds which can be harmful to plants/trees and buildings/architectures. Occasionally, when an air pollutant like sulphuric acid mixes with the water droplets which make up clouds, the water droplets turn acidic, leading to acid rain. When acid rain falls over a place, it can destroy trees and effect animals, fish, and other wildlife. Acid rain destroys the leaves. When acid rain enters into soil, it changes the chemistry of the soil turning it unfit for many living things that depend on soil as a habitat or as a source of nutrition.

Acid rain also alters the chemistry of the lakes and streams that the rainwater flows into, destroying fish and other aquatic life.

Air pollutants can be in the form of particulate matter which can prove to be detrimental to our health. The level of effect usually depend on the length of time of exposure, as well the type and concentration of particles and chemicals we are exposed to. Short-term effects include irritation to the eyes, throat and nose, and upper respiratory infections such as pneumonia and bronchitis. Others include nausea, headaches, and allergic reactions. Short-term air pollution can heighten the medical situations of individuals with emphysema and asthma. Long-term health effects can include chronic respiratory disease, heart disease, lung cancer, and even damage to the brain, nerves, liver, or kidneys. Continual exposure to air pollution affects the lungs of growing children and may aggravate or complicate medical conditions in the elder.

10.3.2.2 Construction Of Dams and its Effects

The ongoing process of development is victimizing millions of people under the heavy costs of development; landless labourers and millions of small farmers, are growingly becoming the victims of pauperization; with their land being taken away for the construction of big dams millions have become homeless. The destructiveness of the big dams is not being increasingly recognized in the development discourse. Even more and more investments are being made in them. Today all the major rivers are dammed in the process. This shows that in the next two or three decades, dam construction is going to be a key developmental activity. Construction of dams in India is not a new phenomenon, nor is scientific irrigation. Large dams were reflected as technological innovations in modern times with twin objectives: 1. As a measure to control devastating flood. 2. To capture run off water from unnecessarily going to sea.

- **POLICY IMPERATIVE :** The government will have to decide on what its policy towards big dams should be if it does not want to confirm the impression that it is running in different directions. This is not a matter of public relations but hard economics. The benefits of big

dams can be subjected to scrutiny. Take generation of power and electricity for example. Two- thirds of it is consumed by industry since independence on one hand and in relation to employment its record is abysmal. Whatever the other benefits of technological advances, increased employment is certainly not one of them.

Chipko movement leader Chandi Prasad Bhatt had initiated a campaign against the vishnuprayag hydroelectric project because of the risks it posed to the unique ecosystem of the valley of flowers and the general geographical havoc that it could create. Such Movements are capable of organizing strong support among the local population though a section of the workers who have found jobs on the project. Another instance of intervention at the highest levels was that of a large dam in Lalpur in Gujarat. It raised two issues- destruction of forests and displacement of tribals. Large dams are generallyconstructed in areas which have so far not been touched by modern development. Many people in these areas look at such projects as symbols of hope. They even accept the argument that someone has to pay the cost for the benefits to society, even if they are the ones who have to pay. As things are today, people are not likely to oppose dam constructions. But they are definitely getting ready to agitate for better rehabilitation terms. A comprehensive rehabilitation policy can spread out only when development is assumed as a process which benefits the people. The major goals of the rehabilitation programme are that the people displaced should get a suitable and appropriate share in the fruits of development. They should be rehabilitated by creating new settlements. Removal of poverty should also be a goal of the rehabilitation policy and therefore some land should be assigned to all. Tribals should develop along the lines of their own genius and we should avoid imposing anything on them. Resettlement should be in the neighbourhood of their own environment.

10.3.2.3 The Role of MNCs

Multinational corporations can offer developing countries with critical financial infrastructure for social and economic development. However, these institutions may also bring in with them relaxed codes of ethical conduct that aid to exploit the need of developing nations, rather than to help them with critical support necessary for countrywide economic and social development. When a multinational invests in a host country, the measure of the investment (given the huge size of the firms) is likely to be substantial. The likely disadvantages of a multinational investing in a country may include:

- **Environmental effect -** multinationals will want to produce in ways that are as efficient and as cheap as possible and this may not always be best for the environment. They will often try to lobby governments to ensure that they can profit from regulations being as lax as possible and given their economic significance to the host country, this lobbying will often be reasonably effective.
- **Access to natural resources -** multinationals will sometimes invest in countries just to get right to use a plentiful supply of raw materials and host nations are often more concerned about the short-term economic gains than the long-term costs to their country in terms of the exhaustion of natural resources.
- **Uncertainty -** multinational firms are increasingly 'footloose'. This means that they can change and move at very short notice and often will. This creates insecurity for the host country.
- **Increased competition -** the effect on the local industries can be severe, because the presence of newly arrived multinationals upsurges the competition in the economy and because multinationals should be able to produce more, taking less time, at a lower cost.
- **Crowding out -** if overseas firms borrow in the domestic economy this may reduce availibility of funds and increase interest rates.
- **Health and Safety -** multinationals have been accused of cutting corners on health and safety in countries where regulation and laws are not as rigorous.

- **Cultural and Social impact -** enormous numbers of foreign businesses can weaken local customs and traditional cultures. For example, the sociologist George Ritzer coined the term McDonaldization to describe the process by which more and more sectors of American society as well as of the rest of the world take on the features of a fast-food restaurant, such as increasing standardization and homogenisation and the movement away from traditional business approaches.

10.3.2.4 Issues Pertaining to Soil

The foundation of agriculture is soil. All crops for human food, as well as animal fodder, depend upon it. Huge quantities of man-made waste products are released into the soil. In vicinities of cities, it is regarded as a future receiver of sludge and other products from new waste treatment plants. Polluted water also causes soil pollution. Soil pollution is usually a consequence of insanitary habits. Various agricultural practices and incorrect methods of disposal of solid and liquid but can also result from fallout from atmospheric pollution. Soil pollution is associated with:

- The use of chemicals, such as fertilizers and growth resulting agents in agriculture.
- Dumping on land of large masses of waste materials from the mining of coal and minerals and the smelting of metals. Toxic and harmful substances can be leached out of such materials and enter the soil.
- The dumping on land of domestic refuse and solid resulting from the treatment of sewage and industrial wastes. Sources of pollution can be divided basically into two groups: natural and cultural.

10.3.2.5 Bio-Diversity Conservation

Biodiversity is used to define the variations of life forms in ecosystems, biomes or on the Earth. It can be used to measure health of biological systems. The continued health of human societies depends upon a natural environment that is productive and contains a wide diversity of plant, animal, and microbe species. Life on the earth includes at least 10

million species of plants and animals. Biodiversity is the multiplicity of species of plants and animals that live in a particular area (ecosystem) or the entire Earth. The greater the number of species, the more diverse the ecosystem is. Biodiversity, or biological diversity, is the variety of all species on earth. It is the different plants, animals and micro-organisms, their genes, and the terrestrial, marine and freshwater ecosystems of which they are a part. Biodiversity is both crucial for our existence and fundamentally valuable in its own right. This is because biodiversity offers the fundamental building blocks for the many goods and services that a healthy environment provides. These include things that are vital to our health, like fresh water, clean air and food products, as well as the many other products such as timber and fiber. Other important services provided by our biodiversity include recreational, cultural and spiritual nourishment that maintain our personal and social wellbeing. Looking after our biodiversity is, therefore, an important task for all people. The main threats to our biodiversity are: " loss, fragmentation and degradation of habitat

- the spread of invasive species
- unsustainable use of natural resources
- climate change
- inappropriate fire regimes
- changes to the aquatic environment and water flows

Biodiversity is the incredible, dizzying variety of life that surrounds us, including all of the earth's plants, animals, their habitats, and the natural processes that they are a part of.

It has become clear that biodiversity is the cornerstone for the existence of life on Earth. It is also important to preserve and conserve biodiversity for the sake of our own curiosity and aesthetic appreciation. Medicines originating from wild species, including aspirin, penicillin, taxol, and quinine have saved millions of lives and healed tremendous suffering. 40% of all prescriptions are for medicines originating from plants and animals. There are 80,000 species of edible plants known on Earth, but 90% of the world's food comes from a mere 20 of these species. Edible plant species, both those we know of and those we don't, offer a tremendous possibility of

resources that could greatly add to our food security. Breeding cultivars with their wild counterparts can also confer resistance to diseases and increase crop yield. Biodiversity is the life support system of our planet- we depend on it for the air we breathe, the food we eat, and the water we drink. Wetlands filter pollutants from water; trees and plants reduce global warming by absorbing carbon; bacteria and fungi break down organic material and fertilize the soil. It has been empirically shown that richness of native species is linked to the health of ecosystems, as is the quality of life for humans. The more we look at it, the connections between biodiversity and our sustainable future appear closer and closer. We literally need to conserve biodiversity as our lives depend on it. Life on Earth faces a crisis of historical and planetary proportions. Unsustainable consumption in many northern countries and crushing poverty in the tropics are destroying wild nature. Biodiversity is besieged. Extinction is the gravest aspect of the biodiversity crisis: it is irreversible. While extinction is a natural process, human impacts have elevated the rate of extinction by at least a thousand, possibly several thousand times the natural rate. Mass extinctions of this magnitude have only occurred five times in the history of our planet; the last brought the end of the dinosaur age.



Check your progress

Q1: What are some of the acts which put restrictions on roads through protected areas?

Q2: What is the link between vehicular traffic, roads and wildlife?

Q3: What are primary and secondary pollutants, which cause air pollution?

Q4: What do you mean by biodiversity?

Q5: What is gravest aspect of biodiversity crisis?



10.4 LET US SUM UP

- While development is carried out to benefit the inhabitants, the environment is equally important. If development is carried out without considering the environment and ecology factor, it may have a negative impact on the environment.
- With the increased focus for economic expansion, new roads are being made and older ones widened within ominously dwindling and shrinking wild lands-including national parks and wildlife sanctuaries.
- The most obvious consequence of roads is the wildlife killed by vehicular traffic, often resulting from human negligence and lack of compliance with prescribed speed limits. Nocturnal animals including tigers and leopards are particularly vulnerable.
- "Edge effects" sometimes extend half a kilometer into forests, drastically eroding plant diversity. Edges also promote weeds and exotic species that out-compete native plants and further alter animals' use of habitats. Forests fragmented by edges additionally suffer changes in ecological and ecosystem process such as pollination, seed dispersal, and carbon storage.
- Advocates of road-building must show why the proposed location is the only possible location for the project not just from financial standpoints but also from ecological angles.
- Profit-maximizing behaviour of private players is predictable. Government should stand up to its responsibility towards conserving biodiversity. While the data, knowledge and expertise to explore alternative development ways exist, the political will to listen seems lacking.
- Those which pollute the air are called pollutants. Examples of pollutants include nitrogen oxides, sulphur oxides (usually from factories), carbon monoxides, hydrocarbons, sand or dust particles, and organic compounds that can evaporate and enter the atmosphere.

- After the industrial age, transportation has become an integral part of our lives. Cars and heavy duty trucks, trains, shipping vessels and airplanes are all burn plenty of fossil fuels to work.
- The process of development is crushing millions of people under the heavy costs of development; millions of small farmers, landless labourers are growingly becoming the victims of pauperization, millions becoming homeless with their lands being taken away for constructing big dams.
- Multinational corporations can aid developing countries with critical financial infrastructure for economic and social development. However, these institutions may also bring with them relaxed codes of ethical conduct that serve to abuse the neediness of developing nations.
- Soil pollution is related to- use of chemicals, dumping of waste materials from the mining of coal and minerals and the smelting of metals, the dumping on land of domestic refuse and solid resulting from the treatment of sewage and industrial wastes, etc.
- The main threats to our biodiversity are: " loss, fragmentation and degradation of habitat " the spread of invasive species " unsustainable use of natural resources " climate change "inappropriate fire regimes " changes to the aquatic environment and water flows Biodiversity is the incredible, dizzying variety of life that surrounds us, including all of the earth's plants, animals, their habitats, and the natural processes that they are a part of.



10.5 FURTHER READING

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4) Laurance, W F, Goosem, M, &Laurance, S G (2009): "Impacts of roads and linear clearings on tropical forests." Trends in Ecology & Evolution, vol 24, issue 12, pp 659-669.

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8) Tabarelli, M., Lopes, A. V., & Peres, C. A. (2008). Edge?effects Drive Tropical Forest Fragments Towards an Early?Successional System. Biotropica, 40(6), 657-661.

10.6 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No 1: The Wildlife (Protection) Act, 1972, Forest (Conservation) Act, 1980 and Environment (Protection) Act, 1995 are some of the acts which place restrictions on roads through Protected Areas (hereafter PA) and other forests.

Ans to Q No 2: The most obvious consequence of roads is the wildlife killed by vehicular traffic, often compounded by human negligence and lack of compliance with prescribed speed limits.

Ans to Q No 3: There are two types of pollutants: Primary pollutants are those gases or particles that are pumped into the air to make it

unclean. They include carbon monoxide from automobile (cars) exhausts and sulphur dioxide from the combustion of coal. Secondary pollutants: When pollutants in the air mix up in a chemical reaction, they form an even more dangerous chemical. Photochemical smog is an example of this, and is a secondary pollutant.

Ans to Q No 4: Biodiversity is a term which is used to describe the variations of life forms in ecosystems, biomes or on the Earth.

Ans to Q No 5: Extinction is the gravest aspect of the biodiversity crisis: it is irreversible. While extinction is a natural process, human impacts have elevated the rate of extinction by at least a thousand, possibly several thousand, times the natural rate.



10.7MODEL QUESTIONS

Short Questions (Answer each question in about 150 words)

Q1: What are some of the major threats to our bio-diversity?

Q2: What are some of the sources of soil pollution?

Long Questions (Answers each question in about 300-500 words)

Q1: What do you understand by "development"? Explain in details the different developmental activities that affects the ecology?

Q2: What has been the role of MNCs in the given context?

Q3: What are some of the implications of road constructions through protected areas?

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UNIT 11: ENVIRONMENTAL MOVEMENTS

UNIT STRUCTURE

11.1 Learning Objectives
11.2 Introduction
11.3 Causes of Environmental Movements
11.3.1 State power and Developmental Ideology
11.3.2 Different Environmental Movements and Politics of Movements
11.4 Let Us Sum Up
11.5 Further Reading
11.6 Answers to Check Your Progress
11.7 Model Questions

11.1 LEARNING OBJECTIVES

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

- understand the causal factors behind environmental movements
- explain the effects of state policy and development strategies on the environment
- discuss the different environmental movements in India and 'Politics of Movements'.

11.2 INTRODUCTION

The environmental movement is a global movement, which includes a choice of organizations, from the bigger to grassroots and varies across the countries. Due to its bigger member countries with different beliefs, and speculative nature, the environmental movement is not always unified in its goals. The movement also covers some other movements with a more specific aim, such as the climate movement. At its wider level, the movement incorporates personal citizens, professionals, religious devotees, politicians, scientists, non-profit organizations and individual advocates. Environmentalist focuses on the managing of resources and stewardship

of the green surroundings by bringing in changes in the individual and public policy. In its respect of civilization as a contributor in (not the enemy of) ecosystems, the movement is happening around ecology, health, and human rights.

11.3.CAUSES OF ENVIRONMENTAL MOVEMENTS

The environmental movements are the consequence of the socio ecological belongings of conceived expansion based on momentary criteria exploitation. The movements are enlightening how the resource-intensive burden of growth have built-in ecological demolition and economic deprivation. The members have activated micro success strategy to defend the normal processes and to offer the macro concept for natural development at the national and regional levels.

- **THE INDIAN CASE**

  Environmental and public health is an in progress effort within India. The first stone of an ecological movement in India was the foundation in 1964 of Dasholi Gram Swarajya Sangh, a working joint initiated by Chandi Prasad Bhatt. It was inaugurated by Sucheta Kriplani and founded on land donated by Shyma Devi. This proposal was ultimately followed up with the Chipko Movement starting in 1974.
  The sternest lone event reinforceing the movement was the Bhopal gas leakage on 3 December 1984. 40 tons of methyl isocyanate was released, right away killing 2,259 people and eventually disturbing 700,000 citizens.

  India has a national campaign against Coca-Cola and Pepsi Cola plants due to their practices of drawing ground water and contaminating fields with sludge. The movement is characterized by local struggles against intensive aquaculture farms.

  The most significant part of the ecological movement in India is the anti-dam movement. Dam building has been considered of as a way for India to catch up with the West by linking to the power web with huge dams, oil or oil-powered plants, or nuclear plants.

Jhola Aandolan a mass movement is conducting as struggling alongside polythene carry bags uses and promoting cloth/jute/paper carry bags to guard ecology and nature.

Activists in the Indian environmental movement consider global warming, sea levels rising, and glaciers retreating decreasing the amount of water flowing into streams to be the biggest challenges for them to face in the early twenty-first century.

11.3.1 State Power and Development Ideology

The state's claim to defend threatened resources and its exclusive right to the legitimate use of violence combine to facilitate its apparatus-building and attempts at social control. State threats or use of violence in the name of resource control helps them to control people, especially unruly regional groups, marginal groups, or minority groups who challenge its authority.

The environment has emerged as an important focus of state-society conflict in many parts of the Third World over the last quarter century, very often accompanying wider demands for socio-political and economic reforms. Environmental goals are nearly always factors in wider campaigns for greater political and economic clout.

Most environmental groups realise that if their local environment is seriously degraded or destroyed, it is they who will lose out. The issue may simply be who has the 'right' to destroy the natural environment: local people or outside interests? But the central point is that environmental protection is always highly political.

State policies in the Third World are influenced by a variety of factors, especially the nature of domestic political structures and distribution of wealth and income. Agricultural pricing policies, investment incentives, tax provisions, and credit and land concessions are designed to further elite interests at the expense of those of 'ordinary' people. Political elites are very likely to be major wealth holders with interests in a variety of activities, some of them environmentally damaging, including commercial logging, mineral and oil exploitation, plantation cropping, and large-scale irrigated farming.

Relatively powerless, usually rural peoples - especially if they belong to national minorities - suffer socio-economic and environmental costs of such schemes, sometimes losing homes, farms and fishing grounds. Rarely, if ever, have they been compensated adequately for their losses. It is hardly surprising that environmental activists belonging to such groups feel that key decisions affecting their lives and environments are beyond their control. They may link human rights to environmental rights, arguing that the natural environment cannot be protected without sustaining its human communities.

When the state's view of what is the correct procedure and weight of the distribution of the benefits fails to meet the expectation of local communities the result is frequently political conflict, often involving violence. The ability of power-holders to enforce the state's policies differs from country to country. But it is very common in African and Asian countries, nearly always forged from diverse cultures and forms of social organisation, for the state to find itself to some degree unable fully to implement its policies. In such an 'environment of conflict', the ability of the state to impose its will can be judged through 'its capacities to penetrate society, regulate social relationships, extract resources, and appropriate or use resources in determined ways'. Such an environment of conflict will frequently result in conflict over the environment and its resources.

Strategies utilized by societal groups and the state help determine the extent of the latter's power. This is the case not only in relation to the state's ability to get people to behave in certain ways, but also its success in mobilising resources for its own ends. Groups in society may (theoretically) use the ballot box (when it is available) to vote for the government they want; however, the less-than-powerful usually find that even when elections result in a change of government few - if any - beneficial changes occur. As a consequence, subordinate groups may choose instead to use other methods - usually involving direct action - to contest the state. Increasingly, the hegemony of the state is challenged by subordinate groups in Third World countries. Often central to the struggle is the belief that states do not have the will or ability to govern for the benefit of the 'have nots'. One of the most important - although least tangible - forces destabilising governments

is the 'bubbling diversity of change' taking place within numerous Third World societies as a consequence of modernisation.

Another reason Third World environmental groups are burgeoning is that they often build links with transnational organisations - such as Greenpeace - helping them to grow and focus their efforts. Growing awareness of the relatedness of socio-economic and political issues leads to environmental concerns serving as a focus for wider problems; transnational links may help not only to broaden a Third World group's horizons but also help support their struggles by supplying welcome publicity. But the key issue is that growing numbers of people in the Third World seem to believe their governments do little for them.

11.3.2 Different Environmental Movements and Politics of Movements

Under this section we are going to study 3 Environmental Movements in India: the Chipko movement in the Himalaya, Save the Narmada Movement in Central India, and the Silent Valley Project in Kerala as nonviolent direct-action environmental movements of grassroots India.

- **CHIPKO MOVEMENT :** The word chipko refers to stick to or to hug and refers to the means used to protect the trees of the Himalaya from trade timber cutters who have distressed the forests. The movement's activists hug the tree trunks to interpose their bodies between the trees and the axemen. The Chipko movement started in the mountainous northern segment of then Uttar Pradesh (now Uttarakhand), immediately west of Nepal. The members of the ecological movement are primarily native survival farmers, both Indo-Aryan-speaking Hindus of the lower Himalaya who are called Pahari and, in fewer numbers, Tibetan-speaking Buddhists of the higher Himalaya who are known as Bhotiya.

  Uttarakhand was a relatively inaccessible land of precipitous slopes, and fragile soils, and ample water and forests populated by subsistence farmers who derived a secure livelihood through their diligence and in a combination of terrace agriculture and animal

husbandry. After the Indian-Chinese border conflict of 1962, an extensive network of roads was built throughout the region. The motive was clearly strategic, but a significant consequence was the sudden opening of the region to the traffic of all kinds, which made its rich supply of natural resources accessible to entrepreneurs in the resource-hungry plains of India. Timber and other products, ranging from limestone for use in cement, the principal building material in India, magnesite, and potassium to rare metals, became the objects of intensive exploitation and removal by corporate contractors. Blasting of mountainsides and felling of trees to make roadbeds and hundreds of vehicles and thousands of laborers used to build the roads were soon replaced by blasting, felling, vehicles, and laborers employed in extracting the resources. The overall environmental degradation wrought by road construction-the massive erosion and landslides caused by road cuts and blast shocks, the resulting loss of soils, forests, and water sources, and the decimation of firewood and other forest products by labor crews and military units, together with social and economic dislocations endured by the local populace-was quickly dwarfed by the same phenomenon on a magnified scale in the operations of the extractive industries.

Hydroelectrical sites along the Ganga and Jamuna rivers and their tributaries were promptly exploited with similar consequences. Now, for example, the largest earth-filled dam in Asia is the Tehri Dam, constructed on the Bhagirathi River, one of the two streams that form the Ganga. This dam will submerge the historic city of Tehri one hundred villages and ten thousand acres of agricultural thousand people will be rendered homeless, and the waters will separate an unknown number of other people from their economic resources networks. Widespread protests have been supported by research and expert testimony confirming that dam will be silted beyond use in less than half the projected century lifetime and that the seismic conditions, together with the greater-than-anticipated runoff the dam will capture, make a serious threat to people and

resources downstream. However, the protests have been to no avail. Significantly, none of the interest groups that will profit from the project is local. In addition, more than twenty projects are under construction or in the planning process in the region.

When the roads came, other opportunities for profit presented themselves to outsiders. Land previously cultivated by local farmers for subsistence or devoted to pasture and fodder for livestock was suddenly used for the cultivation of luxury and commercial crops. Accordingly, large firms vied with lesser capitalists in buying up and exploiting the newfound agricultural bonanza at the expense of local people.

The shrines of Badrinath, Kedarnath, Gangotri, Jumnotri, and other places sacred to Hindus became accessible to pilgrims and tourists in a day or two of travel by bus and taxi from the plains rather than the weeks of trekking formerly required. This new form of mass tourism taxed the capacity of the Himalayan environment heavily by populating the pilgrimage routes with hotels, restaurants, shops, and other businesses. At the same time and often on the same routes secular tourism flourished, attracting plains people and foreigners alike to areas featuring snow views and wildflowers, trekking, hunting, fishing, mountain climbing. The effects of the tourists on the environment and local people received little or no attention. The consumption of fuelwood alone is devastating because the demand for fires to cook food for the tourists and to warm their shelters far exceeds that of the local residents.

The beneficiaries of these kinds of development are almost exclusively outside entrepreneurs, their customers, and political patrons. Most of them are absentee landowners from the plains; a few are expatriate mountain people; and a very few are elite, educated, wealthy, plains-oriented residents of the mountains. On the whole local people are not even employed in the enterprises brought to the region by development. If employed, they are at most porters, milkmen, guides, or manual laborers.

The usual effect of these development activities has been to deplete the forests, to erode the soil, to dry up water sources, to pre-empt firewood, fodder, and building materials, and to co-opt or destroy much of the viable agricultural land and pastures. As a result, during the past twenty years, the migration of men to the plains has accelerated. Most of these men become part of an oversupply of urban unskilled and unemployed. In Uttarakhand villages most of the able-bodied men have emigrated, leaving families to run farms with depleted work forces and resources. Village life virtually ceases to be a possibility under these conditions.

The exploitation of the forest by outside entrepreneurs with governmental approval had been the source of conflict between Uttarakhand villages and the state forest department(thenUttarakhand was a part of Uttar Pradesh state). This conflict, which includes violent incidents, dates to 1821, when the British instituted the Tribal Forest Settlements in Kumaon. The conflict has been accompanied by denial of forest use to the villagers who traditionally depend on its products. The policies have been rationalized by the long-standing assertion that indigenous agriculturalists and herders caused deforestation by misuse and overuse, but these practices rarely could be observed. Trees were not cut for fuelwood; instead, dead trees, fallen branches, and brush were used. Branches were lopped for fodder, but trees were felled only to obtain material for house construction and the making of implements. It is true that new agricultural land was cleared, but unlike the situation in nearby Nepal, the practice has been closely controlled by the government, even as road building programs have facilitated the access by timber and charcoal merchants and other profiteers.

The special effects of the timber and charcoal contractors have been huge and conspicuous, but the neighbouring people are answerable for the deforestation. With the aid of Gandhian community workers, local labor cooperatives and small-scale- creator cooperatives were recognized by the villagers in each of the Himalayan districts of Uttar

Pradesh throughout the early 1960s. The objective was to let the local people share in the profit of development. As a result of confrontations between the villagers and social workers and the timber contractors, their employees, and forestry-department personnel, a series of incidents began in 1972 near Gopeshwar in Chamoli district. A local supportive group was deprived of consent to cut its small annual share of twelve ash trees to use in the creation and for tools. The government sold the trees to a sporting-goods maker to make cricket bats and tennis rackets.

The villagers were unsuccessful in their arguments to the government, they adopted Gandhian nonviolent resistance-they attached themselves to the trees to protect them from the axe. They were successful, and contract to the sporting-goods manufacturer was cancelled.

From that action arose the Chipko environmental movement. More than a dozen major and minor incidents of confrontation occurred during the 1970s. Each confrontation was nonviolent and successful. The successes led to increasing national and international publicity and recognition for the movement. Going from village to village, the Chipko activists prepared for each confrontation by informing people of the movement's purpose and inviting their participation. Workshops and training sessions were accompanied by rallies and picketing at auctions held by the forest department. The movement is diversifying its activities: it now sponsors research on issues of forest, mineral, soil, and water conservation and publishes the results. Reforestation and afforestation activities now foreshadow confrontational practices.

By the late 1980s, the movement had splintered into two groups that have broad grassroots support and advocate participatory methods which respond to local issues in the context of local social and cultural traditions. One group pursues a strategy that emphasizes ecologically sound development of forests by local people to meet local needs. Activities include small- scale sawmills and other forest

industries as part of the program of local cooperatives. This model is based on an acceptance of current modes of resource utilization with a new emphasis on conserving and strengthening the natural-resource base. Technology is viewed as a solution to poverty. The second group follows the deep-ecology paradigm of environmental management. It advocates that no trees be cut. It follows a more symbolic approach to attain its goals-fasting, ritual marches, pilgrimages-and accentuates its public profile by participating in conferences and mass media. The rebuilding of nature's productivity is seen as the solution to poverty.

- **SAVE THE NARMADA MOVEMENT :** The Narmada basin covers 94,500 square kilometres between the Vindhya and Satpura ranges in central India. Between gorges flanked by densely forested basaltic hills, the 1,300-kilometer-long Narmada valley contains large alluvial plains in Madhya Pradesh. To the west the Narmada River, which is sacred to the Hindus, meanders through Gujarat, widening into a 25- kilometre-long estuary as it flows into the Gulf of Cambay. Other than twenty- one million in the valley, mainly in villages, a lot of tribal groups, such as the Bhils and the Gonds, reside in the woody uplands.

  The Narmada valley is the site of one of the world's largest multipurpose water projects: The Narmada River Development Project, which involves the construction of thirty large dams and many small ones on the river with fifty-one main tributaries. The project will transform the valley and its residents and will increase food production and hydropower generation in Gujarat, Madhya Pradesh, and Maharashtra.

  There has been no complete evaluation on the whole of environmental, social, and technological effects of the Narmada project, but the creation of dams and reservoirs will displace approximately one million people and will sink 350,000 hectares of forestland and 200,000 hectares of agricultural land. The Sardar Sarovar Dam in Gujarat, which is undergoing construction, is facing

main resistance from tribal groups that hunt and seek in the jungle canyons and from villagers who are being evacuated by the deluge from the reservoir, which will sink almost 40,000 hectares of land and 250 villages. So far the engineers have built only part of the dam and have dug only some 130 kilometres of canals.

The World bank is committed to environmentally sound development and has issued guidelines for resettlement and rehabilitation of persons displaced by the dams. Despite its commitment and operational guidelines, which assert that no affected person should be made worse off by a bank- supported project, the bank continued to fund the project. For various reasons, the Indian and state governments could not meet the resettlement and rehabilitation guidelines, and social and environmental issues went unaddressed. In 1992 the bank decided to cease funding the project, but the Indian government pledged to complete it.

Save the Narmada Movement began in the 1980s as a struggle for just resettlement and rehabilitation of people being displaced by the Sardar Sarovar Dam, but the focus has shifted to preserving the environmental integrity and natural ecosystems of the entire valley. The movement has used the plan as a sign of Indian development planners' attraction with costly projects at the expenditure of the environment and the poor. The removal of World Bank financial support was an ethical victory for the movement.

Field surveys in July 1993 revealed considerable anti project sentiment among the residents of the basin in Madhya Pradesh. In Gujarat displeasure exists among people whose homes and lands were expropriated without sufficient reward by the government. There was also worry about unbalanced compensation: the rich receiving more than the poor farmers for the same amounts of similar quality lands. The World Bank had noted these relocational problems, but little attention was given to them. By linking problems of environmental degradation of the valley with issues of economic equity justice, the movement forced the bank to withdraw from the project.

- **SILENT VALLEY MOVEMENT :** The Silent Valley, one of the few remaining undisturbed rain-forest areas in India, lies in the Malabar region, the least-developed section of the state of Kerala, at the southern end of the Western Ghats. Far-off from main inner-city centres or highways, the valley has experienced fairly little lumber cutting and almost not any of the peasant or tribal farming that characterizes the rest of rural southern India. Many rare species of plants, ferns, and endangered fauna survive in the valley. Throughout the early 1960s, the state government began setting up a dam for the Kuntipuzha River, which flows all the way through the valley, to produce hydroelectricity as the base for local financial development. The project offers a classic example of the dilemma between environment and development.

  The Kerala People's Science Movement (Kerala Sastra Sahitya Parishad) is a network of rural school teachers and local citizens that promotes environmental scientific projects in the villages. The movement recognized the apparent financial needs of the people of Malabar but contended that the Silent Valley project would make only a trivial involvement to local development. Thus the assembly opposed the project with a movement that brought into quick focus the natural consequences, specifically the possibility of destruction of species that had evolved over millions of years.

  Villagers in Kerala also learned that new industries and clear cutting of timber in the upper watersheds of the river were contributing to the disruption of streams and water supplies. The movement began to confront the plan that energy generated by the dam would help the rural people of Kerala. Most of the energy from the project was to be exported to industrialized areas of Kerala and surrounding states.

  The state government favoured the project, but other environmental groups expressed doubts. After years of activism, the movement asked the Indian government to sign upan advanced committee to inspect the project's ecological and socioeconomic

effects. The committee subsequently recommended the abandonment of the scheme, which the state government accepted in 1983.

The controversy over the Silent Valley project marked the fiercest environmental dispute in India and established a precedent wherever a major development project, specifically a dam, threatened ecological balance, Save the Narmada Movement cited the decision about the Silent Valley in mobilising support for its stance against dam projects.



CHECK YOUR PROGRESS

Q1: What is eco terrorism?

Q2: Define the anti-nuclear movement?

Q3: What is the Bhopal gas tragedy?

Q4: What is JholaAndolan?

Q5: What is the Eco-Revolution Movement?



11.4 LET US SUM UP

- The environmental movements are an expression of the socio ecological effects of narrowly conceived development based on short-term criteria exploitation. The movements are instructive on how the resource-intensive burden of progress have built-in environmental damage and fiscal deprivation.
- The environment has emerged as an important focus of state-society conflict in many parts of the Third World over the last quarter century, very often accompanying wider demands for socio-political and economic reforms. Environmental goals are nearly always factors in wider campaigns for greater political and economic clout.
- State policies in the Third World are influenced by a variety of factors, especially the nature of domestic political structures and distribution of wealth and income.

- When the state's view of what is the correct procedure and weight of the distribution of the benefits fails to meet the expectation of local communities the result is frequently political conflict.



11.5 FURTHER READING

1) Haynes, J. (1999). Power, politics and environmental movements in the Third World. Environmental Politics, 8(1), 222-242. https://doi.org/10.1080/09644019908414445

2) Swain, A. (1997). Democratic Consolidation?? Environmental Movements in India Author(s): Ashok Swain Published by?: University of California Press Stable URL?: https://www.jstor.org/stable/2645699 University of California Press is collaborating with JSTOR to digitize , 37(9), 818-832. Retrieved from https://www.jstor.org/stable/2645699



11.6 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No 1: When an act of violence is committed against someone or some institution in the name of environmental defense it is referred to as eco terrorism.

Ans to Q No 2: The anti-nuclear movement opposes the use of various nuclear technologies. The initial anti-nuclear objective was nuclear disarmament and later the focus began to shift to other issues, mainly opposition to the use of nuclear power. There have been many large anti-nuclear demonstrations and protests. Major anti-nuclear groups include Campaign for Nuclear Disarmament, Friends of the Earth, Greenpeace, International Physicians for the Prevention of Nuclear War, and the Nuclear Information and Resource Service.

Ans to Q No 3: Bhopal gas tragedy implies the Bhopal gas leakage which happened on 3 December 1984. 40 tons of methyl isocyanate was released, immediately killing 2,259 people and ultimately affecting 700,000 citizens.

Ans to Q No 4 : JholaAandolan a mass movement is conducting as fighting against polyethylene carry bags uses and promoting cloth/jute/paper carry bags to protect the environment & nature.

Ans to Q No 5: 'Eco Revolution Movement' has been started by Eco Needs Foundation in 2008 from Aurangabad, Maharashtra state.The pioneer of the Eco Revolution Movement is Prof.PriyanandAgale and more than 20,000 youths are associated with this movement to strengthen this movement.



11.7 MODEL QUESTIONS

Short Questions (Answer each question in about 150 words)

Q1: What Influences state policies in the third world?

Q2: What is the link between third world environmental groups/movements and transnational organisations?

Long Questions (Answer each question in about 350-500 words)

Q1: Write a short note on development activity in the forest area and its effect on local people.

Q2: Write a note on 'Save the Narmada Movement' and 'Silent Valley Movement'.

Q3: Discuss dams as a development strategy and the consequent rise of anti-dam movements.

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UNIT 12: ENVIRONMENTAL ETHICS AND ENVIRONMENTAL LAWS

UNIT STRUCTURE

12.1 Learning Objectives
12.2 Introduction
12.3 Meaning and Concept of Environmental Ethics
12.3.1 Factors and Events that paved the way for Environment Ethics and law
12.3.2 Consensus Regarding Environmental Ethics
12.3.3 Consensus as Regards to Practical Issues
12.4 Initiatives of International Agencies to Protect and Preserve the Environment
12.4.1 Stockholm Conference
12.4.2 The Brundtland Commission
12.4.3 Intergovernmental Panel on Climate Change (IPCC)
12.4.4 United Nations Framework Convention on Climate Change (UNFCCC)
12.4.5 United Nations Conference on Environment and Development (UNCED)
12.4.6 The Kyoto Protocol
12.4.7 Paris Agreement
12.5 Let Us Sum Up
12.6 Further Reading
12.7 Answers to Check Your Progress
12.8 Model Questions

12.1 LEARNING OBJECTIVES

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

- know about the Meaning and Concept of Environment Ethics
- understand History of the initiatives of different Agencies to tackle contemporary environmental issues

- explain the formation and workings of different Global and United Nations Agencies on Climate Change and global warming.
- discuss the different forms of agreements, protocols and measures adopted during every major meet to tackle contemporary environmental issues

12.2 INTRODUCTION

With the rising turn down of natural systems on which human beings rely and the annoyance of the ecological crisis, human beings have realized that we cannot rely on financial and legal methods alone to resolve the trouble of environmental pollution and ecological imbalances; we must also request to human beings' boundless inner moral resources. We will be able to love and respect nature only after we have adopted an appropriate attitude towards nature and with the proper guidance of love and respect, we can diligently deal with the issues of environmental pollution and ecological imbalances. Environmental Ethics becomes very important in this regard and in this unit, we shall learn about the concept of Environmental Ethics. Further, we shall also learn about the initiatives, agreements, protocols at the global level, which are adopted to protect and preserve the environment. In this unit we shall learn about

12.3 MEANING AND CONCEPT OF ENVIRONMENTAL ETHICS

One of the major sub -the discipline of philosophy that deals with the ethical problems surrounding environmental protection are environmental ethics. Its main reason is to offer moral reason and moral inspiration for the cause of worldwide ecological protection. There are several unique features of ecological morals that earn our attention.

From the very early phase, environmental ethics has been an area in which diverse information and perspectives struggle with each other. Anthropocentrism, animal liberation/rights theory, biocentrism all present unique and, in some sense, sensible moral justifications for ecological protection. Their approach is different, but their goals are by and large the

same, and they have reached this consensus: it is everyone's duty to look after the environment. The basic ideas of ecological ethics also sustain from and are personified in, various ingrained cultural traditions. The pluralism of theories and multicultural perspectives is crucial for ecological ethics to preserve its vitality. In short, as the theoretical symbol of a newly emerging moral idea and value orientation, environmental ethics is the fullest extension of human ethics. It calls on us to think and act locally as well as globally

12.3.1 Factors and Events what paved the way for Environment Ethics and Laws

The 1960s and 1970s witnessed an environmental disaster brought about by manufacturing civilization. This crisis was composed of environmental pollution (such as air pollution, water pollution, soil pollution, toxic chemical pollution, solid waste pollution), resource shortages (such as shortages of energy, cultivated land, minerals and fresh water) and ecological imbalances (such as the rapid decrease of forest and biodiversity, the rapid growth of population and the desertification of land the world over). The ecological problems of for the most part of urban countries had been well dealt with by the beginning of the 1980s. However, ecological pollution and ecological crisis were disseminating rapidly across the world. The environmental situations in developing countries have become poorer and worse, and the darkness of resource scarcity and nuclear waste hangs over the world. The population explosion is intimidating earth's carrying capacity. The rapid vanishing of species and forests is declining life, both human and non-human. The ozone crack and worldwide warming are fetching a nightmare.

Facing such an upsetting situation, worldwide groups initiated a wave of campaigns for environmental protection. The World Conservation Strategy (IUCN, 1980), Our Common Future (WCED, 1987), Caring for the Earth (IUCN et al., 1991), and the 1992 Rio Earth SummitConference and the blueprint of action that came from it, Agenda 21 (UN, 1994), were evidence of this new wave. The UN these days is putting more energy into the production of global environmental issues. Worldwide, NGOs alarmed with

ecological issues are playing ever more vigorous roles in protecting the surroundings. Environmental laws have been recognized at national, regional and international levels, and most countries have adopted a strategy of sustainable development. Defending the environment has become humanity's frequent cause.

12.3.2 Consensus Regarding Environmental Ethics

The debates about the philosophical foundations of environmental ethics still persist, yet we can find much consensus at normative and practical levels among environmental ethicists.

Three normative principles of environmental ethics

- **Principles concerning environmental justice:** Environmental justiceconstitutes the minimum ethical stance of environmental ethics. There are two dimensions to environmental justice. The main concern of distributive environmental justice is the equal distribution of environmental benefits and burdens, whereas participatory environmental justice focuses on opportunities to participate in decision-making. While domestic ecological integrity is easily implicit and accepted, the institutionalizing of worldwide (international) ecological fairness remains a confront to global society. The seventeen values of ecological fairness issued at the First National People of Colour Environmental Leadership Summit in 1991 is a good quality initial point for ecological ethics.
- **The principle concerning intergenerational equality:** The principle of intergenerational equality is an addition to that of equality. Equal rights which are the basis of equality consists of the right to life, liberty and happiness which are considered to be the basic human rights shared by everyone, future generation as well as the present generation. Every generation should lead a life which also benifits the future generation to lead a happy life. Thus it is the duty of any given generation to bestow to their intimates not only a just politico-economic system but also healthy and generative earth.

- **The principle concerning respect for nature:** Though they may come from different perspectives, most environmental ethicists believe that the prime concern of every individual is to conserve and protect the integrity of the ecosystem and biodiversity. Since human beings are the part of nature and what we call as the human economy is a subsystem of natures economy, the former must be all inclusive and fit into the latter and abide by its law. Earth, a planet that is our home is in crisis now and therefore it is the foremost responsibility of everyindividual to take care of it.

12.3.3 Consensus as Regards to Practical Issues

Environmental ethics subsumes practical ethics. Environmental ethicists have reached an impetus on practical issues than on moral philosophical issues.

- **An environmental disaster is the pathology of modern industrial civilization:** Technology is not the reason for the crisis of the environment. Technology cannot be the sole reason for its failure to equip itself with better technology which can refine the toxic waste produced due to environmental hazards. The main reasonfor the modern environmental crisis is about modern civilization and its underlying values. Our ecological disaster is the inevitable product of the current economy's selfishness to the weakness and limits of nature, the mad power kick of current politics, contemporary people's universally equating bliss with material satisfaction, and their overwhelming receipt of an automatic and dualist view of nature. It is not this or that part of trade civilization but industrial civilization itself that is not apt for this small globe Therefore, the chief apprehension is to effortlessly alter developed civilization into an environment-friendly green (or post-industrial) civilization by reforming the uneven economic system, rectifying the unfair biased order, changing the existing consumer way of life and reconstructing a sensible living philosophy that is morally responsible towards others and nature.

- **Earth is the common wealth of everyone:** The earth belongs to all people. No country or group is permitted to threaten the ecological balance. Human beings' common interests come before any state's special interests. To guard our general Earth, countries should uphold the essential equilibrium between economic expansion and ecological protection, and developed countries have a responsibility to diminish the amount of energy and property they consume. We need to hand out worldwide prosperity more uniformly among nations and to establish ajuster worldwide order that is friendly with universal ecological protection. Human beings need to study how to exist as a worldwide Commonwealth on Earth.
- **Poverty is a kind of pollution:** Although excessive affluence puts extensive ecological pressure on the earth, poverty remains a key factor in environmental deterioration, especially at the nation-state level. Poor countries often appoint fast economic expansion in ways that damage their environments. They are indebted to export their natural assets economically and extremely in replace for foreign currency with which they can disburse their debts. They are not able to get hold of environmental-protection technologies and they lack the fiscal budget that ecological defence requires. The lowest-income people, especially those existing in cities, are out in the open to the toxic harsh environment and dangerous chemicals. They have to work in deeply polluted conditions. They are the most susceptible in the facade of ecological catastrophes. In addition, the huge gap between the rich and the poor is incompatible with human morality. Militarism is one of the major threats to life on earth.
- **Nuclear war will be the end of all life on earth :** The enormous damage of the surroundings caused by military behaviour across the globe is the hardest to heal. The military business is among the most profoundly polluting industries. Some countries have annual military budgets of more than 40 billion US dollars, while to save thetropics, where 70 per cent of non-human species live, would requireonly 30 billion US dollars (Wilson, 2002). The deliberate

creation of security threats by any nation, driven by militant-industrial corporate groups, must be fiercely resisted. Militarism and environmentalism are mutually exclusive. An environmentalist must be a pacifist.

- **Environmental justice is the priority issue of environmental ethics** : Environmental justice is the new frontier of justice. Unjust social frameworks maintain and reinforce environmental injustice, with the result that the privileged permanently enjoy the benefits of the environment while the disadvantaged bear disproportionately the burdens of the environment. Everyone has the right to a liveable environment. A right to the environment is one of the essential human rights, and every state has a responsibility to protect it. International environmental injustice is especially worrisome today. The developed countries should alter their policies of transferring a lot of polluting industries to developing countries, stop exporting dangerous waste to developing countries and alter the high-consumption lifestyle of their population. Consensus on worldwide environmental justice is urgently needed.
- **Environmental ethics should participate actively in environmental decision-making:** Most policies have environmental and normative implications. Yet decision-makers are frequently unaware of, unclear about or not capable to deal with the ethical rudiments of their decisions. Policies involving deterrence and control of pollution, or conservation and reinstallation of natural areas, are evaluated in terms of economics, politics and ethics. Therefore, ecological ethics play an immense function in decision-making.

12.4 INITIATIVES OF INTERNATIONAL AGENCIES TO PROTECT AND PRESERVE THE ENVIRONMENT

In the present time, anthropogenic activities have posed serious threat to the environment. And as a result environmental problems have been on the rise. Two such major environmental problems of the of the time

are Global Warming and Climate Change. We have read about these in Unit 9. Here we are going to discuss about the various international initatives taken up to mitigate such environmental crisis.

Climate change is a global threat that requires collective action from countries and organizations throughout the world. Climate change and Global Warming are two immediate concerns which needs global consensus to tackle it in a widespread scale. Individual countries and organizations cannot fully tackle these major concerns and the majority of the countries in the world responded to these threats through a collective international response through a number of conventions and conferences since the second half of the twentieth century which is continuing till the present. Let us discuss them in details.

12.4.1 Stockholm Conference

The Stockholm Conference or the United Nations Conference on the Human Environment was held from 5th to 16th June, 1972 in Stockholm, Sweden. The United Nations General Assembly convened the conference to discuss the impact of human interaction on the environment. The conference was attended by members from 122 countries. The conference was boycotted by the countries who were signatories of the Warsaw Pact due to the non-inclusion of East Germany in conference as a separate nation.

THE CONFERENCE ADOPTED 26 PRINCIPLES:

- Human Rights must be asserted and apartheid and colonialism were to be condemned.
- The natural resources of nations must be safeguarded.
- The need for maintenance of Earth's capability to produce its renewable resources.
- Safeguarding of the wildlife from extinction.
- The sharing and non-exhaustion of the renewable resources of the Earth.
- The need for keeping the pollution in check in proportion to the Earth's capacity to clean itself.
- Pollution in the Ocean must be prevented.

- The need for development of mechanism to improve the condition of the environment.
- Assistance to developing countries.
- Developing Countries need for reasonable prices for exports to carry out environmental management.
- Environmental policy does not hamper development.
- The need for giving monetary assistance to developing countries in order to develop environmental safeguards.
- The need for planning of integrated development.
- The need for rational planning to address any conflicts between environment and development.
- Planned human settlements
- Individual nations should plan their own policy to tackle population growth.
- The need for plan of development for nation's natural resources.
- Scientific and technological innovations for use of environmental protection.
- Environmental education is essential.
- Environmental research as a discipline in developing countries.
- Individual nation states may exploit their resources but should not endanger other nation's resources.
- Due compensation for any such endangerment of other nation's resources.
- Nations must establish its own standard.
- Co-operation among nations on international issues.
- International institutions should help to improve the environment.
- The Weapons of Mass Destruction must be eliminated.

LESSONS FROM THE STOCKHOLM CONFERENCE:

The Stockholm conference was unable to garner the participation of a large number of countries. The divide between the first world countries and the third world countries were evident. Developed nations like the United States of America were criticized by the developing countries throughout the conference for its policies. The

divide between the developed countries understanding of climate change vis-à-vis the developing countries was magnanimous. The developed countries saw it as an environmental problem, while the developing countries saw it as a problem related to large scale emission by the developed countries in the process of industrialization. One of the seminal issues that emerged from the conference is the recognition for poverty alleviation for protecting the environment. The Indian Prime Minister Indira Gandhi in her seminal speech in the conference brought forward the connection between ecological management and poverty alleviation. The Stockholm Conference was significant as it laid the ground work for the number of conferences and conventions that were to follow in the next few decades.



CHECK YOUR PROGRESS

Q1: What did Indira Gandhi highlight during her speech in the Stockholm Conference?

Q2: How many members attended the Stockholm Conference?

12.4.2 The Brundtland Commission

The Brundtland Commission also known as the World Commission on Environment and Development (WCED) was appointed in 1983 under the chairmanship of former Norway Prime Minister Gro Harlem Brundtland. The purpose of the commission was to rally the countries around the world to implement the idea of sustainable development. The United Nations was concerned with the deterioration of the environment and the human impact on the natural resources of the earth. The commission was dissolved in 1987 right after the release of their report known as the 'Brundtland Report' and also as 'Our Common Future'. The report made the concept of sustainable development popular among the nations and showcased a way for the states to implement sustainability in their policies towards the environment and its natural resources.



CHECK YOUR PROGRESS

Q3: What is the Brundtland Report also known as?

Q4: Under whose chairmanship was the World Commission on Environment and Development (WCED) was appointed in 1983?

12.4.3 Intergovernmental Panel on Climate Change (IPCC)

The First World Climate Conference held in Geneva from 12th to 23rd February, 1979. It was sponsored by the World Meteorological Organization. It was in this conference, where a number of scientists from all over the world met, the recognition for the need for global collective action to meet the threat posed by climate change and the harmfulness of wide scale emission of Green House Gases (GHGs) was discussed. In 1988 the United Nations General Assembly approved the creation of the Intergovernmental Panel on Climate Change (IPCC). The function of the IPCC was to make available scientific reports and assessment on the impact of climate change- its risks and the possible responses.

12.4.4 United Nations Framework Convention on Climate Change (UNFCCC)

The response for climate change has been largely driven by the United Nations Framework Convention on Climate Change (UNFCCC) which makes use of the reports produced by the IPCC. The UNFCCC is broadly an international treaty on environment which was adopted on 9th May, 1992 and endorsed during the Rio Earth Summit held from 3rd to 14th June, 1992. However it had to wait till 21st March, 1994 to be ratified by a sufficient proportion of countries. The most important objective of the UNFCCC is the stabilization of concentration of the GHGs present in the atmosphere by keeping the emission level around the world in check which can have a major impact on the climate.

The UNFCCC comprises of 196 countries and their meetings are attended by non-state actors like the World Bank and other United Nations agencies.

Typically the countries does not negotiate as single units but as part of groups. Broadly the countries fall under three overlapping broad groups wherein many countries often gets clubbed in in one or more groups. The groups stands like this:

- **Annex 1 Parties:** Comprised of countries of the Organization for Economic Cooperation and Development (OECD), except Mexico and South Korea, and countries undergoing the process of transition to a market economy, including Russia and many Eastern European countries.
- **Annex 2 Parties:** Comprised of only the countries of the OECD.
- **Non-Annex 1 Parties:** The majority of the world's countries, including newly industrialized nations such as Singapore and South Korea, the larger economies such as India, China and Brazil, oil producing states, Small Island Developing States (SIDS) and the low income countries of the world.
- **Principles of UNFCCC:** A set of principles of the convention in particular to the development perspective was ratified by the UNFCCC through its Articles. Three inter-related principles are:
- **Precautionary Principle:** a lack of scientific certainty should not be used as a reason to delay taking action to prevent environmental damages or disasters. (Article 3.3)
- **Equity/common but differentiated responsibilities:** Article 3.1 of the convention states that parties should protect the climatic system based on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities.
- **The Right to Promote Sustainable Development:** this principle is reinforced by Article 3.2 of the convention which recognizes the specific needs
- Commitments of UNFCCC: The convention contains sets of commitments relating to reporting on and implementing policies and measures to tackle climate change. Commitments are differentiated between countries in the three annexes. The convention also

highlights countries requiring attention due to vulnerability to the impacts of climate change, especially in the least developed countries. However the commitments were voluntary in nature and as such they proved to be insufficient.

There have been three pivotal milestones in the development of the extended climate regime under the UNFCCC. The first was the creation of the Kyoto Protocol in 1997 to set binding targets for the Annex 1 countries. The second was the COP 13 meeting in Bali in 2007 that established the process for developing the follow up to Kyoto after its initial commitment period ended in 2012. The third was the agreement of the Durban Platform in 2011 to develop a comprehensive international agreement by 2015 following the failure to meet the 2009 deadline for a post-2012 agreement in Copenhagen.



CHECK YOUR PROGRESS

Q5: Where was the First World Climate Conference held?

Q6: In which year was the IPCC created?

Q7: What is the most important objective of the UNFCCC?

Q8: What are the milestones of the UNFCCC?

12.4.5 United Nations Conference on Environment and Development (UNCED)

The Rio Earth Summit which is also known as the United Nations Conference on Environment and Development (UNCED) held in 1992 was the first conference in which the idea of sustainable development became a part of the measures to tackle climate change. The Conference was the first attempt to bring to the international community on a same page for having a far reaching commitments and having an infrastructure to back these commitments in place.

Earth Summit was created as a response for Member States to cooperate together internationally on development issues after the Cold War.

Due to conflict relating to sustainability being too big for individual member states to handle, Earth Summit was held as a platform for other Member States to collaborate. The summit focused on:

- Systematic scrutiny of patterns of production - particularly the production of toxic components, such as lead in gasoline, or poisonous waste including radioactive chemicals.
- Alternative sources of energy to replace the use of fossil fuels which delegates linked to global climate change.
- New reliance on public transportation systems in order to reduce vehicle emissions, congestion in cities and the health problems caused by polluted air and smoke.
- The growing usage and limited supply of water.

  An important achievement of the summit was an agreement on the Climate Change Convention which in turn led to the Kyoto Protocol and the Paris Agreement.



CHECK YOUR PROGRESS

Q9: What is the Rio Earth Summit also known as?

Q10: What did the Rio Earth Summit focus on?

12.4.6 The Kyoto Protocol

Developments in climate science in the early 1990s led to increasing acknowledgement that the convention's voluntary commitments were insufficient to meet its overall objective. As a result a new form of discussion began to take place which stressed on legally binding targets for countries and it culminated into the Kyoto Protocol. The protocol was adopted on 11th December, 1997 in Kyoto, Japan and it came into effect from 16th February, 2005.

Stressing on the need for legally binding emission cut targets for member countries the Protocol set targets for Annex 1 countries for an average of 5.2 per cent reduction in Green House Gas Emission from 1990 levels during the period of 2008-12. Targets for each country was individually negotiated.

The European Union agreed to an overall reduction of 8 per cent among member states. The United States of America agreed to a 7 per cent cut while Japan and Canada agreed to a 6 per cent cut. Countries like Russia had to return to 1990's level. Other least developed countries were permitted an increase due to national circumstances.

The protocol included a number of flexible mechanisms including the Clean Development Mechanisms. The Protocol is based on the principle of common but differentiated responsibilities: it acknowledges that individual countries have different capabilities in combating climate change, owing to economic development, and therefore puts the obligation to reduce current emissions on developed countries on the basis that they are historically responsible for the current levels of greenhouse gases in the atmosphere.

- Lessons from the protocol: Despite being central to the creation of the protocol, following a change in the government in U.S.A decided to not ratify the agreement in 2003 citing emission cuts negative impact on the domestic economy and international competitiveness. Australia refused to ratify till 2011 and Canada withdrew in 2009. The absence of these major polluters was a big setback for environmental concern of climate change. The Protocol's first commitment period started in 2008 and ended in 2012.

  A second commitment period was agreed in 2012, known as the Doha Amendment to the Kyoto Protocol, in which 37 countries have binding targets: Australia, the European Union (and its 28 member states), Belarus, Iceland, Kazakhstan, Liechtenstein, Norway, Switzerland, and Ukraine. Belarus, Kazakhstan, and Ukraine have stated that they may withdraw from the Kyoto Protocol or not put into legal force the Amendment with second round targets. Japan, New Zealand, and Russia have participated in Kyoto's first-round but have not taken on new targets in the second commitment period. Other developed countries without second-round targets are Canada (which withdrew from the Kyoto Protocol in 2009) and the United States (which has not ratified). As of January 2019, 124 states have accepted the Doha Amendment, while entry into force requires the

- The Rio Earth Summit was the first conference in which the idea of sustainable development became a part of the measures to tackle climate change.
- The Kyoto Protocol stressed on the need for legally binding emission cut targets for member countries.
- Under the Paris Agreement, each country must determine, plan, and regularly report on the contribution that it undertakes to mitigate global warming.



12.6 FURTHER READING

1) Panjabi, R. K. L. (1997). The Earth Summit at Rio: Politics, Economics, and the Environment. New Hampshire, U.S.A.: Northeastern University Press.

2) Shearman, R. (1990). The meaning and ethics of sustainability. Environmental Management, 14(1), 1-8. https://doi.org/10.1007/BF02394014

3) Victor, D. G. (2001). The Collapse of the Kyoto Protocol and the Struggle to Slow Global Warming. Princeton, U.S.A.: Princeton University Press.



12.7 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No 1: The Indian Prime Minister Indira Gandhi in her seminal speech in the conference brought forward the connection between ecological management and poverty alleviation.

Ans to Q No 2: The conference was attended by members from 122 countries.

Ans to Q No 3: The Brundtland Commissionis also known as the World Commission on Environment and Development (WCED)

Ans to Q No 4: The Brundtland Commission was appointed in 1983 under the chairmanship of former Norway Prime Minister Gro Harlem Brundtland.

Ans to Q No 5: The First World Climate Conference was held in Geneva from 12th to 23rd February, 1979.

Ans to Q No 6: In 1988 the United Nations General Assembly approved the creation of the Intergovernmental Panel on Climate Change (IPCC).

Ans to Q No 7: The most important objective of the UNFCCC is the stabilization of concentration of the GHGs present in the atmosphere by keeping the emission level around the world in check which can have a major impact on the climate.

Ans to Q No 8: There have been three pivotal milestones in the development of the extended climate regime under the UNFCCC. The first was the creation of the Kyoto Protocol in 1997 to set binding targets for the Annex 1 countries. The second was the COP 13 meeting in Bali in 2007 that established the process for developing the follow up to Kyoto after its initial commitment period ended in 2012. The third was the agreement of the Durban Platform in 2011 to develop a comprehensive international agreement by 2015 following the failure to meet the 2009 deadline for a post-2012 agreement in Copenhagen.

Ans to Q No 9: The Rio Earth Summit which is also known as the United Nations Conference on Environment and Development (UNCED)

Ans to Q No 10: Earth Summit was created as a response for Member States to cooperate together internationally on development issues after the Cold War. Due to conflict relating to sustainability being too big for individual member states to handle, Earth Summit was held as a platform for other Member States to collaborate.

Ans to Q No 11: The U.S.A decided to not ratify the agreement in 2003 citing emission cuts negative impact on the domestic economy and international competitiveness.

Ans to Q No 12 : The protocol included a number of flexible mechanisms including the Clean Development Mechanisms. The Protocol is based on the principle of common but differentiated responsibilities: it acknowledges that individual countries have different capabilities in combating climate change,

Ans to Q No 13 : As of February 2019, 195 UNFCCC members have signed the agreement, and 185 have become party to it.

Ans to Q No 14 : Ans: The Paris Agreement's long-term goal is to keep the increase in global average temperature to well below 2 °C above pre-industrial levels; and to limit the increase to 1.5 °C, since this would substantially reduce the risks and effects of climate change.



12.8 MODEL QUESTIONS

Short Questions (Answer each question in about 150 words)

Q1. What are the 3 normative principles of environmental ethics?

Q2. Write a short note on international environmental justice and global warming.

Q3. Which group of countries boycotted the Stockholm Conference?

Q4. How did the UNFCCC categorize the countries in relation to their role in climate change?

Long Questions (Answer each question in about 300-500words)

Q1. Write a note on consensus on environmental ethics regarding practical issues.

Q2. How climate change policies began to take shape on an international scale?

Q3. What were the principles agreed in the Stockholm Conference?

Q4. How would you review the Kyoto Protocol? Was it successful or did it fail in its mandate?

Q5. In what way is the Kyoto Protocol different from previous conferences and conventions?

Q6. What is the current scenario of the initiatives of state and international agencies to tackle climate change?

Q7. What is the stand of developed and developing countries on emission of Green House Gases?

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UNIT 13: ENVIRONMENTAL ISSUES IN NORTHEAST INDIA

UNIT STRUCTURE

13.1 Learning Objectives
13.2 Introduction
13.3 Colonial Era Policies
13.4 Post-colonial Environmental Issues
13.4.1 Mining of coal
13.4.2 Destruction of forest and shrinkage of forest cover
13.4.3 Deterioration of water quality
13.4.4 Depleting Wetlands
13.4.5 Soil Erosion
13.4.6 Construction of Dams
13.4.7 Extinction of Species
13.4.7.1 Why are the species endangered?
13.4.8 Exploitation of natural resources and biodiversity conservation
13.5 Let Us Sum Up
13.6 Further Reading
13.7 Answers to Check Your Progress
13.8 Model questions

13.1 LEARNING OBJECTIVES

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

- understand the North East region's ecology through its inhabitants - the various tribes
- explain the policies of the British era and its impact on the environment in the region
- describe the different developments of economic-political gain under the British affecting the environment.
- discuss the Post-colonial environmental issues in North East India

- analyse the impact of post-colonial policies on the environment and its endangerment to different species.

13.2 INTRODUCTION

India's North East falls under the eastern Himalayas, one of the two bio-diversity hotspots of the country, is known for its rare and exotic varieties of abundant flora and fauna. The rich and verdant rainforests spread over the hills and plains not only provides unique glimpses of nature's bounties they are also inseparably connected with the socio-cultural and economic life of the people. The region is the abode of different ethnic groups. About 25.81 percent of the region's population comprised tribal communities. In some states tribes constitute over 80 percent of the total population of the state. Many of these communities fall into what some describe as 'ecosystem people' who share symbiotic relationship with nature and depend on its bounty for their livelihood.

Interestingly, the North East with its diverse flora and fauna, mineral resources and subsistence livelihood is now facing a threat both to its environment and problem of livelihood of its people. The degradation of its environment is observed in terms of pollution of the environment, shrinkage of forest cover, demographic expansion, dying of wetlands etc. to get some of its glimpses certain issues can be consider for discussion. The issue of climate change can be the starting point for that. Though it is very difficult to give a final statement of climate change in the region there are certain marked instances which make even a lay person to worry about the manifestations of climate change in the region.

The defeat of Burma at the hands of the British East India Company in the first Anglo-British war and the singing of the treaty of Yandaboo in 1826, was a watershed moment in the history of Assam and the Northeast India in more than one ways. It led to the gradual annexation of Assam into the British Indian Empire and paved the way for the inevitable exit of the 600 years old Ahom rule in Assam. A lot of changes have taken place in the political-economic life of the Northeast during the colonial period. By the middle of nineteenth century the British Empire made substantial progress

in mapping and exploiting natural resources of the Northeast India. Along with the successful plantation of tea, the British government invested in the exploration of other mineral resources. With the formation of GSI in 1856, the nature of mineral exploration in the state acquired a more professional nature. The GSI undertook exploration of coal and oil in North East India.

The Northeastern part of India in the post-colonial age has seen the continuation of many colonial era rules and decisions. The region has seen deforestation, construction of dams, extinction of species, exploitation of natural resources by private players as well as the state. In the previous unit, we have discussed about Environmental Ethics and Environmental Laws. In this unit, we shall try to understand about the environmental issues in the context of Northeast India and how various policies, initiatives of different agents have altered the environmental setting of the region. In the following section, let us have a look at the history of the colonial era policies specially the 'Line System' and also study the different environmental concern.

13.3 COLONIAL ERA POLICIES

The post-independence Indian state in the North East had adopted and implemented the colonial strategies of governance in which the Inner Line was used tactically to control and monitor population mobility to these restricted and scheduled "disturbed areas."

So, on one hand we have the conventional discourse that the inner line was constructed by the British administrators to protect the identity of the tribes living in the hills, on the other hand, records of correspondences of the officials present us a different story. It shows that the line created a boundary between the administered and the un-administered areas and thus the hill people now cannot enter the plains for raids and vice versa. The purpose of creating such a divide was to prevent disturbances from the un-administered areas (people in the hills). The line was extended as per the requirements/interests (profit motives) of the British capitalists, miners and planters. Thus, under the veil of carrying out a noble ideal of protecting tribal

interests, the colonial administrators were protecting the interests of their own kind.

The key point being the colonizers left the hills untouched not because they cared much about the hill communities' rights but because they did not see those territories as fertile enough to generate surplus. They filled their cup up to the brink. That is to say they extended the boundary to wherever surplus generation was possible. They left out the hills not because of ethical reasons caring about the tribals rights but because they didn't see them as avenues of surplus creation or revenue generation or even if they did, the stakes were too risky. Now let us consider the forest cover in the northeast region.

To protect their interest in the Garo Hills the British passed a series of regulations in the district, viz. Regulation Act of 1876 imposed restrictions of un-authorized entry of non-tribal persons into the district for trading and other purposes. It also restricted other British subjects, save those who were native of Garo Hills, from acquiring any interest in land or anything contained therein without the sanction of the Chief Commissioner of Assam. Subsequent to this, Regulation 1 of 1882 authorized the latter to prohibit even the natives of the district from exploiting forest resources without possession of a licence. The prohibitions covered a wide spectrum of activities, ranging from the cutting of wood to hunting and collection of forest produce like ivory, rubber and wax; significantly, these materials constituted valuable items of exchange for the non-monetized Garo economy. By 1897 the Government had converted 14 forests into Reserves where all rights of the people were extinguished. In 1882 the areas populated by elephants were declared as Elephant mahal and rendered the free capturing of elephant as illegal. That these measures were directed at the 'generation of revenue' for the state exchequer than at conservation per se is demonstrated by the fact that rights to exploit natural resources can be obtained for fee.

Following the transfer of the district headquarter to Kohima the British authorities proposed to open up Namboor forest and settle it with people from the plains as it was not considered advisable to administer the plains portion of the district from Kohima which was far off. Further, to encourage

expansion of the tea industry it was decided to allow the new railway line to pass through the heart of Namboor forest and, after settling it with plains people, extend normal laws to it. According to the need of different contexts, large tracts of lands were announced as non-accessible (whether be the non-administered areas of the Naga Hills, for enabling autonomy of the hill tribes or be it the reserved forest areas, for preserving the forest cover) such that Colonial surplus generation and revenue creation was not in crisis. Colonial morality was thus a direct reflection of their economic interests.



CHECK YOUR PROGRESS

Q1: Why were many communities in North East India described as 'ecosystem people'?

Q2: When was the GSI formed?

Q3: What was the purpose of passing Regulation 1 of 1882 by the British in Garo Hills?

Q4: What was the purpose of the Inner Line System?

13.4 POST-COLONIAL ENVIRONMENTAL ISSUES

Though endowed with an extremely rich resource base in the form of biomass, hydro, solar, mineral resources and large area of fertile lands, the region is rated under special category states for its slow pace of economic development. The economy is primarily agrarian in character with majority of the rural workforce engaged in single crop settled cultivation in the plain lands and shifting cultivation in hilly areas. The climate in most parts of the region is hot and humid with high rainfall. The high altitude areas experience low temperature during winter. The region though receives more precipitation compared to other regions in India, the amount of solar radiation available in the region is sufficient enough for different end uses such as electricity generation, water heating, drying, space heating etc.

The exploitation of resources is not only associated with the exploitative motive of the British, it has a legacy in post-colonial era too. The focus of government of India on industrialization countrywide has left enough scope

for resource exploitation of the region. Though the country claims to be a welfare state, its continuing orientation to economic growth sometimes contradicts its approach. In the following subsections, we shall learn in details about how resource extraction for economic gain has led to severe environmental threat in the region.

13.4.1 Mining of coal

Northeast India has a good deposit of sub-bituminous tertiary coal. The northeast Indian coals have unusual Physico-chemical characteristics such as high sulfur, volatile matter and vitrinite content, and low ash content. Such characteristics are associated with more severe environmental impacts due to mining and its utilization in coal based industries. Environmental challenges include large scale landscape damage, soil erosion, loss of forest ecosystem and wildlife habitat, air, water and soil pollution.

As on April 2014, India's inventory of coal resource was 300 Billion Tons (BT). Northeast India contributes 105 Million Tons (MT) of the Gondwana coal and 1492 MT of tertiary coal reserves. Meghalaya and Assam in northeast India contain 73 % of the total tertiary coal reserves. Nagaland and Arunachal Pradesh contribute 21 % and 6 % of the total tertiary coal reserves, respectively.

Unscientific mining of minerals poses a serious threat to the environment, resulting in reduction of forest cover and loss of biodiversity, soil erosion and pollution of air, water and land. The primitive and unscientific 'rat-hole' method of mining adopted by private operators and related activities have caused large-scale environmental degradation and severe ecosystem destruction in Meghalaya large scale denudation of forest cover, scarcity of water, air and water pollution, degradation of soil and agricultural lands, land subsidence, haphazard dumping of coal and overburden are some of the conspicuous environmental implications of coal mining in north eastern coal mines of Meghalaya, India. Based on a study in the Nokrek Biosphere Reserve in Meghalaya, India, it is revealed that coal mining has adversely affected the vegetation and the density of trees, shrubs and herbs in mined areas.

Opencast mining operations contribute major air pollutants to the atmosphere and are responsible for environmental degradation by deteriorating the air quality in respect to dust, fine coal particles and other gaseous pollutant. The major sources of air pollution in coal mining area include: drilling and blasting, loading and unloading of coal and overburden, movements of heavy vehicles on haul roads, dragline operations, crushing of coal in feeder breakers, presence of fire, exposed pit faces, wind erosion and exhaust of heavy earthmover machinery.

Since coal mining and its utilization in coal based industries is associated with environmental issues, it is necessary to manage or mitigate its impact on environment or clean coal prior to its utilization. The main environmental acts that impact the mining industry in India are: The Wildlife (Protection) Act, 1972 (amended in 1991); The Water (Prevention and Control of Pollution) Act, 1974 (amended in 1988); The Forest (Conservation) Act, 1980 (amended in 1988); The Air (Prevention and Control of Pollution) Act, 1981 (amended in 1988); and The Environment (Protection) Act, 1986. Separate pollution standards for air quality and coal mine effluents has been laid down by Central Pollution Control Boards for coal mining in India. In order to achieve sustainable utilization of coal resources integrated approach considering various aspects to reduce its environmental impacts is necessary. Proper implementation of regulatory rules and policies is as important as other management strategies to deal with environmental issues.

13.4.2 Destruction of forest and shrinkage of forest cover

Depleting forest cover is yet another environmental problem of North East India. While the region continues to be perceived by outsiders as full of greenery and thick forest cover, a look into the forest statistics talks about a dismal reality about the region. An analysis of the status of forests and change of forest cover in the region reported in Forest Survey of India (FSI) report, shows that in comparison to the other states of the country the region records a loss of 783 sq. km of forest cover in the year 1995, whereas the states of the rest of the country record a gain of 276 sq. km altogether. The region also records loss of forest cover in the FSI report of 1997 and 1999 which is

316 sq. km in case of former and 216 sq. km in case of later. While the region is harbored with tropical forest and rain forest, the bio-diversity of the region are in great threat. A number of species are becoming extinct day by day.

According to State of Forest report of 1999, the percentage of actual forest cover to geographical area in North East India is 56.93 percent against 65.3 percent reported in official documents. In terms of percentage the actual forest cover is 8.38 percent higher than officially reported figures. This is true of all the hilly states of the north eastern region. In Assam and Tripura the officially reported forest cover is higher than the actual forest cover. The reason for actual forest cover being higher or lower than the officially recorded forests is that in the hilly areas of the region which are inhabited by the different tribal communities, the forests are owned by the village communities, religious groups, individuals (private) and forest departments, a substantial portion of the forests not owned by the state government has not been included in the official statistics.

13.4.3 Deterioration of water quality

Water like air, is an indispensable and most precious natural resources on this planet. There is a marked deterioration in the water quality, increase in turbidity or opacity, reduction in plant life at the bottom, qualitative changes in the physico chemical environment of the water, disturbance in the benthic environment of the river, disturbance in spawning / breeding areas of aquatic fauna and so on. Hence there is an overall depletion in the quantity and quality of aquatic life. It has been seen that before 1950, the rate of siltation was very rapid and it has been observed that within a few years, the river bed rose by three meters in several areas. The situation has been aggravated due to further cutting of trees in the catchment areas resulting into washing away of the soil to the Brahmaputra River. Again water pollution in the region also shows a marked degradation of its environment. Though there is plenty of water, the quality of drinking water is deteriorating day by day. Especially in north eastern region, the number of water supply devices in comparison to population is insufficient. The refineries,

petrochemical industries, sugar mills, paper mills, are causing water pollution in the region. The Digboi refinery has been discharging its effluents without any treatment in the nearby rivers, thus polluting the biggest water sources of North East Region. The Noonmati Refinery and Assam Petrochemical Limited, at Namrup have been polluting many rivers which ultimately pollute the river Brahmaputra. Following an investigation by Assam Pollution Control Board in August 2006, it was found that the oil industries have been polluting the rivers of the state and destroying the rainforests. It says Assam produces 15 percent of India's onshore crude supplying crude oil to state-run Indian oil refineries. The investigation found refineries were discharging bio-chemical wastes such as oil and grease, phenolic compound and sulphide into the Brahmaputra River and its tributaries.

The drainage of fertilizer plants at Namrup goes into the Dilli River that flows in to Disang in Assam, which has been causing destruction to the aquatic life and fishes in that river. The effluents of Jogigopa paper mill are directly drained to the river Brahmaputra. Similar is the case with Cachar paper mill, the effluent of which is polluting the river Barak and the Nagaland Paper mill discharges its effluent into Tipak Nala, which ultimately reaches to the river Brahmaputra. The Kamrup paper mill is also continuously polluting the river Brahmaputra. Apart from these, Spun silk mill at Jagiroad and other industries like Indian Carbon, Assam Carbon, Bokajan Cement, Dimapur Sugar mill and distillery situated in Bhutan are discharging their effluent in the tributaries of Brahmaputra which has direct impact on the water pollution in North East. According to the Meghalaya State Pollution Control Board, water of the Ward's Lake (situated in a park at the center of Shillong town) is chemically unsuitable for human consumption. Similarly the Umiam Lake is also extremely polluted. The Shillong Times, a regional newspaper, in its report in 1990 puts its water in class 'c'. Acid mine drainage from coal mines, besides other harmful effects, is also known to release various heavy metals into the ecosystems.

13.4.4 Depleting Wetlands

Another significant deterioration of the environment in the region is seen in case of dying wetlands. The dying of wetland is a very commonly reported phenomenon in the region. Presence of wetland is a boon to ecology of an area for it helps in the specific transfer of energy and matter in the ecosystem through the interaction with the physical environment. The wetlands maintain ecosystem diversity, as they are the natural storehouse of valuable flora and fauna of an area. But the degradation and decline of the wetlands in the country and globally is an awesome problem to the environmentalist here. The wetlands are reported to get dried up and the water of the wetlands is getting polluted leading to the death of the diverse biota of the wetland.

The wetlands of Assam and those around Guwahati city are under threat. Two wetlands Silsako and Numalijalah wetland around Guwahati city are reported to suffer threat to their existence because of the encroachment by the people. It has been reported that in 1912-13 the original total wetland area of the Silsako was 17.5847 ha. and the total water spread and total wetland area have declined to 407.07 ha and 150.36 ha, respectively. It means that 23.15 percent of the total wetland area was left. In case of Numalijalah wetland the total wetland area and total water spread area has shrinked to 22.62 percent and 19.66 percent of the original respectively.

13.4.5 Soil Erosion

Problem of soil erosion and land degradation in the northeast India is widely visible both in the valleys and in the hills. After the great earth quake that visited the region in 1958, the frequency and intensity of siltation and floods have taken a new dimension due to the disturbance and imbalance caused to the river courses and surrounding land mass. Soil erosion, silt deposition and rising of the river beds level have also been accelerated due to the changes taking place in the hills. Increase in population growth and its ever rising demand for basic necessities for survival as well as for other comforts of life necessitated expansion of jhum lands in the hills. Besides

settled agriculture in the valleys, industrial growth, road construction, mining, urbanization etc., added to the problem.

The decreasing jhum cycles, landslides, the hill features have started to take a new and unaesthetic and ecologically unfriendly look. The significance of soil erosion and resultant siltation in the river beds is manifold. There is a vertical and a horizontal increase in river beds and increasing frequency and intensity of floods is the perennial problems of plains of north east. There is a marked deterioration in the water quality, increase in turbidity or opacity, reduction in plant life at the bottom, qualitative changes in the physico chemical environment of the water, disturbance in the benthic environment of the river, disturbance in spawning I breeding areas of aquatic fauna and so on. Hence there is an overall depletion in the quantity and quality of aquatic life. It has been seen that before 1950, the rate of siltation was very rapid and it has been observed that within a few years, the river bed rose by three metres in several areas. The situation has been aggravated due to further cutting of trees in the catchment areas resulting into washing away of the soil to the Brahmaputra River.

13.4.6 Construction of Dams

Out of the major resources that are vital for industries, the water resources can be worth mentioning. The region is considered to have a potential to be the future: power house of the country. The harnessing of the hydroelectric energy from the river system has been given highest marks for its hydroelectric potential by the October 2001 Central Electricity Authority (CEA) (preliminary ranking study). The 168 schemes considered by a ranking study have a cumulative installed capacity of 63, 328 MW and 149 of these were given ranks A and B, indicating higher viability. These schemes were developed by agencies such as National Hydroelectric Power Corporation (NHPC) and North Eastern Electric Power Corporation (NEEPCO), the Brahmaputra Board and the State Electricity Board and a major portion of this power will be evacuated to other parts of the country.

This emphasis on power generation has been anticipated to create a major environmental havoc in the region being seismically sensitive zone.

The inter linking of river for optimum development of water resources envisaging inter basin water transfer from surplus to deficit areas has been another exploitative measure by the government of India which has received lot of criticisms from the environmentalists and hydrologists. The Brahmaputra is one of the world's largest rivers, with a drainage basin of 580,000 sq. km, 33 per cent of which is in India. Originating in the great glacier mass of Chema-Yung-Dung in the Kailash range of southern Tibet at an elevation of 5,300 metres, it traverses 1,625 km through Chinese territory and 918 km in India, before a final stretch of 337 km through Bangladesh, emptying into the Bay of Bengal through a joint channel with the Ganga.

One of the major arguments put forward to argue for large hydroelectric projects in the North-east, is that there is relatively 'small displacement' by submergence as compared to that in other parts of the country and therefore these projects are benign. But a careful perusal of the ground situation indicates that displacement, particularly of livelihoods and rights, is grossly underestimated. The region is home to a rich diversity of indigenous communities, with a substantial portion of the population dependent on natural resource-based livelihoods. This diversity of communities comes with unique socio-cultural, agro-ecological, and landholding systems (such as different forms of community control over forests in various parts of the region). Considering the unique features of the region and the scale of intervention planned, it is critical that the social and environmental impacts are carefully assessed before deciding on the feasibility of large dams.

A major catalyst in triggering the larger debate on downstream impacts of dams in Assam, has been repeated incidents of dam-induced floods across the state from upstream projects (for example, the 405 MW Ranganadi in Arunachal Pradesh) in recent years. Concerns about downstream impacts raised in the North-east include loss of fisheries; changes in beel (wetland) ecology in the floodplains; impacts on agriculture on the chapories (riverine islands and tracts); impacts on various other livelihoods due to blockage of rivers by dams (for example, driftwood

collection, sand, and gravel mining); increased flood vulnerability due to massive boulder extraction from riverbeds for dam construction and sudden water releases from reservoirs in the monsoons and dam safety and associated risks in this geologically fragile and seismically active region. Flow fluctuations in rivers, such as Lohit, Dibang, Siang, and Subansiri will seriously impact breeding grounds of critically endangered grassland birds, such as the Bengal Florican, foraging areas of the endangered wild water buffalo, habitat of the endangered Ganges river dolphin, and important national parks, such as Dibru-Saikhowa and Kaziranga.

13.4.7 Extinction of Species

Northeast India is part of a global biodiversity hotspot and also two Endemic Bird Areas. The region has the highest faunal diversity in India. Many among these are threatened. The categories included here are 'Critically Endangered', 'Endangered' and 'Vulnerable'. Of the 11 'Critically Endangered' species of mammals listed for India, seven have been recorded in this region. Of the 57 'Vulnerable' species of birds in India, 42 have been recorded in the Northeast. Among reptiles, 10 species in India are included in the 'Vulnerable' category of which eight are found in this region. Overall, 54% of threatened mammals, 68% of birds and 63% of reptiles in the country have been recorded in the Northeast. Many species have become endangered because of habitat loss and fragmentation, poaching, small original range, habitat alteration, pollution, disturbance in specialized habitat and diseases.

13.4.7.1 Why are the species endangered?

- Habitat loss: For most species the loss of their natural habitat is the main reason for the decline of the population. The forest cover in northeast India is disappearing at an alarming rate.
- Habitat fragmentation: While fragmentation of the natural habitat has threatened many species, arboreal mammals are worst affected. Examples of these are the Hoolock Gibbon and the flying squirrels
- Poaching: Although most species are poached for food and trade, some have been particularly affected by this despite the availability

of a good habitat. Tiger, Gangetic Dolphin, Rhinoceros, Elephant, Chiru, Bear, Otter, and turtles and tortoises, are typical examples. While a systematic record of many species are not maintained, at least a thousand rhinoceros fell prey to poachers since 1980.

- Habitat alteration: Alteration of some specific parts of a habitat may endanger the species. The Greater Adjutant may vanish from an area if dumping grounds and nesting / roosting sites in urban areas are altered. Tree plantation in grasslands will result in the decline of the Bengal Florican and Black-breasted Parrot among many other species.
- Small original range: Some species have become threatened because of their small original distribution or very restricted range. Some obvious examples are the Pygmy Hog, Golden Langur and Manipur Thamin. Any small intervention in their habitat can be disastrous.
- Pollution: This affects all species at various levels, but water fowl and birds of prey are particularly vulnerable.
- Specialized habitat: Species such as Elephant, Tiger, Macaques and forest birds may survive well in a variety of habitats and can adapt well to habitat changes while some species such as the Pygmy Hog, Bengal Florican and White-winged Duck cannot.

13.4.8 Exploitation Of Natural Resources And Biodiversity Conservation

Natural resources are those that our planet offers us without the need for human intervention. They are essential for survival, but if they are consumed at a faster rate than their natural regeneration, as is currently the case, they can be exhausted. The North Eastern region is considered a geographic gateway for much of India's flora and fauna, and harbors exceptional biodiversity and has relatively complex biogeography. Roughly, the region contains more than one-third of the country's total biodiversity. Besides representing the Himalayan Biodiversity Hotspot, the region also represents an important part of the Indo-Burma (Myanmar) global biodiversity hotspot, amongst the 34 recognized global biodiversity hotspots.

Human survival and wellbeing depend on biodiversity and healthy ecosystems, and the goods and services they provide. Yet, in recent decades, the world has experienced unprecedented biodiversity loss and ecosystem degradation. The loss of ecosystems and biodiversity is a challenge for us all, but it is a particular challenge for the world's poor, many of whom depend directly on nature for the provision of food, clean water, fuel, medicine, shelter and reduced vulnerability to climate change and natural disasters. Biodiversity loss and ecosystem change impact human health and well-being, which may include among other factors increased risk of emergence or spread of infectious diseases in animals, plants and humans. Conserving biodiversity, maintaining ecosystem services, and sustainably managing natural resources are fundamental to sustainable development.

The primary vegetation in extensive areas of the Northeast India has been disturbed and modified both through natural and anthropogenic causes. However, the first one has contributed only marginally to the change in vegetation type; human induced activities have led to irreversible transformation in the landscapes and resulted in colossal loss of biodiversity in the entire region. Shifting agriculture or slash-and-burn agriculture is the major land use in Northeast India. This traditional practice has largely been blamed for deforestation in the region. Encroachment situation of forest land is alarming in some areas of NE region. This has not only caused loss of forest area but has also created a tool for perpetual degradation of forest resources. Grazing pressure on forests and grassland of the region far exceeds the carrying capacity and is one of the major factors for degradation of forests especially near human habitations. Grazing therefore constitutes a threat to forest conservation and biodiversity in the State. Replacement of original mixed vegetation with monoculture plantations like rubber in Tripura, Tea plantations in Arunachal Pradesh, etc. are also posing threats to the unique biodiversity of the region. Unplanned activities of development infrastructure is resulting into a great pressure on fragile ecosystems of NE region.

Till date, a total of 16 National Parks and 53 Wildlife sanctuaries have been designated in different NE states covering an area of 6912 km2 and 11,261 km2, respectively. A total of five biosphere reserves to conserve the representative habitats, biota and to support the harmonious coexistence of man and nature have been established in the Northeastern region.



CHECK YOUR PROGRESS

Q5: Which two wetlands around Guwahati city are reported to suffer threat to their existence?

Q6: What are the various reasons, which are threatening species in North East India?



13.5 LET US SUM UP

- From this unit we have learned that it the pristine north east is continuously attacked by a system of production foreign to it.
- It distorted the economy and the ecological set up which began to take place vehemently with the entry of British to the region and continues with the post independent Indian state's resource exploitative path of development.
- Whether be dam building projects or coal mining, the negative impact on environment in Northeast India and its ecosystem are evident.
- Extinction of species and depletion of flora and fauna are happening at an alarming rate.



13.6 FURTHER READING

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2) Hazarika, J. (1996). Geopolitics of North-East India: A Strategical Study. New Delhi, India: Gyan Publishing House.

13.7 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No 1: Many communities in North East India are described as 'ecosystem people' because they share symbiotic relationship with nature and depend on its bounty for their livelihood.

Ans to Q No 2: The GSI was formed in 1856.

Ans to Q No 3: Regulation 1 of 1882 authorized the British to prohibit the natives of the Garo Hills district from using forest resources without possession of a licence. The prohibitions covered a wide spectrum of activities, ranging from the cutting of wood to hunting and collection of forest produce like ivory, rubber and wax; significantly, these materials constituted valuable items of exchange for the non-monetized Garo economy.

Ans to Q No 4: On one hand we have the conventional discourse that the inner line was constructed by the British administrators to protect the identity of the tribes living in the hills, on the other hand, records of correspondences of the officials present us a different story. It shows that the line created a boundary between the administered and the un-administered areas and thus the hill people now cannot enter the plains for raids and vice versa. The purpose of creating such a divide was to prevent disturbances from the un-administered areas (people in the hills). The line was extended as per the requirements/interests (profit motives) of the British capitalists, miners and planters. Thus, under the veil of carrying out a noble ideal of protecting tribal interests, the colonial administrators were protecting the interests of their own kind.

Ans to Q No 5: Silsako and Numalijalah wetland around Guwahati city are reported to suffer threat to their existence because of the encroachment by the people.

Ans to Q No 6: Small original range - Some species have become threatened because of their small original distribution or very restricted range.

Some obvious examples are the Pygmy Hog, Golden Langur and Manipur Thamin. Any small intervention in their habitat can be disastrous.



13.8 MODEL QUESTIONS

Short Questions (Answer each question in about 150 words)

Q1: Which type of coal is found in North East India?

Q2: Why is the water quality of the Northeast region deteriorating?

Long Questions (Answer each question in about 300-500 words)

Q1: How did the British exploit their economic interest in Northeast India?

Q2: According to you what are the biggest environmental hazards in Northeast India? Comment.

Q3: How does construction of dams pose as a threat to the people and the environment?

Q4: How does mining impact the environment? Discuss.

Q5: What are the reasons for extinction of species in Northeast India?

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