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CENTRE FOR DISTANCE AND ONLINE EDUCATION (CDOE)

M.A SOCIOLOGY

SEMESTER - I

ELECTIVE - I:
ENVIRONMENTAL SOCIOLOGY

(Candidates admitted from 2025-26 onwards)

PERIYAR UNIVERSITY

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M.A Sociology 2025 admission onwards

ELECTIVE - I

Environmental Sociology

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Elective – I: Environmental Sociology

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Unit II Basic Concepts and Theoretical Parameters: Environment – Ecosystem – Ecology – Biodiversity - Eco-feminism – Deep Ecology; Ecology and Imperialism - Contributions of Dunlop and Cotton, Radhakamal Mukherjee, Ramachandra Guha.

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Unit - I

Environmental Sociology

The word environment is derived from the French verb 'environer' which means to 'encircle or surround. Environment can be defined as the sum total of materials and forces surrounding the living organism. Gisbert defined environment as "anything immediately surrounding an object and exerting a direct influence on it." It is the sum total of conditions that surrounds us at a given point at space and time. Thus, environment is comprised of the interacting systems of physical, biological and cultural elements and these are interlinked individually and collectively in various ways.

This broad definition includes the natural world and the technological environment as well as the cultural and social context that shape human lives. It includes all factors living and non living that affect an individual organism or population at any point in the life cycle.

Meaning of Environmental Sociology

Environmental Sociology is a sub discipline within the field of sociology that studies of the interactions between the physical environment, social organization, and social behavior. Environmental sociologists typically place special emphasis on studying the social factors that cause environmental problems, the societal impacts of those problems, and efforts to solve the problems. They also look at the social processes by which certain environmental conditions become socially defined as problems.

Definitions

a) Environmental sociology is typically defined as the study of relations between human societies and their physical environments or, more simply, "societal-environmental interactions" (Dunlap and Catton 1979).
b) The technical definition of environmental sociology is the sociological study of how humans interact with the various aspects of the environment. In other words; how people treat the various aspects of the environment such as pollution, conservation and recycling.

c) Environmental Sociology is typically defined as the sociological study of societal-environmental interactions, although this definition immediately presents the perhaps insolvable problem of separating human cultures from the rest of the environment. Although the focus of the field is the relationship between society and environment in general, environmental sociologists typically place special emphasis on studying the social factors that cause environmental problems, the societal impacts of those problems, and efforts to solve the problems. In addition, considerable attention is paid to the social processes by which certain environmental conditions become socially defined as problems.

Nature of Environmental Sociology

a) The field of environmental sociology focuses on a variety of physical environments that range from the completely natural to completely man-made. "Modified" environments are natural environments, such as polluted lakes or planned landscapes, which show various degrees of human alteration.
b) Some major areas of study in sociology of environment include agriculture, natural resources, disasters, the environmental movement, and the man-made environment. These studies deal with the reciprocal interactions between each of these topics and humans.
c) Environment Sociology studies the interactions include the ways in which humans influence the environment as well as the ways in which environmental conditions (often modified by human action) influence human affairs, plus the manner in which such interactions are socially construed and acted upon. The relevance of these interactions to sociology stems from the fact that human populations depend upon the biophysical environment for survival, and this in turn necessitates a closer look at the functions that the environment serves for human beings.
d) Environmental sociology is also interested in a more general manner in human causes and social factors of environmental pollution, as well as in the social impacts of this pollution and of diminishing natural resources that is in

the reciprocal relations between human societies and their biophysical environment.

e) Environmental Sociology has different dimensions to it that their own research foci, environmental attitudes and the environmental movement, social impact analysis, risk assessment, responses to toxic sitting and discovery natural hazards, research and so forth.

Scope of Environmental Sociology

There are two schools of thought when it comes to environmental sociology; constructivism and realism. The constructivist's tend to be those individuals who develop ways that will help to improve the environment, however, they do tend to be on the more extremist side in their methods. The realists are those who want to help find the solutions needed to improve the environment.

a) The realist approach

In the realist approach, the problems of the environment are quite real. Inevitably, **social scientists** will follow the lead of the **natural sciences** in identifying the problems. The task of sociology is to explain the social causes of environmental problems. Also, what social alternatives could produce a better environmental outcome? In this approach, sociologists are in the same boat as most other commentators on environmental problems. Academics in many disciplines—for example environmental scientists, economists, and psychologists—argue about what the problems are and what can be done. If sociology has anything special to offer, it is a deeper and more systematic understanding of the social roots of environmental problems and the processes of social change.

b) The constructionist approach

A second approach attacks realism and argues that there is no one 'reality' of environmental problems. Different people have their own differently constructed and equally valid interpretations of the environment. This second perspective comes from a sociological tradition which says that society is not a real thing — it is socially constructed. In this view social and other realities do not exist independently of the

meanings people create about them. Applied to environmental issues, this approach maintains that 'there is no singular "nature" as such, only a diversity of contested natures; and that each such nature is constituted through a variety of socio-cultural processes from which such natures cannot be plausibly separated'. So sociologists should investigate how the environment is understood by different sections of the population, how environmental issues are constituted as social Problems and how people respond to these discourses of environmental trouble.

c) The reformist approach

The reformist approach aims to make small reforms to the economic and political structures of current society to deal with environmental problems. A much-read book with this approach is *Natural Capitalism*. Within this approach markets are the main means to distribute products—products are bought and sold for money. According to Hawken and colleagues, 'natural capitalism does not aim to discard market economics'. Instead what is necessary is the steering of markets 'in more creative and constructive directions'. Other aspects of the capitalist economy such as money, private ownership of the means of production (factories and farms, and so on) and wage labour are also retained.

Origin and Development of Sociology of Environment

During the 18th and 19th centuries, various philosophers, historians, scholars, and sociologists contributed ideas that influenced the discipline known today as environmental sociology. Some of these influential people include the French philosopher Baron de Montesquieu, the German philosopher Johann Gottfried Herder, the English historian Henry Thomas Buckle, the English philosopher Herbert Spencer, the French scholar Emile Durkheim, the German sociologist Max Weber, and the German philosopher and political theorist Karl Marx. The Origin of Species, an influential book by the English naturalist Charles Darwin, also helped to alter perspectives concerning the nature of civilization and social progress. After the book's

publication, there were attempts to apply the concept of natural selection in the development of species to human and social institutions.

Environmental science came alive as a substantive, active field of scientific investigation in the 1960s and 1970s driven by (a) the need for a multi-disciplinary approach to analyze complex environmental problems, (b) the arrival of substantive environmental laws requiring specific environmental protocols of investigation and (c) the growing public awareness of a need for action in addressing environmental problems.

Emergence of Environmental sociology

- The environmentalist movement as a topic of sociology can be related to the growing concern with environmental problems. The birth of the movement is normally dated to the publication of *Silent Spring* by Rachel Carson in 1962, a book which documented the effect of toxic pesticides on birds and other animals. The 'hippy' movement that developed later in the 1960s was the first large-scale popular subculture to develop themes from environmentalism.
- It became recognized in the latter half of the 20th century that biological determinism failed to fully explain the relationship between humans and the environment. As the application of social determinism became more useful, the role of sociology became more pervasive in analyzing environmental conditions. At first, classical sociology saw social and cultural factors as the only cause of other social and cultural conditions. This lens ignored the concept of environmental determinism or the environmental factors that cause social phenomena.
- The works of William R. Catton, Jr. and Riley Dunlap challenged the constricted anthropocentrism of classical sociology. In the late 1970s, they called for a new holistic, or systems perspective. Since the 1970s, sociology has noticeably transformed to include environmental forces in social explanations.
- Before the 1970s, Western sociology had not paid a lot of attention to the biophysical environment. Yet, with the rise of concern about the environment, the sociological community recognized this area as worthy of sociological attention

- There is general agreement that the first explicit use of 'environmental sociology' was by Samuel Klausner in his 1971 book *On Man in His Environment* (page 4). Dunlap (2002b: 11– 12) remembers that he first came across the term in Klausner's book several years later 'when the term was just starting to be used'. Three years later, he edited a special issue of the *Annals of the American Academy of Political and Social Science* on 'Society and Its Physical Environment'. By this time, sociological interest in environmental matters had been re-ignited, primarily by the rising popularity of environmentalism and the environmental movement.
- Then in the early 1970s, the widespread attention accorded the apocalyptic predictions contained in *The Limits of Growth* (Meadows *et al*. 1972), combined with the 'energy crisis' in the United States, deepened this environmental concern among academics. In addition, it broadened the scope of sociological interest in environmental matters to include issues related to resource scarcities and energy use.

- The contemporary environmental sociology is embedded historically and introduces the sociology of the environmental issues and nature. There is a vast discussion led within the field of environmental sociology about the significance of the environment for classical sociologists. Dunlap and Catton [1978] claim that sociology largely ignored the natural environment Their belief stands on the assumption that all social sciences are based on the separation of the natural world Dunlop and Cotton called this "Human exemptionalism Paradigm" and with this theory they laid the foundations for the formulation of the environmental sociology Alexandrescu 2009:48. The view that sociology was oblivious to environmental topics throughout its history is being disproved by several authors and it is possible to find that also sociological classics had an insight into the relationship between the society and the environment and the dynamics of this relationship.
- In the 1960s and 1970s a number of sociologists began to recognize the importance of environmental questions and started a research related to this area so that the subject of environmental sociology began to be more and more complex According to Alexandrescu, it was Dunlap and Catton's article "Environmental

Sociology: a New Paradigm" published in 1978 that created the environmental sociology as such. They also framed the New Ecological Paradigm.

- In 1964, sociologists in the Rural Sociological Society formed a committee to study the sociological aspects of forest research, which was later broadened to cover natural resource development in general. Many of the early advocates of environmental sociology were rural sociologists.
- Another major factor in the emergence of environmental sociology was the energy crisis of the early 1970s; this situation renewed public interest in issues of resource scarcity and societal responses.
- The development of environmental sociology during the past 30 years has paralleled that of the environmental movement itself. The rise of the environmental movement in the 1960s aroused interest in the field among sociologists; it led to the establishment of environmental sociology as a recognized subspecialty within the discipline. However, declining interest in environmental issues among policy makers during the more conservative years of the Reagan administration led to a subsequent waning of interest among sociologists: Fewer articles were devoted to the subject in academic sociological journals of the time, which may have contributed to the emergence of a social constructivist critique of environmental sociology. The revival of public interest in environmental problems during the Clinton administration, though, once again sparked a rising number of articles on the subject. Today, environmental sociology occupies a recognized, although minor, place in the field of sociology.

Need for the study of the Environmental sociology

a) Environmental sociology incorporates more of the social sciences for understanding human relationships, perceptions and policies towards the environment. Environmental engineering focuses on design and technology for improving environmental quality in every aspect.
b) Environmental scientists work on subjects like the understanding of earth processes, evaluating alternative energy systems, pollution control and mitigation, natural resource management, and the effects of global climate

change. Environmental issues almost always include an interaction of physical, chemical, biological and socio-cultural processes.

c) Environmental sociology is also interested in a more general manner in human causes and social factors of environmental pollution, as well as in the social impacts of this pollution and of diminishing natural resources that is in the reciprocal relations between human societies and their biophysical environment.

d) Environmental Sociologists seek to understand a variety of topics, including agrifood systems, the origins of human-induced environmental decline, the relationship between population dynamics, health, and the environment, and the role that elites play in harming the environment, environmental regulatory agency dynamics.

Relationship between environment and society

- Man is the most intelligent animal on the surface of the earth. Intelligence and creativity have led man to discover, to invent, to manipulate, to exploit, to construct and also to destroy things around him.
- Civilization and rapid growth of human population have engaged man in various activities- both constructive and destructive. But the outcomes of most of the human activities have contributed significantly to the degradation of the environment around us.
- Human activities have given rise to problems like urbanization, deforestation, and increased consumption of natural resources, production of solid, liquid and gaseous wastes, ground water depletion, production of toxic substances, extinction of wild life, soil erosion as well as environmental pollution.

Unit – 2

1. Environment

Meaning

- As per the Oxford Dictionary, 'Environment' literally means surroundings/ surrounding objects/ conditions/ circumstances of life of person or society.
- The word 'environment' may be defined to include everything external to man/ organism. It covers the region, surroundings or circumstances in which anything exists.
- The 'environment' is considered as a composite term for the conditions in which an organism lives, and therefore, consists of air, water, soil, sunlight, food, etc. which are the basic needs of all organisms to survive.

Definition

- C.C. Park (1980) has defined the 'environment' as "the sum total of conditions which surrounds a man at a given point in space and time."

- A. Goudie (1984) has defined "the environment" as "the representative of physical components of the earth where in man is the important factor influencing his environment."

2. Ecology

- The word "ecology" ("Ökologie") was coined in 1866 by the German scientist Ernst Haeckel (1834–1919). **Ecology** is the scientific analysis and study of interactions among organisms and their environment. Ecology can be defined as the relationship shared by organisms with the environment and with each other.

- It is an interdisciplinary field that includes biology, geography, and Earth science. Ecology includes the study of interactions that organisms have with each other, other organisms, and with abiotic components of their environment.

The main three constituents of ecology are the following-

- Interactions and relationships with the surrounding environment
- Interactions and relationships with other organisms
- Living organisms

Every plant and animal present in the ecology relies on the numerous aspects of the environment, in order to get nutrients, water, and food. Another thing that is studied in the field of ecology is how the organisms respond to the atmosphere, topography, soil, and climate and water availability. Additionally, the following things are studied in extensive detail when it comes to ecology.

- Biodiversity within the ecosystem
- Abundance and distribution of organisms present in the environment
- Progress changes and modifications in the ecosystem
- The effects of environmental factors on organisms present in a population
- Adaptations, interactions and life processes of any specific species

- Ecology is not synonymous with environment, environmentalism, natural history, or environmental science. It is closely related to evolutionary biology, genetics, and ethology. An important focus for ecologists is to improve the understanding of how biodiversity affects ecological function. Ecologists seek to explain:

- Life processes, interactions, and adaptations
- The movement of materials and energy through living communities
- The successional development of ecosystems
- The abundance and distribution of organisms and biodiversity in the context of the environment.

There are many practical applications of ecology in conservation biology, wetland management, natural resource management(agroecology, agriculture, forestry, agroforestry, fisheries), city planning (urban ecology), community health, economics, basic and applied science, and human social interaction (human ecology).

3. Eco-System

An ecosystem, a term very often used in biology, is a community of plants and animals interacting with each other in a given area, and also with their non-living environments. The non-living environments include weather, earth, sun, soil, climate and atmosphere. The ecosystem relates to the way that all these different organisms live in close proximity to each other and how they interact with each other.

Definition

“An ecosystem is a community of living organisms in conjunction with the nonliving components of their environment (things like air, water and mineral soil), interacting as a system. These biotic and abiotic components are regarded as linked

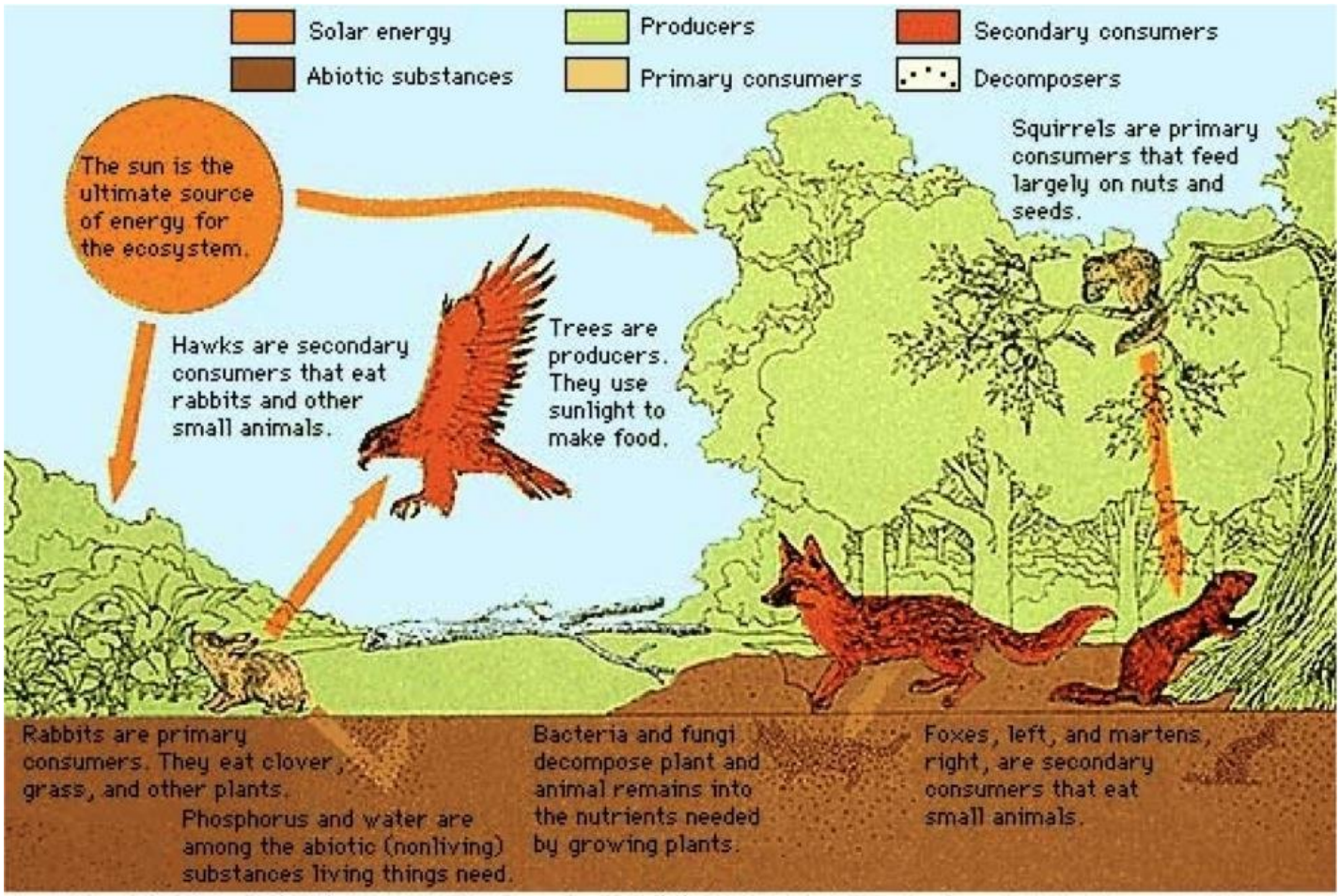
together through nutrient cycles and energy flows. As ecosystems are defined by the network of interactions among organisms, and between organisms and their environment, they can be of any size but usually encompass specific, limited spaces (although some scientists say that the entire planet is an ecosystem)."

An ecosystem can be destroyed by a stranger. The stranger could be rise in temperature or rise in sea level or climate change. The stranger can affect the natural balance and can harm or destroy the ecosystem. Its a bit unfortunate but ecosystems have been destroyed and vanished by man-made activities like deforestation, urbanization and natural activities like floods, storms, fires or volcanic eruptions.

Ecosystem Structure

At a basic functional level, ecosystem generally contains **primary producers** (plants) capable of harvesting energy from the sun through the process called photosynthesis. This energy then flows through the food chain. Next come **consumers**. Consumers could be **primary consumers** (herbivores) or **secondary consumers** (carnivores). These consumers feed on the captured energy. **Decomposers** work at the bottom of the food chain. Dead tissues and waste products are produced at all levels. Scavengers, detritivores and decomposers not only feed on this energy but also break organic matter back into its organic constituents. It is the microbes that finish the job of decomposition and produce organic constituents that can again be used by producers.

Energy that flows through the food chain i.e. from producers to consumers to decomposers is always inefficient. That means less energy is available at secondary consumers level than at primary producers level. Its not surprising but amount of energy produced from place to place varies a lot due to amount of solar radiation and the availability of nutrients and water.



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Bio-Diversity

Biodiversity or Biological diversity is a term that describes the variety of living beings on earth. In short, it is described as degree of variation of life. Biological diversity encompasses microorganism, plants, animals and ecosystems such as coral reefs, forests, rainforests, deserts etc. Biodiversity also refers to the number, or abundance of different species living within a particular region. It represents the wealth of biological resources available to us. It's all about the sustaining the natural area made up of community of plants, animals, and other living things that is begin reduced at a steady rate as we plan human activities that is being reduced by habitat destruction.

- Biodiversity is the variability among living organisms from all sources, including terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species, and of ecosystems.
- Biodiversity forms the foundation of the vast array of ecosystem services that critically contribute to human well-being.
- Biodiversity is important in human-managed as well as natural ecosystems.
- Decisions humans make that influence biodiversity affect the well-being of themselves and others.

The Importance of Biodiversity

Biodiversity is extremely important to people and the health of ecosystems. A few of the reasons are:

- Biodiversity allows us to live healthy and happy lives. It provides us with an array of foods and materials and it contributes to the economy. Without a diversity of pollinators, plants, and soils, our supermarkets would have a lot less produce.
- Most medical discoveries to cure diseases and lengthen life spans were made because of research into plant and animal biology and genetics. Every time a species goes extinct or genetic diversity is lost, we will never know whether research would have given us a new vaccine or drug.
- Biodiversity is an important part of ecological services that make life livable on Earth. They include everything from cleaning water and absorbing chemicals, which wetlands do, to providing oxygen for us to breathe—one of the many things that plants do for people.
- Biodiversity allows for ecosystems to adjust to disturbances like extreme fires and floods. If a reptile species goes extinct, a forest with 20 other reptiles is likely to adapt better than another forest with only one reptile.
- Genetic diversity prevents diseases and helps species adjust to changes in their environment.

Threats to Biodiversity

Extinction is a natural part of life on Earth. Over the history of the planet most of the species that ever existed, evolved and then gradually went extinct. Species go extinct because of natural shifts in the environment that take place over long periods of time, such as ice ages.

Today, **species are going extinct at an accelerated and dangerous rate**, because of non-natural environmental changes caused by human activities. Some of the activities have direct effects on species and ecosystems, such as:

- Habitat loss/ degradation
- Over exploitation (such as overfishing)
- Spread of Non-native Species/ Diseases

Some human activities have indirect but wide-reaching effects on biodiversity, including:

- Climate change
- Pollution

All of these threats have put a serious strain on the diversity of species on Earth. According to the International Union for Conservation of Nature (IUCN), globally about one third of all known species are threatened with extinction. That includes 29% of all amphibians, 21% of all mammals and 12% of all birds. If we do not stop the threats to biodiversity, we could be facing another mass extinction with dire consequences to the environment and human health and livelihood.

Eco-Feminism

Eco-feminism, also called **ecological feminism**, branch of feminism that examines the connections between women and nature. Its name was coined by French feminist Françoise d'Eaubonne in 1974. It emerged in the mid-1970s alongside second-wave feminism and the green movement.

- Eco-feminism brings together elements of the feminist and green movements, while at the same time offering a challenge to both. It takes from the green movement a concern about the impact of human activities on the non-human world and from feminism the view of humanity as gendered in ways that subordinate, exploit and oppress women.

- Eco-feminism uses the basic feminist tenets of equality between genders, a revaluing of non-patriarchal or nonlinear structures, and a view of the world that respects organic processes, holistic connections, and the merits of intuition and collaboration. To these notions eco-feminism adds both a commitment to the environment and an awareness of the associations made between women and nature.
- Specifically, this philosophy emphasizes the ways both nature and women are treated by patriarchal (or male-centred) society. Eco-feminism is a movement that sees a connection between the exploitation and degradation of the natural world and the subordination and oppression of women.
- Eco-feminists examine the effect of gender categories in order to demonstrate the ways in which social norms exert unjust dominance over women and nature. The philosophy also contends that those norms lead to an incomplete view of the world, and its practitioners advocate an alternative worldview that values the earth as sacred, recognizes humanity's dependency on the natural world, and embraces all life as valuable.
- Ecofeminist activism grew during the 1980s and 1990s among women from the anti-nuclear, environmental, and lesbian-feminist movements. The "Women and Life on Earth: Ecofeminism in the Eighties" conference held at Amherst (1980) was the first in a series of eco-feminist conferences, inspiring the growth of ecofeminist organizations and actions...".

Deep Ecology

Deep ecology is a somewhat recent branch of ecological philosophy (ecosophy) that considers humankind as an integral part of its environment. The philosophy emphasizes the interdependent value of human and non-human life as well as the importance of the ecosystem and natural processes. It provides a foundation

for the environmental and green movements and has led to a new system of environmental ethics.

The phrase "deep ecology" was coined by the Norwegian philosopher **Arne Naess** in 1973, and he helped give it a theoretical foundation.

- For Arne Naess, ecological science, concerned with facts and logic alone, cannot answer ethical questions about how we should live. For this we need ecological wisdom.
- Deep ecology seeks to develop this by focusing on deep experience, deep questioning and deep commitment. These constitute an interconnected system. Each gives rise to and supports the other, whilst the entire system is, what Næss would call, an ecosophy: an evolving but consistent philosophy of being, thinking and acting in the world, that embodies ecological wisdom and harmony.

Principles

Proponents of deep ecology believe that the world does not exist as a resource to be freely exploited by humans. The ethics of deep ecology hold that a whole system is superior to any of its parts. They offer an eight-tier platform to elucidate their claims

- 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 situation is 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 situations of 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.

Ecological Imperialism

- Ecological imperialism is the theory, advanced first by Alfred Crosby, that European settlers were successful in colonization of other regions because of their accidental or deliberate introduction of animals, plants, and disease leading to major shifts in the ecology of the colonized areas and to population collapses in the endemic peoples.
- The many pathogens they carried with them adversely affected the native populations of North America, Australia, and Africa, and were far more destructive than weaponry: it is estimated that disease wiped out up to 90 percent of indigenous people in some locations.
- Ecological imperialism was about the dis-placement of indigenous ecologies in favor of biological “neo-Europes

Narrower problems:

Human domination of nature
Commercialization of nature
Unconstrained exploitation of natural resources

Related problems:

Covert imperialism
Ecological authoritarianism

Aggravates

Natural environment degradation
Erosion of biological diversity
Rival claims for conservation land
Unethical practice of the life sciences
Inappropriate projection of values onto other cultures

RK MUKERJEE'S SOCIAL ECOLOGY

- Radhakamal Mukerjee's contribution to the studies of what is called 'social ecology' is unparalleled. Social ecology, as a discipline, requires the cooperation of a member of sciences including social sciences.

- The geological, geographical and biological factors work together to produce an ecological zone. Ecological conditions also conditioned by social, economic and political factors. Indeed, human or social ecology is the study of all aspects of reciprocal relations between man and his environment.

Subject matter of Social Ecology

- In his book, Regional Sociology (1926), Mukerjee explains the scope of human ecology "as a synoptic study of the balance of plant, animal and human communities, which are systems of correlated working parts in the organization of the region".

- American pioneers in ecological studies did not give adequate attention to the factor of culture in their conception of ecological relations. They viewed such relations as similar to those which take place among plants and animals.

- Mukerjee argued that ecological relations among human beings are largely similar with those among lower organisms. But, in case of human beings, cultural norms have a very important role. Human ecology highlights this fact.

- In the formation of an ecologic unit like 'region' social habits, values and traditions become very important. Individuals having the same or similar values possess solidarity. The ecological standpoint in which man's constant strivings, aspirations and ideals mingle silently with the ecological forces and processes.

- Social ecology stresses the ever complex give-and-take relationship between man and the region. There is a definite link between ecology and society. The development of ecological zones is the outcome of a dynamic process that is the challenge of the environment and the response of the people who establish a settlement.

- Ecological balance is not achieved by a mechanical carving out of a territory and setting people therein. Such an attempt weakens or destroys the social fabric. For example, in building industrial plants or constructing irrigation plants or constricting irrigation dams in India, very often, people of the concerned locations are moved to new settlements. It seriously affects community's life of the people. As a people lives in an area, it develops a symbiotic relationship with the ecology

or environment of the area. In the new situation it may fail to develop that kind of relationship with the surrounding.

- Mukerjee's ideas about social ecology advocated regional development. He stood for a balance between economic growth and ecological fitness. Traditional crafts and skills like weaving or engraving should be revamped for attaining economic growth of a region without any great damage to its ecology.

- Deforestation has created havoc. Long back Mukerjee cautioned his countrymen against it. He strongly advocated for conservation of forests and protection of ecological balance. Mindless urbanization was also lamented by Mukerjee. From the ecological point of view he upheld the idea and process of urbanization. Urban development at the expense of the countryside should be kept in check. Agriculture should be diversified and industries should be decentralized.

Activities that damaging the nature environment in the view of Mukerjee

Mukerjee notices with concern that

a) Overgrazing

b) Improvident destruction of trees and scrubs

c) Faulty method of cultivation brings about a serious imbalance in the biophysical constitution of the entire region. It seriously impairs nature's cycle.

Removal of vegetation brings about a chain of unfavourable reactions such as:
(1) Denudation of the top soil,

(2) Fall in the underground water level,

(3) Diminution of rainfall,

(4) Increase of aridity, and

(5) Acceleration of 'river', sheet or gully and wind erosion. These have led to serious and continuous agricultural deterioration.

Industrial civilization, because of its mindless exploitation of natural resources, finds its "security threatened due to the exhaustion of coal and petroleum" and the diminishing supply of minerals and vitamins, which cannot be synthetically manufactured. The importance of ecological values can hardly be overemphasized even in the industrial society.

Of course, there is no need for loss of nerves. Man's success in his adaptation to the geographical environment rests on certain ideal values, which have their roots in ecological values. But it is necessary that these values should "have reached the level of standards of moral behaviour".

Contribution of Ramachandra Guha on Indian Environmentalism

Ramachandra Guha is probably the most outstanding Indian scholar to have contributed significantly to the understanding of **'environmentalism in India'**.

In an early exposition, Guha identified three strands in the environmental movement in India – Gandhian, Appropriate Technology and Ecological Marxists.

- The strand represented by the Crusading Gandhians propagated an alternative, non-modern philosophy whose roots lay in Indian tradition

- The Appropriate Technology mainly tried to demonstrate in practice a set of technological and social alternatives to the prevailing model of development;

- The third strand embraced a variety of groups who arrived at environmentalism via conventional political philosophies, notably Marxism. The last strand is most closely identified with the People's Science Movements (PSMs) like the Kerala Sastra Sahitya Parishad (KSSP). According to Guha, the three contending ideologies exercised influence on each other.

- Guha has also attempted to trace lineage for Indian environmentalism. According to him, the historical study of natural resource conflict and the anthropological study of indigenous conservation systems are two important ways of constructing a lineage for Indian environmentalism; he claims that his attempt takes up yet a third alternative, the provision of an intellectual genealogy for the movement.

- Thus, Guha concerns himself with those forgotten thinkers who provided important insights into the human-nature relationship in India. He regards J.C. Kumarappa, Patrick Geddes, Verrier Elwin and Radhakamal Mukerjee as pioneers of human-ecological thinking in India.

- Guha's **The Unquiet Woods**: Ecological Change and Peasant Resistance in the Himalaya was an attempt to trace the origins of the Indian environmental movement and to document protests against commercial logging in the Himalayan foothills. He traces the origins of environmental movements in India to the Chipko (Hug the Trees) movement of the Central Himalaya in the early 1970s; the following decade saw a wave of protests against commercial logging in the Himalayan foothills which had both the Gandhians as well as left wing activists involved.

- Guha construes Chipko as a powerful statement against the violation of customary rights by state forestry which brought into focus a wide range of issues regarding forest policy and the environment debate as a whole.

- Ramachandra Guha and Madhav Gadgil have argued that nature-based conflicts revolving around competing claims over forests, land, water and fisheries have increased in frequency and intensity, thereby adding a new dimension to Indian democracy and civil society; the environmental movement also poses an ideological challenge to the dominant notions of the meaning, content and patterns of development in India.

- In another work, **Ecology and Equity**: The Use and Abuse of Nature in Contemporary India, they have tried to present a critique of the development model in our country since independence.

- According to Guha, Europeans like Patrick Geddes, Dietrich Brandis, Verrier Elwin, Madeleine Slade, Albert Howard, Catherine Mary Heinman, Marjorie Sykes and Laurie Baker have made notable contribution to Indian environmental thought. He also distinguishes between two waves of Indian environmentalism: the first wave spanned from the late 19th century to the outbreak of the First World War and the second wave started in the early seventies.

- During the first wave Indian thinkers associated with the national movement and some Europeans contributed to environmental thought; and, in the second wave intellectual reflection and popular social movement have come together to generate a public debate on 'the conditions and prospects for sustainable development'.

- Guha terms the period from August 1947 to the early 1970s an age of ecological innocence in which environmental concerns were relegated to the background, given the urge to industrialize rapidly and 'catch up' with the developed world. According to Guha, the environmental movement in India is presently in a state of exhaustion, though it is moving ahead. Now it has to confront the forces of globalization and liberalization.

- He emphasized the necessity of learning from the experience of Chipko or the Jharkhand Movement or even the water sharing experiments of the Pani Panchayat and argued that it is only by delving deep into the ambit of mainstream statist and technicist development discourse that the voluntary movement can keep the option of exploring social alternatives open.

- According to them, while political independence transferred the control over natural resources to the Indian State, the colonial approach to management of natural resources remained unchanged. They argued that ecology movements developed in India as people's response to threat to their survival and as a

demand for the conservation of the vital life support systems; thus, threat posed to natural resources by unlimited development aspirations has been at the very centre of ecology movements in India.

Contributions of Dunlap and Cotton on Environment

New Ecological Paradigm

In the 1970s, The New Ecological Paradigm (NEP) conception critiqued the claimed lack of human-environmental focus in the classical sociologists and the Sociological priorities their followers created. This was critiqued as the Human Exceptionalism Paradigm (HEP). The HEP viewpoint claims that human-environmental relationships were unimportant sociologically because humans are 'exempt' from environmental forces via cultural change. This view was shaped by the leading Western worldview of the time and the desire for Sociology to establish itself as an independent discipline against the then popular racist-biological environmental determinism where environment was all. In this HEP view, human dominance was felt to be justified by the uniqueness of culture, argued to be more adaptable than biological traits. Furthermore, culture also has the capacity to accumulate and innovate, making it capable of solving all natural problems. Therefore, as humans were not conceived of as governed by natural conditions, they were felt to have complete control of their own destiny. Any potential limitation posed by the natural world was felt to be surpassed using human ingenuity. Research proceeded accordingly without environmental analysis.

In the 1970s, sociological scholars Riley Dunlap and William R. Catton, Jr. began recognizing the limits of what would be termed the Human Exemptionalism Paradigm. Catton and Dunlap (1978) suggested a new perspective that took environmental variables into full account. They coined a new theoretical outlook for Sociology, the New Ecological Paradigm, with assumptions contrary to HEP.

The NEP recognizes the innovative capacity of humans, but says that 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. Thus, the biophysical environment can impose constraints on human activity. They discussed a few harbingers of this NEP in 'hybridized' theorizing about topics that were neither exclusively social nor environmental explanations of environmental conditions. It was additionally a critique of Malthusian views of the 1960s and 1970s.

Dunlap and Catton's work immediately received a critique from Buttel who argued to the contrary that classical sociological foundations could be found for environmental sociology, particularly in Weber's work on ancient "agrarian civilizations" and Durkheim's view of the division of labor as built on a material premise of specialization/specialization in response to material scarcity. This environmental aspect of Durkheim has been discussed by Schnaiberg (1971) as well.

Unit - 3

Global warming and the greenhouse effect are two terms that have been constantly under debate among environmentalists, who are currently fighting to reduce the effect of these dangerous conditions on the Earth. Both global warming and greenhouse effect are related to each other and are greatly responsible for early springs, really hot summers, really cold winters and even most of the natural disasters that are happening around the world. These two play an important part in the sustainability of the Earth and are completely different from each other.

Global Warming

- Global warming is when the average temperature of the Earth's atmosphere and the oceans rise. The temperature of the Earth is on a constant rise since the beginning of time, but recent warming conditions have been drastically increasing the rate of the temperature on the Earth.
- The temperature of the Earth since the early 20th century has been increased by approximately 0.8 °C (1.4 °F), with the majoring of the increase occurring since 1980. Though global warming has existed since the beginning of time, the drastic change in temperature is upsetting the balance of the Earth's temperature.
- The constant increasing of the temperature has been credited to the increasing concentrations of greenhouse gases produced by human activities such as the burning of fossil fuels and deforestation. The increase in human activities as well

as human population has shown an increase in the amount of emissions that are produced world-wide. A surge in use of cars, fridges, planes, etc. has resulted in rise of emissions which are directly responsible for global warming.

- Global warming effects include a rise in sea levels and a change in the amount and pattern of precipitation, as well a probable expansion of subtropical deserts. It will also result in the melting of glaciers and ice in the Arctic and the Antarctic. Extreme weather changes such as droughts, heat waves, natural disasters, heavy rainfall, etc. are also said to be effects of global warming.

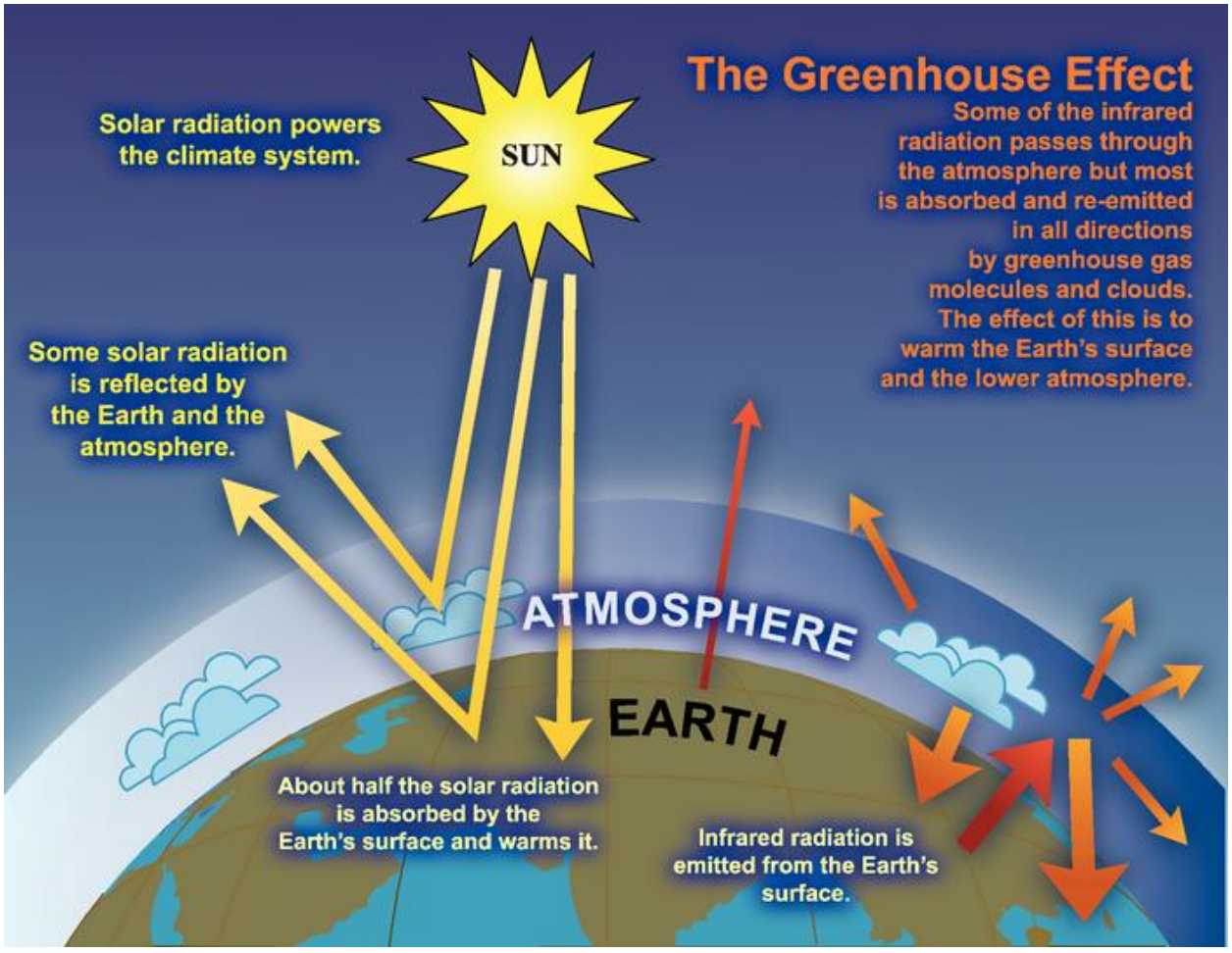
Green House effect

Greenhouse effect helps in the sustenance of life and temperature. The atmosphere of the earth has a blanket of air which surrounds us just like the greenhouse room. The atmosphere has the ability to restrict the heat and trap it around the earth. This phenomenon is a natural greenhouse effect. Thus, it helps in keeping earth warm thereby maintaining temperature and sustenance of life.

- Greenhouse effect is one of the contributing factors to global warming. The greenhouse effect is based on the activities of the greenhouses, which are glass domes and structures that are build to provide heat to plants in order to grow.
- The greenhouses absorb heat from the sun and retain the heat in order to help maintain a constant temperature for plant growth. This is similar to the 'greenhouse' effect that is experienced by the Earth's atmosphere. Greenhouse effect is the retention of the heat by the greenhouses gases on the surface of the Earth, allowing the planet's temperature to rise.
- The theory of greenhouse effect was first argued by Joseph Fourier in 1824. The greenhouse effect plays an important part in the development of life on the planet. Research shows that due to the retention of the heat by the Earth's atmosphere, the planet became warm enough to sustain life. If the greenhouse effect did not exist, the planet would be too cold for living organisms or plants.
- The greenhouse effect is a process by which thermal radiation from a planetary surface is absorbed by atmospheric greenhouse gases, and is re-radiated in all directions. The Earth receives heat and energy from the Sun in the form of UV, visible, and near IR radiation. Most of this energy passes through the atmosphere without being absorbed. Of all the total amount of energy that is available at the top of the Earth's atmosphere, approximately 50% of this energy is absorbed by the planet's surface. The rest of the energy is reflected back toward the sun, mostly by clouds.
- The retention of the heat on the planet is due to the greenhouse gases. The greenhouse gases (GHG) are responsible for trapping heat on the surface

causing the heat to be absorbed by the Earth, which then promotes global warming.

- Four major gases that are responsible for the greenhouse effect are water vapor, carbon dioxide, methane and ozone.
- The greenhouse effect is being strengthened through human activities, which mainly contribute to increased carbon dioxide level. Carbon dioxide levels have been increased due to burning of fossil fuels, deforestation and increase the human population. Greenhouse gases warm the earth by re-radiating some of the energy back towards the surface, allowing for more heat absorption and rise in the temperature of the Earth.
- Greenhouse effect is a contributing factor to the global warming. Even with all the limitations placed on emission control, the temperature of the Earth is expected to continue to rise



	Global Warming	**Greenhouse Effect**
Definition	Global warming is when the average temperature of the Earth's atmosphere and the oceans rise.	Greenhouse effect is the retention of the heat by the greenhouses gases on the surface of the Earth, allowing the planet's temperature to rise.
Discovery	There is no clear indication as to when the effects of global warming were discovered. It became popular topic of discussion during the last 50-60 years.	Joseph Fourier in 1824
Causes	Combustion of fossil fuels, pollution, mining, deforestation, population, etc	Increase of greenhouse gases, mining, combustion of fossil fuels, deforestation, population, global warming, etc.
Effects	Rising sea levels, melting of ice glaciers, extinction of species, oxygen depletion, volcanoes, earthquakes, acidification, depleted food supply, etc	droughts, flooding, melting of snow, extreme weather conditions, natural calamities, rising sea level, etc.
Solutions	Though the damage is already done, however to reduce the acceleration rate of global warming it is important to cut down on emissions in any way possible, planting of new trees, reducing dependency on cars, etc.	Though the damage is already done, however to reduce the acceleration rate of global warming it is important to cut down on emissions in any way possible, planting of new trees, reducing dependency on cars, etc.

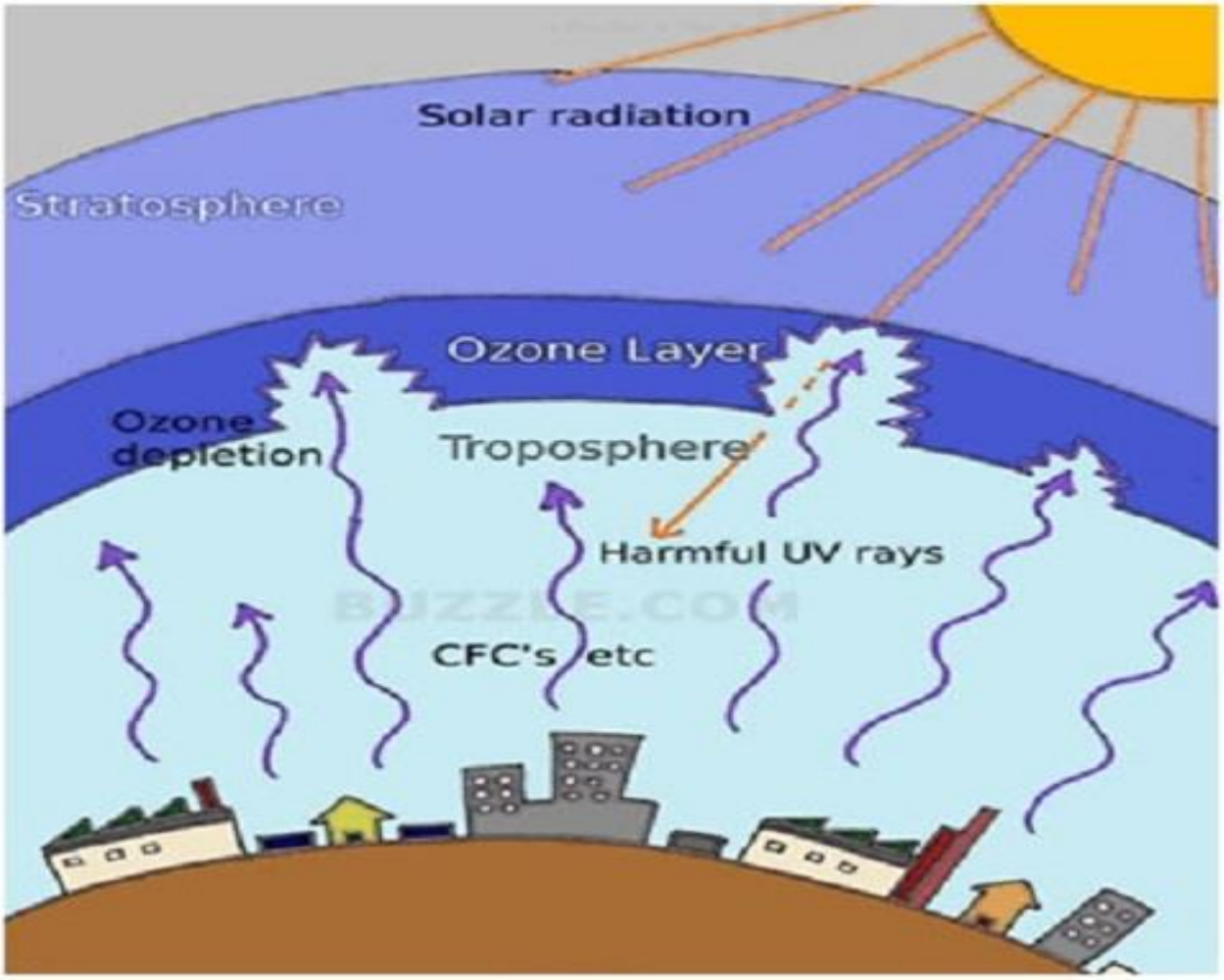
Image Courtesy: studentmedia.uab.edu, enwin.com

Ozone layer depletion

The ozone layer is mainly found in the lower portion of the stratosphere, about 20 to 30 km (12 to 19 miles) above the earth, though the thickness varies seasonally and geographically. The ozone layer protects living things from harmful ultraviolet rays from the sun; without the protection of the ozone layer, millions of people would develop skin cancer and weakened immune systems.

Ozone depletion is the term commonly used to describe the thinning of the ozone layer in the stratosphere. Ozone depletion occurs when the natural balance between the production and destruction of ozone in the stratosphere is tipped in favor of destruction. Human activity is the major factor in tipping that natural balance, mostly from releasing artificial chemicals, known as ozone-depleting substances (ODS), to the atmosphere. These are stable substances that do not break down in the lower atmosphere and contain either/both chlorine and/or bromine.

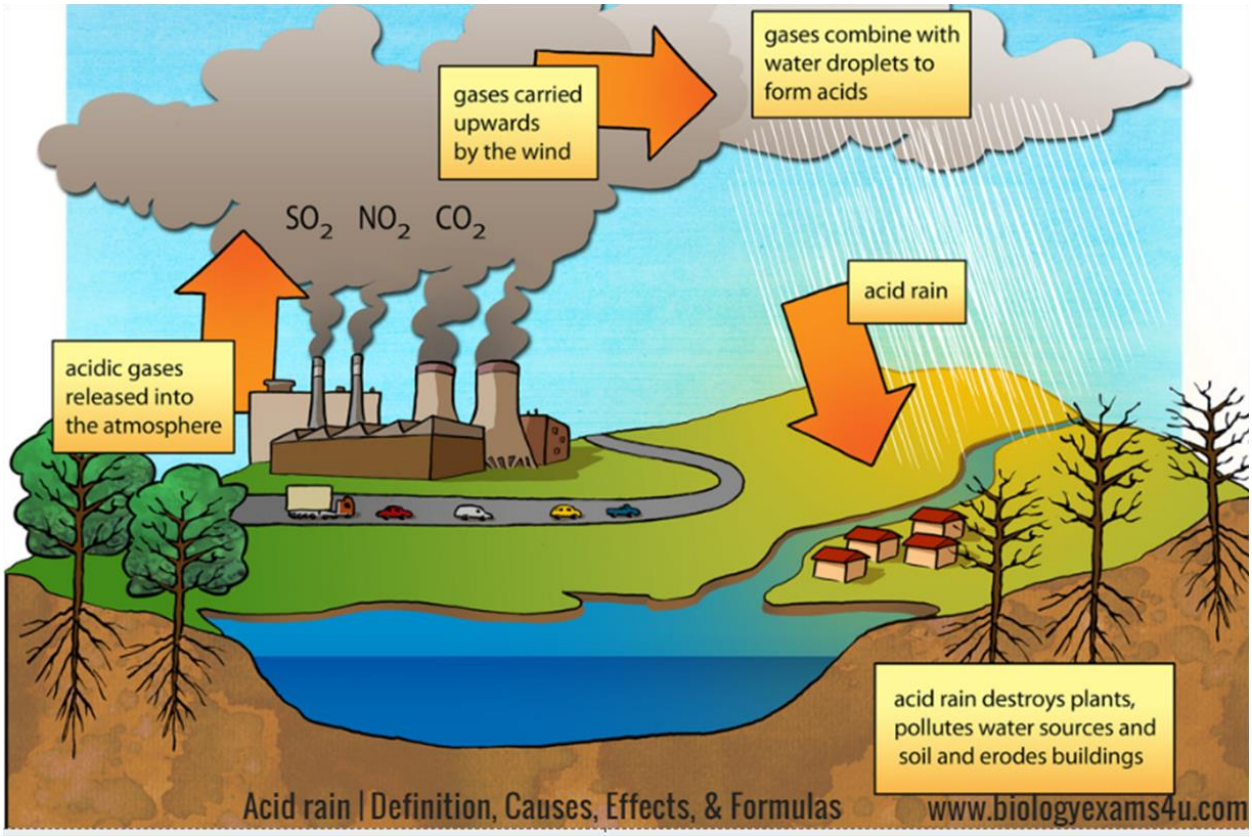
Ozone-depleting substances containing chlorine include chlorofluorocarbons (CFCs), carbon tetrachloride, methyl chloroform and hydrochlorofluorocarbons (HCFCs). Halons, methyl bromide and hydrobromofluorocarbons (HBFCs) are ODSs that contain bromine. Ozone depletion is a major environmental problem because it increases the amount of ultraviolet (UV) radiation that reaches Earth's surface, which increases the rate of skin cancer, eye cataracts, and genetic and immune system damage



Acid rain

According to the Environmental Protection Agency (EPA) “Acid rain, or acid deposition, is a broad term that includes any form of precipitation that contains acidic components, such as sulfuric acid or nitric acid”. The precipitation is not necessarily wet or liquid; the definition includes dust, gasses, rain, snow, fog and hail. The type of acid rain that contains water is called wet deposition. Acid rain formed with dust or gasses is called dry deposition. The term acid rain was coined in 1852 by Scottish chemist Robert Angus Smith, according to the Royal Society of Chemistry, which calls him the "father of acid rain."

Sulfur dioxide (SO_2) and nitrogen oxides (NOx) released into the air by fossil-fuel power plants, vehicles and oil refineries are the biggest cause of acid rain today. A chemical reaction happens when sulfur dioxide and nitrogen oxides mix with water, oxygen and other chemicals in the air. They then become sulfuric and nitric acids that mix with precipitation and fall to the ground. Acid rain affects nearly everything. Plants, soil, trees, buildings and even statues can be transformed by the precipitation.



Deforestation

Deforestation is the removal of a forest or stand of trees from land which is then converted to a non-forest use. Deforestation can involve conversion of forest land to farms, ranches, or urban use. The most concentrated deforestation occurs in tropical rainforests. Deforestation refers to the decrease in forest areas across the world that are lost for other uses such as agricultural croplands, urbanization, or mining activities. Greatly accelerated by human activities since 1960, deforestation has been negatively affecting natural ecosystems, biodiversity, and the climate.

Over half of the tropical forests worldwide have been destroyed since the 1960s, and every second, more than one hectare of tropical forests is destroyed or drastically degraded. This intense and devastating pressure on forests is not limited to the tropics – an estimated 3.7 million hectares of Europe's forests are damaged by livestock, insects, diseases, forest fires, and other human-linked activities.

Causes of Deforestation

1) For the cause of Agriculture

According to the same report, 33% of agriculture-caused deforestation is a consequence of subsistence agriculture – such as local peasant agriculture in developing countries. Commercial or industrial agriculture (field crops and livestock) cause around 40% of forest loss – in the search for space to grow food, fibers or biofuel (such as soybeans, palm oil, beef, rice, maize, cotton and sugar cane). It is also particularly interesting to note livestock is believed to be responsible for about 14% of global deforestation. The main reasons why have to do with the large areas require both to raise livestock but also to grow its (soy-based) food.

2) For the Cause of construction and energy sources

The construction of human infrastructures has also been driving deforestation. More specifically, 10% of deforestation can be attributed to new infrastructures that serve the current human lifestyle in four main ways: transportation, transformation and energy generation.

On one hand, roads, rails, ports or airports have been built to move all sorts of goods – from cereals and fruits to spices, minerals or fossil fuels – either directly to trade centers or to transformation sites. So while at first there were only fruit trees, roads soon arrived to allow transporting fruit to other regions. And while some goods were and are collected manually, others such as coal, oil, natural gas, biomass, but also meat, dairy or spirits, required the construction of large extraction, transportation and/or transformation infrastructures.

3) For the cause of expansion of urbanization

The population shift that is leading people to move from rural areas to urban areas is also contributing to deforestation (5%, according to FAO). This urban growth – in which 68% of the world's population is expected to live in cities by 2050 – is leading to an exponential growth of housing and consumption sites. And as cities become larger so they can host more people, they challenge the natural boundaries surrounding them, often leading to deforestation. This is one of the reasons why deforestation is happening.

Effects of Deforestation

1) Threats to Bio-diversity
2) Disturbing local people and their livelihood
3) Scarcity of food supply in future

4) Climate change
5) Soil erosion and land slide
6) Threats to animals and their livelihood

Air Pollution

Air Pollution - causes, effects and control measures

Air pollution - Air pollution may be defined as the presence of one or more contaminants like dust, mist, smoke and colour in the atmosphere that are injurious human beings, plants and animals.

1. Rapid industrialization
2. Fast urbanization
3. Rapid growth in population
4. Growth of vehicles on the roads and
5. Activities of human beings have disturbed the natural balance of the atmosphere.

The composition of Air is given below:

Nitrogen	*78%*
Oxygen	*21%*
Argon	*less than 1%*
Carbondioxide	*0.037%*
Water vapour	*Remaining*
Ozone, Helium and ammonia	*Trace amount*

Sources of Air pollution

Sources of air pollution are of two types.
Natural sources and **Artificial sources**

Natural sources of pollution are those that are caused due to natural phenomena. Ex: Volcanic eruptions, Forest fires, Biological decay, Pollen grains, Marshes, Radioactive materials.

Artificial sources are those which are created by man. Ex: Thermal power plants, Vehicular emissions, Fossil fuel burning, agricultural activities etc.

Classification of Air Pollutants

Depending on the form of pollutants present in the environment**,** they are classified as:

1. Primary pollutants and
2. Secondary pollutants

Primary pollutants are those that are directly emitted in the atmosphere in the harmful form
Ex: CO, NO, CO2, SO2 etc.

Secondary pollutants are those that are formed by reacting with other components or some basic component of the atmosphere to form new pollutants.
Ex: Oxides of Nitrogen (NO2 or NO3) react with moisture in the atmosphere to give Nitric acid

Indoor air pollutants are primary air pollutants. The most important indoor air pollutant is **Radon** gas.
Sources of indoor air pollutants are:

1. Radon gas is emitted from building materials like bricks, concrete, tiles, etc that are derived from soil containing radium
2. Radon is also found in natural gas and ground water and is emitted while being used.
3. Burning fuel in the kitchen and cigarette smoke release pollutants like CO, SO2, HCHO (Formaldehyde) and BAP (Benzo-(A) pyrene).

Sources And Common Effects of Common Air Pollutants

Carbonmonoxide: It is a colourless, odourless gas that is poisonous animals. It is formed by incomplete combustion of carbon containing fuels.
Source of carbonmonoxide is cigarette smoking and incomplete combustion of fossil fuels (more than 77% comes from motor vehicle exhaust)
Health effects include reduced ability of red blood cells to carry oxygen to body cells and tissues. This leads to headache and anemia. At high levels it causes coma, irreversible brain damage and death.

Nitrogen Dioxide: It is a reddish-brown irritating gas that causes photochemical smog. In the atmosphere, it gets converted into nitric acid (HNO3). It is caused by burning fossil fuels in industries and power plants.
Health effects include lung irritation and damage. Environmental effects involve acid deposition leading to damage of trees, lakes, soil and ancient monuments. NO2 can damage fabrics.

Sulphur Dioxide: It is a colourless and irritating gas that is formed by combustion of sulphur containing fossil fuels such as coal and oil. In the atmosphere it is converted into Sulphuric acid which is a major component of acid deposition.
Health effects involve breathing problems for healthy people.
Environmental effects involve reduced visibility and acid deposition on trees, lakes, soils and monuments leading to their deterioration and adverse effect on aquatic life.

Suspended Particulate Matter (SPM): Includes a variety of particles and droplets (aerosols) that can be suspended in atmosphere for short to long periods.
Human sources for SPM include burning coal in power and industrial units, burning diesel and other fuels in vehicles, agriculture, unpaved roads, construction, etc.
Health effects include nose and throat irritation, ling damage, bronchitis, asthama, reproductive problems and cancer.
Environmental Effects include reduced visibility and acid deposition. Acid deposition may lead to damaged trees, soils and aquatic life in lakes.

Ozone is a highly reactive gas with an unpleasant odour occurring in the stratosphere where it protects mankind fro the harmful ultra-violet rays from the Sun. However on earth, it is a pollutant.
It occurs on earth due to reaction between Volatile Organic Compounds (VOCs) and Nitrogen Oxides. It moderates the climate

Photochemical smog is a browinsh smoke that frequently forms on clear, sunny days over large cities with significant amounts of automobile traffic.It is mainly due to chemical reactions among nitrogen oxides and hydrocarbons in the presence of sunlight.
Health effects include breathing problems, cough, eye, nose and throat irritation, heart diseases, reduced resistance to colds and pneumonia.
Environmental effects involve damage to plants and trees. Additionally, Smog reduces visibility.

Lead is a solid and highly toxic metal. Its compounds are emitted into the atmosphere as particulate matter.
Human Sources: Paint, Smelters (metal refineries), lead manufacture, storage batteries, leaded petrol, etc
Health effects: Lead accumulates in the body and brain leading to nervous system damage and mental retardation (especially in children), digestive and other health problems. Lead containing chemicals are known to cause cancer in test animals.
Environmental Effects: It can harm wildlife.

CONTROL MEASURES

The atmosphere has several built-in self cleaning processes such as dispersion, gravitational settling, flocculation, absorption, rain-washout, etc to cleanse the atmosphere. However, control of contaminants at their source level is a desirable and effective method through preventive or control technologies.
Source control: Some measures that can be adopted in this direction are:

1. Using unleaded petrol
2. Using fuels with low sulphur and ash content

3. Encouraging people to use public transport, walk or use a cycle as opposed to private vehicles

4. Ensure that houses, schools, restaurants and playgrounds are not located on busy streets

5. Plant trees along busy streets as they remove particulates, carbon dioxide and absorb noise

6. Industries and waste disposal sites should be situated outsdide the city preferably on the downwind of the city.

7. Catalytic converters should be used to help control emissions of carbon monoxide and hydrocarbons

Water Pollution

- Water pollution is the contamination of water bodies (like oceans, seas, lakes, rivers, aquifers, and groundwater) usually caused due to human activities. Water pollution is any change in the physical, chemical or biological properties of water that will have a detrimental consequence of any living organism.

- Water pollution also considered**,** the release of substances into subsurface groundwater or into lakes, streams, rivers, estuaries, and oceans to the point where the substances interfere with beneficial use of the water or with the natural functioning of ecosystems. In addition to the release of substances, such as chemicals or microorganisms, water pollution may also include the release of energy, in the form of radioactivity or heat, into bodies of water.

Sources of Water Pollution

Some of the most commonly occurring water pollutants are

- Domestic Waste
- Industrial effluents
- Insecticides and pesticides
- Detergents and Fertilizers

Some of the water pollution that is caused is by *Direct Sources*, such as factories, waste management facilities. refineries etc, that directly release waste and harmful by-products into the nearest water source without treating them. *Indirect sources* include pollutants that enter the water bodies via groundwater or soil or via the atmosphere as acid rain.

Effects of Pollution of Water

1. Diseases: In humans, drinking or consuming polluted water in any way has many disastrous effects on our health. It causes typhoid, cholera, hepatitis and various other diseases.
2. Destruction of Ecosystems: Ecosystems are extremely dynamic and respond to even small changes in the environment. Water pollution can cause an entire ecosystem to collapse if left unchecked.
3. Eutrophication: Chemicals in a water body, encourage the growth of algae. These algae form a layer on top of the pond or lake. Bacteria feed on this algae and this decreases the amount of oxygen in the water body, severely affecting the aquatic life there.
4. Effects the food chain: Disruption in food chains happens when toxins and pollutants in the water are consumed by aquatic animals (fish, shellfish etc) which are then consumed by humans.

Land Pollution

Land pollution, in other words, means degradation or destruction of earth's surface and soil, directly or indirectly as a result of human activities. Anthropogenic activities are conducted citing development, and the same affects the land drastically, we witness land pollution; by drastic we are referring to any activity that lessens the quality and/or productivity of the land as an ideal place for agriculture, forestation, construction etc. The degradation of land that could be used constructively in other words is land pollution.

Causes of Land Pollution

1. Deforestation and soil erosion: Deforestation carried out to create dry lands is one of the major concerns. Land that is once converted into a dry or barren land, can never be made fertile again, whatever the magnitude of measures to redeem it are. Land conversion, meaning the alteration or modification of the original properties of the land to make it use-worthy for a specific purpose is another major cause. This hampers the land immensely. Also there is a constant waste of land. Unused available land over the years turns barren; this land then cannot be used. So in search of more land, potent land is hunted and its indigenous state is compromised with.

2. Agricultural activities: With growing human population, demand for food has increased considerably. Farmers often use highly toxic fertilizers and pesticides to get rid off insects, fungi and bacteria from their crops. However with the overuse of these chemicals, they result in contamination and poisoning of soil.

3. Mining activities: During extraction and mining activities, several land spaces are created beneath the surface. We constant hear about land caving in; this is nothing but nature's way of filling the spaces left out after mining or extraction activity.

4. Overcrowded landfills: Each household produces tonnes of garbage each year. Garbage like aluminum, plastic, paper, cloth, wood is collected and sent to the local recycling unit. Items that can not be recycled become a part of the landfills that hampers the beauty of the city and cause land pollution.

5. Industrialization: Due to increase in demand for food, shelter and house, more goods are produced. This resulted in creation of more waste that needs to be disposed of. To meet the demand of the growing population, more industries were developed which led to deforestation. Research and development paved the way for modern fertilizers and chemicals that were highly toxic and led to soil contamination.

6. Construction activities: Due to urbanization, large amount of construction activities are taking place which has resulted in large waste articles like wood, metal, bricks, plastic that can be seen by naked eyes outside any building or office which is under construction.

7. Nuclear waste: Nuclear plants can produce huge amount of energy through nuclear fission and fusion. The left over radioactive material contains harmful and toxic chemicals that can affect human health. They are dumped beneath the earth to avoid any casualty.

8. Sewage treatment: Large amount of solid waste is leftover once the sewage has been treated. The leftover material is sent to landfill site which end up in polluting the environment.

Effects of Land Pollution

1. Soil pollution: Soil pollution is another form of land pollution, where the upper layer of the soil is damaged. This is caused by the overuse of chemical fertilizers, soil erosion caused by running water and other pest control measures; this leads to loss of fertile land for agriculture, forest cover, fodder patches for grazing etc.

2. Change in climate patterns: The effects of land pollution are very hazardous and can lead to the loss of ecosystems. When land is polluted, it directly or indirectly affects the climate patterns.

3. Environmental Impact: When deforestation is committed, the tree cover is compromised on. This leads to a steep imbalance in the rain cycle. A disturbed rain cycle affects a lot of factors. To begin with, the green cover is reduced. Trees and plants help balance the atmosphere, without them we are subjected to various concerns like

Global warming, the green house effect, irregular rainfall and flash floods among other imbalances.

4. Effect on human health: The land when contaminated with toxic chemicals and pesticides lead to problem of skin cancer and human respiratory system. The toxic chemicals can reach our body through foods and vegetables that we eat as they are grown in polluted soil.

Remedial Measures of Land Pollution

1. Make people aware about the concept of Reduce, Recycle and Reuse.

2. Reduce the use of pesticides and fertilizers in agricultural activities.

3. Avoid buying packages items as they will lead to garbage and end up in landfill site.

4. Ensure that you do not litter on the ground and do proper disposal of garbage.

5. Buy biodegradable products.

6. Do Organic gardening and eat organic food that will be grown without the use of pesticides.

7. Create dumping ground away from residential areas.

Noise Pollution

The word noise is derived from the Latin term nausea. It has been defined as unwanted sound, a potential hazard to health and communication dumped into the environment with regard to the adverse effect it may have on unwilling ears. The intensity of sound is measured in decibels (dB)**.** Noise pollution, unwanted or excessive sound that can have deleterious effects on human health and environmental quality.

Noise pollution is generally defined as regular exposure to elevated sound levels that may lead to adverse effects in humans or other living organisms. According to the World Health Organization, sound levels less than 70 dB are not damaging to living organisms, regardless of how long or consistent the exposure is. Exposure for more than 8 hours to constant noise beyond 85 dB may be hazardous.

Sources of Noise pollution

1. **Road Traffic Noise:**
   In the city, the main sources of traffic noise are the motors and exhaust system of autos , smaller trucks, buses, and motorcycles. This type of noise can be augmented by narrow streets and tall buildings, which produce a canyon in which traffic noise reverberates.

2. Air Craft Noise:
Now-a-days , the problem of low flying military aircraft has added a new dimension to community annoyance, as the nation seeks to improve its nap-of the- earth aircraft operations over national parks, wilderness areas , and other areas previously unaffected by aircraft noise has claimed national attention over recent years.

3. Noise from railroads:
The noise from locomotive engines, horns and whistles, and switching and shunting operation in rail yards can impact neighboring communities and railroad workers. For example, rail car retarders can produce a high frequency, high level screech that can reach peak levels of 120 dB at a distance of 100 feet, which translates to levels as high as 138, or 140 dB at the railroad worker's ear.

4. Construction Noise:
The noise from the construction of highways , city streets , and buildings is a major contributor to the urban scene . Construction noise sources include pneumatic hammers, air compressors, bulldozers, loaders, dump trucks (and their back-up signals), and pavement breakers.

5. Noise in Industry:
Although industrial noise is one of the less prevalent community noise problems, neighbors of noisy manufacturing plants can be disturbed by sources such as fans, motors, and compressors mounted on the outside of buildings Interior noise can also be transmitted to the community through open windows and doors, and even through building walls. These interior noise sources have significant impacts on industrial workers, among whom noise- induced hearing loss is unfortunately common.

6. Noise in building:
Apartment dwellers are often annoyed by noise in their homes, especially when the building is not well designed and constructed. In this case, internal building

noise from plumbing, boilers, generators, air conditioners, and fans, can be audible and annoying. Improperly insulated walls and ceilings can reveal the soundof-amplified music, voices, footfalls and noisy activities from neighboring units. External noise from emergency vehicles, traffic, refuse collection, and other city noises can be a problem for urban residents, especially when windows are open or insufficiently glazed.

7. Noise from Consumer products:
Certain household equipment, such as vacuum cleaners and some kitchen appliances have been and continue to be noisemakers, although their contribution to the daily noise dose is usually not very large.

Effects of Noise Pollution

- **Hypertension** is, in this case, a direct result of noise pollution caused elevated blood levels for a longer period of time.
- **Hearing loss** can be directly caused by noise pollution, whether listening to loud music in your headphones or being exposed to loud drilling noises at work, heavy air or land traffic, or separate incidents in which noise levels reach dangerous intervals, such as around140 dB for adult or 120 dB for children.
- **Sleep disturbances** are usually caused by constant air or land traffic at night, and they are a serious condition in that they can affect everyday performance and lead to serious diseases.
- **Child development**. Children appear to be more sensitive to noise pollution, and a number of noise-pollution-related diseases and dysfunctions are known to affect children, from hearing impairment to psychological and physical effects. Also, children who regularly use music players at high volumes are at risk of developing hearing dysfunctions. In 2001, it was estimated that 12.5% of American children between the ages of 6 to 19 years had impaired hearing in one or both ears
- Various **cardiovascular dysfunctions**. Elevated blood pressure caused by noise pollution, especially during the night, can lead to various cardiovascular diseases.

- **Dementia** isn't necessarily caused by noise pollution, but its onset can be favored or compounded by noise pollution.
- **Psychological dysfunctions** and noise annoyance. Noise annoyance is, in fact, a recognized name for an emotional reaction that can have an immediate impact.

Effect On Vegetation Poor quality of Crops:- Now is well known to all that plants are similar to human being. They are also as sensitive as man. There should be cool & peaceful environment for their better growth. Noise pollution causes poor quality of crops in a pleasant atmosphere.

Effect On Animal:- Noise pollution damage the nervous system of animal. Animal looses the control of its mind. They become dangerous.

Effect On Property:- Loud noise is very dangerous to buildings, bridges and monuments. It creates waves which struck the walls and put the building in danger condition. It weakens the edifice of buildings.

LEGAL CONTROL MEASURES:

(a) Constitution of India

Right to Life:- Article 21 of the Constitution guarantees life and personal liberty to all persons. It is well settled by repeated pronouncements of the Supreme Court that right to life enshrined in Article 21 is not of mere survival or existence. It guarantees a right of persons to life with human dignity. Any one who wishes to live in peace, comfort and quiet within his house has a right to prevent the noise as pollutant reaching him.

(b) Cr.P.C. Section 133

Here Section 133 is of great importance. Under Crpc. Section 133 the magisterial court have been empowered to issue order to remove or abate nuisance caused by noise pollution Sec 133 empower an executive magistrate to interfere and remove a public nuisance in the first instance with a conditional order and then with a permanent one. The provision can be utilized in case of nuisance of environment nature. He can adopt immediate measure to prevent danger or injury of a serious land to the public. For prevention of danger to human life, health or safety the magistrate can direct a person to abstain from certain acts.

(c) I.P.C. Public Nuisance 268-295

Chapter IV of Indian Penal code deals with offences relating to public health, safety, ...decency , morals under Sections 268, 269, 270, 279, 280, 287, 288, 290 291 294. Noise pollution can be penalized with the help of above section. Private remedies suits in the area may related to public nuisance under A299. This article punishment in case of Public nuisance law of torts covers. A person is guilty of public nuisance who does any act or is guilty of an illegal omission which causes any common injury, danger, or annoyance to the pubic or to the people in general who dwell or occupy property in the vicinity or which must necessarily cause injury, obstruction danger or annoyance to persons who may have occasion to use any public right. A common nuisance is not excused on the ground that it causes some convenience or advantage. Who ever commits a public nuisance in any case not otherwise punishable by this code, shall be punished with fine, which may extend to Rs. 200.

Controlling measures of Noise Pollution

Some noise pollution preventive measures are provided in the points below.

- Honking in public places like teaching institutes, hospital, etc. should be banned.
- In commercial, hospital, and industrial buildings, adequate soundproof systems should be installed.
- Musical instruments sound should be controlled to desirable limits.
- Dense tree cover is useful in noise pollution prevention.
- Explosives should be not used in forest, mountainous, and mining areas.

UNIT- IV

Genetically Modified Foods

Genetically modified (GM) foods are foods derived from organisms whose genetic material (DNA) has been modified in a way that does not occur naturally, e.g. through the introduction of a gene from a different organism. The technology is often called “modern biotechnology” or “gene technology”, sometimes also “recombinant DNA technology” or “genetic engineering”. Currently available GM foods stem mostly from plants, but in the future foods derived from GM microorganisms or GM animals are likely to be introduced on the market.

Genetically Modified Organisms (GMOs) are being made by inserting a gene from an external source such as viruses, bacteria, animals or plants into usually unrelated species. Biotechnology has granted us the ability to overcome insurmountable physiological barriers and to exchange genetic materials among all living organisms.

The use of recombinant DNA technology has the potential to allow the creation of an organism which is desired and designed by human. Genetically Modified Food (GMF) means any food containing or derived from a genetically engineered organism. Describing biotechnology methods is beyond the scope of this paper however, it is informative to only name some of the vastly used techniques in creating GM crops: *Agrobacterium* has been used as an intermediate organism for transferring a desirable gene into plants . This has been a successful method for modification of trees and cereal crops. Biolistic transformation is a physical method by which the genes of interest are bombarded into the plant cells and DNA-coated beads are usually used as carriers.

Bt cotton, the only GE crop under cultivation in India, covers around 95% of the total cotton growing area. In a short period of 12 years, around 7.7 million farmers have adopted Bt cotton in India. As a further advancement, a total of 1128 varieties of Bt cotton hybrids have been allowed to be commercially released by GEAC from 2002-2012 for various zones of India.

Sustainable agriculture

Sustainable agriculture is a type of agriculture that focuses on producing long-term crops and livestock while having minimal effects on the environment. This type of agriculture tries to find a good balance between the need for food production and the preservation of the ecological system within the environment.

In addition to producing food, there are several overall goals associated with sustainable agriculture, including conserving water, reducing the use of fertilizers and pesticides, and promoting biodiversity in crops grown and the ecosystem. Sustainable

agriculture also focuses on maintaining economic stability of farms and helping farmers improve their techniques and quality of life.

There are many farming strategies that are used that help make agriculture more sustainable. Some of the most common techniques include growing plants that can create their own nutrients to reduce the use of fertilizers and rotating crops in fields, which minimizes pesticide use because the crops are changing frequently. Another common technique is mixing crops, which reduces the risk of a disease destroying a whole crop and decreases the need for pesticides and herbicides. Sustainable farmers also utilize water management systems, such as drip irrigation, that waste less water.

Ecological Concerns related with negative approaches in agricultre

Agriculture profoundly affects many ecological systems. Negative effects of current practices include the following:

- Decline in soil productivity can be due to wind and water erosion of exposed topsoil; soil compaction; loss of soil organic matter, water holding capacity, and biological activity; and salinization of soils and irrigation water in irrigated farming areas. Desertification due to overgrazing is a growing problem, especially in parts of Africa.
- Agricultural practices have been found to contribute to non-point source water pollutants that include: sediments, salts, fertilizers (nitrates and phosphorus), pesticides, and manures. Pesticides from every chemical class have been detected in groundwater and are commonly found in groundwater beneath agricultural areas; they are widespread in the nation’s surface waters. Eutrophication and "dead zones" due to nutrient runoff affect many rivers, lakes, and oceans. Reduced water quality impacts agricultural production, drinking water supplies, and fishery production.
- Water scarcity in many places is due to overuse of surface and ground water for irrigation with little concern for the natural cycle that maintains stable water availability.
- Other environmental ills include over 400 insects and mite pests and more than 70 fungal pathogens that have become resistant to one or more pesticides; stresses on pollinator and other beneficial species through pesticide use; loss of wetlands and wildlife habitat; and reduced genetic diversity due to reliance on genetic uniformity in most crops and livestock breeds.
- Agriculture's link to global climate change is just beginning to be appreciated. Destruction of tropical forests and other native vegetation for agricultural production has a role in elevated levels of carbon dioxide and other greenhouse gases. Recent studies have found that soils may be sources or sinks for greenhouse gases.

Based on a multi-pronged goal, sustainable agriculture seeks to:

- satisfy human food and fiber needs;
- enhance environmental quality and the natural resource base upon which the agricultural economy depends;
- make the most efficient use of nonrenewable resources and on-farm resources and integrate, where appropriate, natural biological cycles and controls;
- sustain the economic viability of farm operations; and
- enhance the quality of life for farmers and society as a whole."

Industrialization and urbanization

Industrialization has historically led to urbanization by creating economic growth and job opportunities that draw people to cities. Urbanization typically begins when a factory or multiple factories are established within a region, thus creating a high demand for factory labor. Other businesses such as building manufacturers, retailers, and service providers then follow the factories to meet the product demands of the workers. This creates even more jobs and demands for housing, thus establishing an urban area.

Industrialization effect on Environment

- The biggest problem is air pollution, caused by the smoke and emissions generated by burning fossil fuels. The United State's EPA regulates more than 80 different toxins that can be found in industrial pollution, from asbestos and dioxin to lead and chromium. In spite of these regulations, industries are among the worst generators of air pollution in the world.
- Water pollution is also a problem in these areas, specifically in regions where factories are built next to natural water sources. These toxins can come in a variety of forms — solid, liquid or gaseous — and they can all end up contaminating the local water supplies.
- Soil contamination is another problem that goes hand in hand with industrialization. Lead is the most common form of soil contamination, but other heavy metals and toxic chemicals can also leach into the soil and, in turn, contaminate any crops that grow there.
- Finally, industrialization has led to dramatic habitat destruction. Forests are cut down for their lumber, and ecosystems are destroyed to create roads, strip mines and gravel pits. Destroying these habitats upsets local ecosystems and leads to plant and animal extinction if the species are unable to relocate or adapt to their new surroundings.

Urbanization effect on Environment

- Intensive urban growth can lead to greater poverty, with local governments unable to provide services for all people.
- Concentrated energy use leads to greater air pollution with significant impact on human health.
- Automobile exhaust produces elevated lead levels in urban air.
- Large volumes of uncollected waste create multiple health hazards.
- Urban development can magnify the risk of environmental hazards such as flash flooding.
- Pollution and physical barriers to root growth promote loss of urban tree cover.
- Animal populations are inhibited by toxic substances, vehicles, and the loss of habitat and food sources.

Population growth and Environmental Problems

The rapid population growth and economic development in country are degrading the environment through the uncontrolled growth of urbanization and industrialization, expansion and intensification of agriculture, and the destruction of natural habitats. One of the major causes of environmental degradation in India could be attributed to rapid growth of population, which is adversely affecting the natural resources and environment. The growing population and the environmental deterioration face the challenge of sustained development without environmental damage. The existence or the absence of favorable natural resources can facilitate or retard the process of economic development. The three fundamental demographic factors of births, deaths and migration produce changes in population size; composition, distribution and these changes raise a number of important questions of cause and effect.

The growing trends of population and consequent demand for food, energy, and housing have considerably altered land-use practices and severely degraded India's forest vis-à-vis environment also. The growing population put immense pressure on land extensification at cost of forests and grazing lands because the demand of food could not increase substantially to population. Thus, horizontal extension of land has fewer scopes and relies mostly on vertical improvement that is supported by technical development in the field of agriculture i.e. HYV seeds, Fertilizers, Pesticides, Herbicides, and agricultural implements. All these practices causing degradation and depletion of environment with multiplying ratio.

Impact of Population growth on environment

Poverty

Poverty is said to be both cause and effect of environment degradation. Poorer people, who cannot meet their subsistence needs through purchase, are forced to use common property resources such as forests for food and fuel, pastures for fodder, and ponds and rivers for water. It also contributes to environmental degradation through over exploitation of natural resources like land, air and water. Population pressure driven overexploitation of the surface and underground water resources by the poor has resulted into contamination and exhaustion of the water resources. Urban population is also using rivers to dispose of untreated sewage and industrial effluent. The result is that health of those dependents on untreated water resources is increasing at risk.

Environmental challenges

Population growth and economic development are contributing to many serious environmental problems in India. These include pressure on land, land/soil degradation, forests, habitat destruction and loss of biodiversity, changing consumption pattern, rising demand for energy, air pollution, global warming and climate change and water scarcity and water pollution.

Environment Effect on Human health

- The environment can affect human health; a less widely known fact is that promoting human health can also affect the environment.
- Improvements in human health, such as reduced mortality and decreased disease and hunger, can cause environmental harm, such as increased use of fossil fuels, deforestation, pollution, and decrease biodiversity.
- The interactions between the environment and human health raise complex ethical questions related to environmental regulations and health policy decisions.
- These ethical questions are bound to intensify with the emergence of environmental effects of climate change, and new technologies that can impact the environment, such as nanotechnology, genetically modified organisms, and bio-fuels.

All organisms depend on their environments for energy and materials needed to sustain life: clean air, potable water, nutritious food, and safe places to live. For most of human history, increases in longevity were due to improved access to these

necessities. Advances in agriculture, sanitation, water treatment, and hygiene have had a far greater impact on human health than medical technology.

Although the environment sustains human life, it can also cause diseases. Lack of basic necessities is a significant cause of human mortality. Environmental hazards increase the risk of cancer, heart disease, asthma, and many other illnesses. These hazards can be physical, such as pollution, toxic chemicals, and food contaminants, or they can be social, such as dangerous work, poor housing conditions, urban sprawl, and poverty.

Environmental Risk Factors for Disease

- Pollution
- Microbes in air, water, or soil
- Contaminants in food
- Weather conditions (e.g. droughts, heat waves**)**
- Natural disasters (e.g. hurricanes, earthquakes, floods)
- Pesticides and other chemicals
- Pests and parasites
- Radiation
- Poverty
- Lack of access to health care

Environment-Related Illnesses

- Cancer
- Heart disease
- Diabetes
- Asthma
- Chronic obstructive pulmonary disease
- Obesity
- Occupational injuries
- Arthritis
- Parkinson’s disease
- Malaria
- Dysentery
- Depression

UNIT-V

Chipko Movement

- **Chipko movement**, also called **Chipko andolan**, nonviolent social and ecological movement by rural villagers, particularly women, in India in the 1970s, aimed at protecting trees and forests slated for government-backed logging.
- The movement originated in the Himalayan region of Uttarakhand (then part of Uttar Pradesh) in 1973 and quickly spread throughout the Indian Himalayas. The Hindi word *chipko* means “to hug” or “to cling to” and reflects the demonstrators’ primary tactic of embracing trees to impede loggers.
- The name of the movement ‘chipko’ comes from the word ’embrace’, as the villagers hugged the trees and encirled them to prevent being hacked.
- The Chipko movement was a non-violent agitation in 1973 that was aimed at protection and conservation of trees, but, perhaps, it is best remembered for the collective mobilization of women for the cause of preserving forests, which also brought about a change in attitude regarding their own status in society.
- The movement began in response to the increasing destruction of forests for commerce and industry. When government-controlled exploitation of natural resources started to increasingly threaten the livelihoods of Indian villagers, they sought to stop the destruction using Mahatma Gandhi’s method of satyagraha or non-violent resistance
- However, a sports manufacturing company was given the permission to fell trees and use them to make equipment, which proved to be the final provocation and a people’s movement was born.
- The other reason that angered the villagers was the government’s policy that did not allow local agriculturists and herders to cut the trees for fuel wood or for fodder and for certain other purposes.
- It was then that environmentalist and Gandhian social activist Chandi Prasad Bhatt, founder of the cooperative organisation Dasholi Gram Swarajya Sangh, led the first Chipko movement near the village of Mandal in 1973.

Importance

- The movement got its name from protesters literally hugging trees to protect them from loggers. A particular feature of the resistance is that it's been led mainly by women from rural areas, who heavily rely on forests for their livelihoods. To spread their messages to a largely rural population, Chipko

activists have often used folk songs. The movement was able to spread throughout India while staying largely local and organised autonomously.

- As the Chipko Movement grew, some influential leaders emerged from its ranks, bringing their message to the national stage. The most well-known of them was Sunderlal Bahuguna (1927-2021). His work, rooted deeply in the Chipko message, had a tremendous impact on India's environmental policies, including the preservation of forests and other natural resources in the Himalayan region.
- The Chipko Movement was the result of hundreds of decentralised and locally autonomous initiatives. As men often left their homes in the mountains to look for work in other regions, the movement's leaders and activists have primarily been village women, acting to save their means of subsistence and their communities.
- Another particular feature of the movement has been the way its messages have spread. People living in remote areas often didn't have access to newspapers or other types of mass media. Hence, the movement adopted the method of spreading its message through folk songs and marches.
- The movement also spread to Karnataka in the south, Rajasthan in the west, Bihar in the east and to the Vindhyas in central India. The protests succeeded in halting clear felling also in the Western Ghats and the Vindhyas, as they generated pressure for a more responsible and inclusive natural resources policy in India.
- As demonstrations began to spread to all parts of India, pressure grew on the government to adopt policies more sensitive to people's needs and environmental factors. The Chipko protests in the northern Indian state of Uttar Pradesh achieved a major victory in 1980 with a 15-year ban on green felling in the Himalayan forests enacted by then-Prime Minister Indira Gandhi. A similar ban was later also implemented in the state of Uttaranchal and the northern Indian state of Himachal Pradesh.

Narmadha Bachao Andolan

Narmada Bachao Andolan is related to an Indian social movement launched in 1985 by native tribals, farmers, environmentalists, and human rights activists in opposition to a number of large dam projects on the Narmada River, which flows through the states of Madhya Pradesh, Maharashtra, and Gujarat. Originally known as the Narmada Dharangrast Samiti, or Committee for Narmada Dam-Affected People, the movement was renamed Narmada Bachao Andolan in 1989.

The Narmada Bachao Andolan (NBA) is a social movement in India. It was launched in 1985 to oppose the construction of many large dams on the Narmada

River. The NBA is led by a group of activists, including Medha Patkar. They argue that the dams will displace thousands of people and have a devastating impact on the environment. The NBA has been successful in delaying the construction of some of the dams.

Several groups, such as the Narmada Asargrastha Samiti in Gujarat, the Narmada Ghati Nav Nirman Samiti in Madhya Pradesh, and the Narmada Dharangrastha Samiti in Maharashtra, had different viewpoints regarding the need for fair rehabilitation plans and opposition to dam construction without proper resettlement policies.

The Narmada Bachao Andolan (NBA) was formed by local people, professionals, activists, and NGOs who advocated for non-violent means to address these issues. Medha Patkar led the movement, aiming for an alternative development model nationally and holding the World Bank accountable internationally.

Key Features of Narmada Bachao Andolan

- The Narmada Bachao Andolan was a social mass movement that began in 1985 to protest the lack of appropriate resettlement and rehabilitation (R&R) policy for the more than 250,000 displaced due to the construction of large dams along the Narmada River.
- Initially known as the Narmada Dharangrast Samiti or Committee for Narmada Dam-Affected People, the Narmada Bachao Movement was renamed in 1989.
- The Narmada Valley project was conceived in 1946, but construction did not begin until 1978 when the Narmada Water Disputes Tribunal (NWDT) issued final orders that included R&R plans.
- The plan was to construct 30 large dams, 135 medium dams, and 3,000 small dams along the 1,312-kilometer Narmada River from Madhya Pradesh to Gujarat.
- Except for the Sardar Sarovar Dam, all dams were in Madhya Pradesh.
- This decision was based on the assumption that it would provide water to approximately forty million people, irrigation, and electricity to the region’s residents.
- The 138.68-meter-high wall of the Sardar Sarovar Dam would submerge 38,000 hectares of land, displacing 244 villages and 250,000 people.
- The villages comprise 81% of its basin and are primarily populated by tribal populations such as Bhils, Gonds, Baigas, and others whose primary occupation is agriculture.

- The construction of the Sardar Sarovar Dam resumed in 1999 and was completed in 2006. The project's height was increased from 138 to 163 meters.

Pioneers in Narmada Bachao Andolan

Medha Patkar is a prominent leader of the movement. She has organized hunger strikes and peaceful protests and has been imprisoned many times for the cause.

Baba Amte is renowned for his work against leprosy. He also opposed the dam construction. He published a booklet titled "Cry O Beloved Narmada" in 1989.

Filmmaker Ali Kazimi documented the 1991 Sangharsh Yatra in his film "Narmada: A Valley Rises."

Anand Patwardhan is a veteran documentary filmmaker. He produced an award-winning documentary called "A Narmada Diary" in 1996.

Alok Agarwal, a current member of the Aam Aadmi Party, remains actively involved in the movement.

Bihar Chief Minister Nitish Kumar participated in a rally organized by the NBA in 2016.