



**Environment and Human Rights**  
**Master of Arts in Human Rights**

**Uttarakhand Open University**

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**Unit 1: Introduction to Environment**

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**1.0 Learning Objectives**

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On completion of this unit you should be able to understand

- The need of environmental sciences.
- What is environment, and the need for interdisciplinary approach to study?
- Types of environment.
- Importance of environmental studies

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**1.1 Introduction**

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Environmental science is an interdisciplinary subject created by the needs of rapid development of the industrial era. In the last century, especially last decades several serious environmental issues have become a focal point of the scientific community. These are mainly pollution leading to global warming, ozone layer depletion, acid rain; and deforestation leading to water crisis, desertification, global warming: also rapid population growth leading to depletion resources.

Above circumstances require a holistic knowledge about working of our environment supporting life on this planet and thorough understanding the changes causing problems. Since

no single existing subject covered the above lacunae in knowledge completely, hence environmental science as a separate subject was required to understand the complex subject and find the solutions.

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## **1.2 Definition**

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The word environment is derived from the French verb *environner*, which means to “encircle” or “surround.” Thus, our environment can be defined as the physical, chemical and biological world that surrounds us, as well as the complex of social and cultural conditions affecting an individual or community.

Environmental science is defined as an interdisciplinary academic field that integrates various academic fields (particularly sciences) to study the structure and function of our life-supporting environment and to understand causes, effects, and solutions of different types of environmental problems. In other words, environmental science is the scientific study of all the components or factors that make or influence our life-supporting biophysical environment. Environmental sciences involves multiple disciplines, like Biology, Geology, Chemistry, Physics, Engineering, Sociology, Health, Anthropology, Economics, Statistics, Philosophy, Ecology.

In simple terms environmental sciences deals with every issue that affects an organism. Environmental science is methodological study of the environment and includes the study of all biophysical as well as anthropogenic conditions or circumstances under which an organism lives.

Environment, Ecology and Ecosystem: Environment, Ecology and Ecosystem are three different terms. But they are interrelated. And we must understand all of them to understand environment.

Ecology - At the same time we should understand Ecology which is understanding interaction of an organism and its environment.

The term ecology was coined in 1866 by the German scientist Ernst Haeckel.

Ecology is the branch of biological science concerned with the relationships and interactions between living organisms and their physical surroundings or environment.

Ecology comes from the Greek words *oikos* (house or place where one lives) and *logos* (study of). Ecology means the study of the “house” in which we live i.e. our immediate surroundings which envelop us and with whom we interact with us on everyday basis.

Ecology can be defined more specifically as the “Study of the interactions between organisms and the non-living components of their environment or “Study of interrelationship between the organism and Environment”

The basic unit of ecology is ecosystem. Living organisms and the environment in which they live and with which they exchange materials and energy combine to make up an

ecosystem. An ecosystem comprises of the biotic components – the living plants and animals including all the microbes and the abiotic components – air, water, minerals, soil, temperature, humidity etc. that constitute the environment. Third and essential component of most natural ecosystems is energy, usually starts in the form of sunlight, rarely it may be chemical energy. Common examples of land-based or terrestrial ecosystems include forests, deserts, jungles, meadows and alpine and semi-alpine ecosystems. Water-based or aquatic ecosystems include streams, rivers, lakes, marshes, estuaries and oceanic ecosystems. There are no specific limitations on the size of an ecosystem, and the boundaries are also not well defined in many cases. A small water body can be studied as a separate ecosystem. A desert comprising hundreds of miles or large oceans and even the whole surface of earth can be viewed as an ecosystem.

Structural units of ecology: The basic structural units of ecological organization are species and populations. A biological species are defined as all the organisms potentially able to interbreed under natural conditions and to produce fertile offspring. A population defined as of all the members of a single species occupying a defined geographical area at a particular time. An ecological community is composed of a number of populations that lie and interact within a defined region.

Scientists like to use term natural environment as a better term to use given the common use of the word environment. It is a known fact that the Earth includes a large Environment. Definitely, any organism has a relationship with its environment. Humans have a unique working relationship with domesticated animals like cows, chickens, dogs etc. This study of how the existence and activities of an organism influence its environment and the vice versa is called ecology.

Ecosystem is a large geographical area where both biotic and abiotic components interact with each other. E.g. Desert, Ocean, Sea etc.

- 1) What is environment?
- 2) What we study in environmental sciences?
- 3) What is ecology?

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### **1.3 Types of Environment**

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Before discussing types of environment we must know what constitutes the environment. Environment is constituted of following elements

- 1) Physical elements like land, sunlight, temperature, air, elevation, latitude, water bodies, climate soils, rocks and minerals. They interact amongst themselves and with biological elements to constitute unique environment at a place. It can be divided into three spheres
  - i) The lithosphere (solid earth)
  - ii) The hydrosphere (water component)
  - iii) The atmosphere (gaseous component)

2) Biological elements such as plants, animals, microorganisms and humans constitute the biosphere. They interact amongst themselves and with physical elements. Biological components can be categorized into

i) Plants (flora)

ii) Animals (fauna)

3) Cultural elements such as economic, social and political elements are essentially man-made features. They are the latest entrants to the environment and affect the system.

As such the types of environment can be decided on the constituents' separately or the unique small spatial units.

Classification on basis of physical elements.

i) Lithospheric Environment

ii) Hydrospheric Environment

iii) Atmospheric Environment

Classification into small spatial systems like

i) Mountain Environment

ii) Glacier Environment

iii) Plateau Environment

iv) Coastal Environment

v) Oceanic environment

From the conceptual point of earth being a unique planet to support life environment can be classified into two broad types:

I) Essential life-supporting biophysical environment: It includes all the biophysical entities as well as the processes that contribute to providing all humans and other living beings the basic material needs of life, that is, oxygen, water, food, and habitat. In fact, the concepts of environmental sciences are based on this meaning. The "essential life-supporting biophysical environment" is also termed as "environment", "natural environment", "biophysical environment", "biosphere", or "ecological system".

II) Non-essential life-assisting environment: It includes all the entities or processes that assist human life in various ways, but cannot be considered essential for the physical survival of life on this planet. It includes social systems, language, technology, economic system, education, and various aspects of human civilization. Although we can survive physically, without these entities the life will be largely in wild or natural form. "Non-essential life-assisting

environment” is also known as “anthropogenic environment”, “social environment”, “man-made environment”, or “built environment”.

## Classification on basis of life

- 1) The natural surroundings of an organism, both living and physical are its environment. Physical objects like land and manmade object, light and other forms of energy, water, air etc. which surround us, are our physical environment. It is classified as “abiotic” environment.
- 2) Humans, other animals, plants and microbes surrounding us comprise our living environment. It is classified as “biotic” environment.
  - i) What are constituents of environment?
  - ii) Define types of physical environment?
  - iii) What is biotic and abiotic environment?

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## 1.4 Importance of environment

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The importance of environment studies can be judged with the fact that earth is the only planet known to support life. It is a rare place in known universe with delicate balance of optimum temperature, radiation, atmosphere and water to support life. Also on earth the resources are limited. This applies to all components of environment, coming in stress to the point of crisis due to recent exponential development. Examples are water crisis, energy crisis, agricultural crisis, housing scarcity, and practically scarcity of almost all natural resources.

Also the issue of pollution is important, be it air pollution, water pollution, toxic landfills, noise pollution, etc.

The health issues arising out of pollution and climate change are affecting the majority population of the world. Smog is regularly affecting north India every winter and affecting health of millions of people. We are in constant danger of environmental disasters like Bhopal gas tragedy, Endosulfan tragedy in Kerala, Chernobyl reactor leak, Fukushima reactor leak etc. We yet not able to understand fully the health implications of these disasters many of which occurred several decades back.

The new infectious diseases starting from AIDS epidemic followed by Ebola, MERS, SARS and now ongoing COVID 19 pandemic, are challenging the very existence of mankind. They are also raising serious questions on our unsustainable lifestyles and bringing into focus the perils of rapid globalization. The advances in transportation industry have not only contributed to pollution but also blown local environmental phenomenon into global one. In future environmental sciences may become an integral part of epidemiology for managing health disasters like the current COVID crisis.

With the advancement in fields of satellite imaging and computations now it has become possible to predict the fickle weather systems within reasonable limits. This has greatly helped aviation, shipping sectors and fishing a lot. It has also helped a lot in managing disasters.

At the same time human activities have interfered a lot in weather phenomenon bringing into play new variables into an already uncertain system. Hence environmental sciences are going to play a major role in metrology in future.

The rapid and indiscriminate development in past century has made the study of environment very important for all disciplines. Environmental sciences involves multiple disciplines, like Biology, Geology, Chemistry, Physics, Engineering, Sociology, Health, Anthropology, Economics, Statistics, Philosophy, Ecology. The importance of environmental sciences is for all of them.

### **The objectives of environmental sciences are**

1. Comprehensive knowledge of environmental issues and how they affect us and what is our role in them.
2. Understanding pollution and its implications. To create a pollution-free environment (that is, clean air, water, land, and food) by adopting different methods of preventing and controlling pollution.
3. Optimal utilization and conservation of our natural resources such as water, forest, minerals, and fossil fuels. Reducing wastage and recycling.
4. Adopting eco-friendly lifestyles by knowing environmental implications of one's activities, preventing and controlling pollution, and utilizing the resources efficiently and minimizing wastages.
5. Encouraging eco-friendly industries by adopting clean and efficient technologies and installing pollution control systems.
6. Solving critical global environmental issues like global warming, climate change, ozone-layer depletion, desertification, and energy crisis by using interdisciplinary knowledge and approach.
7. Sustainable developments by ensuring equal distribution of natural resources in all classes and conserve the natural resources for future generations, as well as by conserving delicate nature in every way possible.

### **The importance of the subject can be summed in three burning issues:**

1. International importance of environmental issues especially pollution: environment issues like global warming and ozone depletion, acid rain, marine pollution and biodiversity must be tackled with international efforts and cooperation. These cannot be solved by the efforts of single society region or nation.
2. Problems due to unsustainable development: Recent uncontrolled development, led to Rapid unplanned Urbanization, Unregulated Industrial Growth, Clogged Transportation Systems, Unsustainable Agriculture and Housing problems for masses etc. Developed world has phased out these issues locally. However to cleanse their own environment they managed

to move the 'dirty' factories to developing nations. Rapid skewed unequal growth is an enormous issue for the developing nations and is also affecting developed world to some extent.

3. Explosively increase in population: In the developing world especially India population explosion is biggest issue. India with 16 per cent of the world's population and only 2.4 per cent of land area exerts a very heavy pressure on the natural resources including land and scarce water. Agricultural experts have recognized soil health problems like deficiency of micronutrients and organic matter, soil salinity and damage of soil structure. Water crisis is a major issue not only in India but many developed nations as well.

### Future avenues

- Disaster management.
- Assessment of impact on epidemiology of both infectious and non-infectious diseases.
- Occupational health.
- Assessment of environmental changes in weather.

We should understand that development of environmental science is still in nascent phase and applications both academic and practical shall be far greater than what we currently use it for.

More than any discipline environmental studies has a major role of public awareness. That's why it has become subject right from pre-school up to university. People have to be made aware of changes around them. How the environmental changes affect their lives? How their actions are contributing to the disastrous changes in environment? What is the cost of inaction? How they can contribute in improving environment? Ultimately only collective action of whole mankind can only stop the downward spiral of changes occurring to our environment. And nobody can escape the ill effects of this biggest man-made disaster.

Governments across the world are now focusing on this issue more seriously than ever. Indian government has a separate ministry for Environment and separate green tribunal for the same. Both are contributing in not only direct efforts to conserve environment but government is taking numerous steps to educate public about the environmental pollution and resource crisis. State governments are also acting vigorously in this field.

Intergovernmental panels like United Nations Environment Programme (UNEP) and IPCC are co-coordinating between all nations on this sensitive issue.

### Check your progress

- 1) What are objectives of studying environmental sciences?
- 2) Mention the important issues in environmental sciences.

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## 1.5. Scope of Environmental Sciences

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Environmental sciences knowledge is of tremendous use in most of the areas of development. These areas are studied as scope of the subject. Environmental science has a vast scope since it covers a wide range of subject matters or issues related to our complex life-supporting systems. The areas of applicability define the career opportunities related to the subject.

Major areas of applicability of the subject are

- management of natural resources, water crisis, energy crisis,
- conservation of ecosystem and biodiversity, desertification
- prevention and control of pollution, including climate change, ozone layer depletion
- managing development in terms of population, urbanization, health

In last few decades, environmental science is considered important for many economic activities. This has given rise to job opportunities in this field.

**Major career options related to the subject are as follows:**

I. Industries: Industries need to comply with numerous environmental norms. Hence, environment experts are required to guide the industries for controlling pollution, adopting clean technologies, proper waste disposal, and carrying out environmental audit. CPCB and norms of green tribunal and other legal bodies and authorities are being implemented vigorously in industries and they need experts for the same.

II. Consultancy: Environment consultancies are hired by various government bodies, industries, advocacy and rights groups and NGOs for carrying out different types of field-based studies, laboratory based analyses or, population studies; which are often required in environment impact assessment (EIA) and other compliance processes. Environment is becoming important issue for litigation and all parties need help for the same.

III. Research and development (R&D): R&D opportunities in this area include studying pollution in detail and its implication on environment and humans. Various governments industries and NGOs bodies are supporting the research in this field as it is the biggest issue of this millennium. Enormous funding is also being done for the development of clean and efficient technologies for future.

IV. Academics: Environmental science is taught at every level of education, from school to university level. A large number of teachers or academicians are required for this purpose. Environmental studies are now being focused right from primary education.

V. Green marketing: Environmental quality certifications like ISO-14000 are also being incorporated in marketing strategy—this creates many career opportunities. Many eco-friendly products are being promoted in market, experts are required to create awareness in public about them.

VI. Media: Mainstream print and electronic media requires experts to report and analyse environmental issues to generate awareness about the environment, hence there is an immense

need for skilled manpower in this field. Dedicated green media have come up in form of magazines and newspapers, who regularly publish articles on environmental theme, for example, Down to Earth, a magazine published by Centre for Science and Environment.

VII. Green advocacy: Environmental lawyers are emerging as major players in ensuring proper implementation of environmental norms, laws, and programmes. Public Interest Litigation (PIL) empowers a common man to fight against any anti- environment activity.

VIII. NGOs: These days, most of the environmental programmes are being implemented through NGOs, with the help of funds from national and international agencies. Green-peace, IPCC, WWF, CSE, CEE, TERI, Tarun Bharat Sangh, and Vatavaran are some examples of environmental NGOs. Uttarakhand has many environmental groups like Uttarakhand sewanidhi (USKN), CHIYA etc. Uttarakhand is home to historic Chipko andolan in pre-independence era.

IX. Government jobs: A number of conventional jobs are available in government bodies such as environmental ministry, pollution control boards, national parks, and biosphere reserves.

X. International agencies: Various international agencies such as UNEP, IUCN, TSBF, and World Bank require qualified human resources to implement environment-related projects.

XI. Environmentalism: Though not a direct employment scope but environmentalism is much bigger movement across world to conserve our planet, its wildlife, natural resources. It is addressing the major issues affecting people like pesticide use, air pollution, water pollution, solid waste disposal, water crisis, energy crisis, radiation and other environmental crisis. There is a constant pressure by environmentalists on all major governments and international forums to act now on this issue. They have achieved major success in form of Davos summit resolutions, etc to bring a consensus on environmental action. But a lot is still required to bring the change required for life to continue on this planet.

We must understand that we not only studying environmental sciences for just a career or academics; but for larger issues pertaining to our health and for the very sake of survival of future generations.

XII. Environmental ethics: In the era of rapid development and to provide a better lifestyle for masses, several ethical questions arise when there is always an environmental cost to pay. We all are aware that environment has to be protected, but at the same time there are harsh social, economic and political realities. We have to provide food, water, housing and basic infrastructure to masses. A minimum quality of life has to be provided to the citizens by a responsible social government. Hence ethical issues arise and have to be addressed each time. We have to develop constantly, with due concern to climate change, preserving biodiversity, reducing pollution. There are multiple unanswered questions, which we have to address in almost every public infrastructure project as regards to environment. Fortunately in India we are establishing bodies/authorities to answer the same.

**Check your progress**

- 1) What are the areas of application of environmental sciences?
- 2) What are career avenues in field of environmental sciences?
- 3) What is environmentalism?

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**1.6. Summary**

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In this unit you have learnt that we need require a holistic knowledge about working of our environment supporting life on this planet and thorough understanding the changes causing problems. We need the knowledge to answer several serious environmental issues have become a focal point of the scientific community. These are mainly pollution leading to global warming, ozone layer depletion, acid rain; and deforestation leading to water crisis, desertification, global warming; also rapid population growth leading to depletion resources.

Environment is the physical, chemical and biological world that surrounds us, as well as the complex of social and cultural conditions affecting an individual or community. We have also learnt that we can study this interdisciplinary academic field by integrating various academic fields (particularly sciences) to study the structure and function of our life-supporting environment and to understand causes, effects, and solutions of different environmental problems.

We have learnt about Environment, Ecology and Ecosystem and their co-relation. Ecology is the branch of biological science concerned with the relationships and interactions between living organisms and their physical surroundings or environment.

We have classified environment physical elements, and more importantly as biotic and abiotic environment. We learnt that environment can be classified as local systems. For the purpose practicality the most important classification is “essential life-supporting biophysical environment” and “non-essential life-assisting environment”.

Understanding environment is important for supporting life on earth. We have to understand and find solutions for the problems of pollution, resource crisis and population growth. The drastic climate change needs to be addressed to sustain life on this planet. Only public awareness and action with state and international support can solve the serious environmental issues we are facing.

The scope is unlimited not only in career options like Academics, industries, research and development, media, NGOs, marketing, government and international jobs; but more importantly in making public aware about the rapid environmental changes. Only by proactive environmentalism we can save our environment to protect our health and life of our future generations. Environmental ethical questions need to be answered in development projects related to needs of masses.

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## **1.8 GLOSSARY**

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Abiotic factors - Physical Objects like land and manmade object, light and other forms of energy, water, air etc. which surround us, and the elements/compounds found in them.

Atmosphere – Gaseous envelope around the earth, the air. It has many gases out which N<sub>2</sub>, O<sub>2</sub>, CO<sub>2</sub> and water vapour are most important.

Biosphere – All parts of earth where the living organisms live.

Biotic factors – Living organisms in environment or ecosystem, like animals including humans, plants and microbes.

Demography – Study of populations.

Desertification – The process of desert formation, it is manifested by permanent loss of plant cover in a region, and the loss of capacity of the land to support plant growth.

Ecology – It is the branch of biological science concerned with the relationships and interactions between living organisms and their physical surroundings or environment.

Ecosystem – Entity arising out of functional interaction of biotic components with abiotic components of environment.

Environment - The physical, chemical and biological world that surrounds us, as well as the complex of social and cultural conditions affecting an individual or community.

Epidemic – Large sudden outbreak of a infectious disease in a community.

Epidemiology – The branch of medicine which deals with the incidence, distribution, and possible control of diseases and other factors relating to health.

Fauna – The collective term for all animals in a given ecosystem or environment.

Flora - The collective term for all plants in a given ecosystem or environment.

Hydrosphere – The portion of earth having water in liquid or solid form.

Lithosphere – Solid rocky crust of earth.

Metrology - Study of measurement, or study of weather.

Pollution – Man made unfavourable changes in the natural environment which are harmful to the life on earth.

Organism – The primary unit of life, any form unicellular or multicellular which can survive and reproduce.

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**Unit 2: Biological Diversity**

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**2.0 Learning Objectives**

**2.1 Introduction**

**2.2 Types of biodiversity**

**2.2.1 Genetic diversity**

**2.2.2 Species diversity**

**2.2.3 Ecosystem diversity**

**2.3 Importance of Biodiversity**

**2.3.1 Human Health**

**2.3.2 Agricultural**

**2.3.3 Wild Food Sources**

**2.4 Biodiversity of India and the world**

**2.5 Values of biological diversity**

**2.5.1 Direct values of biological diversity**

**2.5.2 Indirect values of biological diversity**

**2.6 Biodiversity and ecosystem functioning**

**2.6.1 Energy flow**

**2.6.2 Food chain and food web**

**2.6.3 Ecological pyramids**

**2.6.4 Nutrient cycling**

**2.6.5 Productivity**

## **2.7 Biodiversity Assessment**

### **2.7.1 Factors of measuring biodiversity**

### **2.7.2 Importance of Biodiversity Assessment**

## **2.8 Summary**

## **2.9 References**

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## **2.0 Learning Objectives**

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After studying this unit you will be able to explain:

- Introduction of biodiversity and its type
- Importance of the biodiversity
- Values of biodiversity
- Ecosystem components, structure, and functions
- Biodiversity assessment

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## **2.1 Introduction**

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Biodiversity originates from Greek word Bios means life and Latin word Diversitas means form or variety. It refers to different forms of life (plants, animals, fungi and microbes) on planet Earth. The term ‘biological diversity’ was coined by Thomas Lovejoy in 1980 and the term ‘biodiversity’ was coined by Walter G. Rosen in 1986 at National Forum on Biodiversity held in Washington (Sarkar, 2019). Biodiversity or biological diversity can range from smallest known life forms Nanobes with diameter 20-150 nm, smallest known bacteria (Unwins, 1999) to blue whale having length up to 110 feet and from extreme cold to extreme hot. Different form of life exists at any extreme conditions with which one can depict the range of diversity on the Earth. Biological diversity has no particular/standardized definitions. Different definitions were given from time to time to explain biodiversity. Biodiversity or biological diversity defined as the variation among different genetic, species and ecosystem levels in the biological system (Bartkowski et al., 2015).

“Biological diversity is defined as the variability among all the sources including, inter alia, land (terrestrial), marine and aquatic ecosystems and the ecological complexes of which they are part it includes diversity within species, between species and of the ecosystems”: Convention on Biological Diversity, 1992 (signed by United Nation Earth Summit held in Rio de Janeiro).

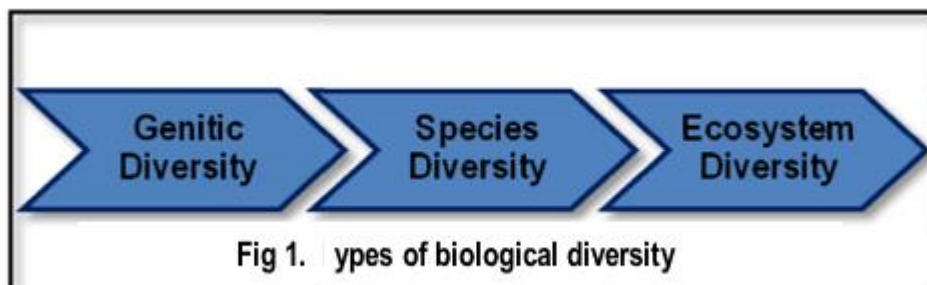
According to Noss (1990), “Biodiversity is not only the variability among genetic, species and ecosystem level in a defined area but it should also include the various inter-specific interactions, biogeochemical cycles and natural disturbances. It should include the range of diversity indices and quantitative factors along with quantitative factors should be considered as an indicator for biological disruption”. Biodiversity is defined as the abundance, number, composition, interactions, spatial distribution, population, species, communities and their functions, genotypic and phenotypic traits, landscape units in a biological system (Díaz et al., 2009). It is the interaction between different types of diversities like genetic, species and ecosystem diversity.

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## **2.2 Types of biodiversity**

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Generally, the biological diversity has three types, these includes genetic diversity, species diversity and ecosystem diversity (Fig. 1). The detailed description of genetic diversity, species diversity and ecosystem diversity are as follows:




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### **2.2.1 Genetic diversity**

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It refers to the variation in the genetic constitution within a species or within a population. Every organism in this world is different from another in their genetic material. For example, in humans even twins are not exactly similar in their genetic makeup and shows lots of diversity from one another. Likewise, genetic diversity of rice, barley, maize etc. shows variation in the same species. The same species shows difference in their genetic makeup, color, size aroma, shape and nutrient content. Due to the genetic diversity species are able to show adaptation and respond to the environmental changes. It is also helpful in evolution and speciation (Carvalho et al., 2019).

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### **2.2.2 Species diversity**

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It is the biological diversity at the most basic level. Species exists in large groups with different physical and biological characters. These species function individually or in a group in the food web. Species interact with each other through different interactions (competition, mutualism etc.) which collectively play an important role in ecosystem dynamics. Species diversity is measured by species richness and relative abundance (White et al., 2018).

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### **2.2.3 Ecosystem diversity**

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As you know that an ecosystem consists of both living and non- living components and their interactions with each other. Ecosystem diversity is defined as the diversity among different ecosystems in a region. For example, ecosystems like mountains, desert, grasslands, and mangroves show diversity. This type of ecological diversity is more stable and productive as they are capable to tolerate unfavourable environmental conditions (Brierley et al., 2016; Kumar et al., 2019).

- ❖ Diversity at the level of community and ecosystem exists along 3 levels
  - It could be within-community diversity (alpha diversity),
  - Between-communities diversity (beta diversity) or
  - Diversity of the habitats over the total landscape or geographical area (gamma diversity).
- ❖ Alpha, Beta, and Gamma Diversity

Whittaker (1972) described three terms for measuring biodiversity over spatial scales: alpha, beta, and gamma diversity.

- Alpha Diversity: It refers to the diversity within a particular area or ecosystem, and is usually expressed by the number of species (i.e., species richness) in that ecosystem.
- Beta diversity: A comparison of diversity between ecosystems, usually measured as the amount of species change between the ecosystems.
- Gamma diversity: A measure of the overall diversity within a large region. Geographic-scale species diversity according to Hunter (2002).

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## **2.3 Importance of Biodiversity**

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As you know, that loss of biodiversity may have reverberating consequences on ecosystems because of the complex interrelations among species. For example, the extinction of one species may cause the extinction of another. Biodiversity is important to the survival and welfare of human populations because it has impacts on our health and our ability to feed ourselves through agriculture and harvesting populations of wild animals.

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### **2.3.1 Human Health**

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Many medications are derived from natural chemicals made by a diverse group of organisms. For example, many plants produce compounds meant to protect the plant from insects and other animals that eat them. Some of these compounds also work as human medicines. Contemporary societies that live close to the land often have a broad knowledge of the medicinal uses of plants growing in their area. For centuries in Europe, older knowledge about the medical uses of plants was compiled in herbals— books that identified the plants and their uses. Humans are not the only animals to use plants for medicinal reasons. The other great apes, orangutans, chimpanzees, bonobos, and gorillas have all been observed self-medicating with plants.

Modern pharmaceutical science also recognizes the importance of these plant compounds. Examples of significant medicines derived from plant compounds include aspirin, codeine, digoxin, atropine, and vincristine. Many medications were once derived from plant extracts but are now synthesized. It is estimated that, at one time, 25 percent of modern drugs contained at least one plant extract. That number has probably decreased to about 10 percent as natural plant ingredients are replaced by synthetic versions of the plant compounds. Antibiotics, which are responsible for extraordinary improvements in health and lifespans in developed countries, are compounds largely derived from fungi and bacteria.

In recent years, animal venoms and poisons have excited intense research for their medicinal potential. By 2007, the FDA had approved five drugs based on animal toxins to treat diseases such as hypertension, chronic pain, and diabetes. Another five drugs are undergoing clinical trials and at least six drugs are being used in other countries. Other toxins under investigation come from mammals, snakes, lizards, various amphibians, fish, snails, octopuses, and scorpions.

Aside from representing billions of dollars in profits, these medications improve people's lives. Pharmaceutical companies are actively looking for new natural compounds that can function as medicines. It is estimated that one third of pharmaceutical research and development is spent on natural compounds and that about 35 percent of new drugs brought to market between 1981 and 2002 were from natural compounds.

Finally, it has been argued that humans benefit psychologically from living in a biodiverse world. The chief proponent of this idea is famed entomologist E. O. Wilson. He argues that human evolutionary history has adapted us to living in a natural environment and that built environments generate stresses that affect human health and well-being. There is considerable research into the psychologically regenerative benefits of natural landscapes that suggest the hypothesis may hold some truth.

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### **2.3.2 Agricultural**

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Since the beginning of human agriculture more than 10,000 years ago, human groups have been breeding and selecting crop varieties. This crop diversity matched the cultural diversity of highly subdivided populations of humans. For example, potatoes were domesticated beginning around 7,000 years ago in the central Andes of Peru and Bolivia. The people in this region traditionally lived in relatively isolated settlements separated by mountains. The potatoes grown in that region belong to seven species and the number of varieties likely is in the thousands. Each variety has been bred to thrive at particular elevations and soil and climate conditions. The diversity is driven by the diverse demands of the dramatic elevation changes, the limited movement of people, and the demands created by crop rotation for different varieties that will do well in different fields.

Potatoes are only one example of agricultural diversity. Every plant, animal, and fungus that has been cultivated by humans has been bred from original wild ancestor species into diverse varieties arising from the demands for food value, adaptation to growing conditions,

and resistance to pests. The potato demonstrates a well-known example of the risks of low crop diversity: during the tragic Irish potato famine (1845– 1852 AD), the single potato variety grown in Ireland became susceptible to a potato blight—wiping out the crop. The loss of the crop led to famine, death, and mass emigration. Resistance to disease is a chief benefit to maintaining crop biodiversity and lack of diversity in contemporary crop species carries similar risks. Seed companies, which are the source of most crop varieties in developed countries, must continually breed new varieties to keep up with evolving pest organisms. These same seed companies, however, have participated in the decline of the number of varieties available as they focus on selling fewer varieties in more areas of the world replacing traditional local varieties.

The ability to create new crop varieties relies on the diversity of varieties available and the availability of wild forms related to the crop plant. These wild forms are often the source of new gene variants that can be bred with existing varieties to create varieties with new attributes. Loss of wild species related to a crop will mean the loss of potential in crop improvement. Maintaining the genetic diversity of wild species related to domesticated species ensures our continued supply of food.

Since the 1920s, government agriculture departments have maintained seed banks of crop varieties as a way to maintain crop diversity. This system has flaws because over time seed varieties are lost through accidents and there is no way to replace them. In 2008, the Svalbard Global Seed Vault, located on Spitsbergen Island, Norway, began storing seeds from around the world as a backup system to the regional seed banks. If a regional seed bank stores varieties in Svalbard, losses can be replaced from Svalbard should something happen to the regional seeds. The Svalbard seed vault is deep into the rock of the arctic island. Conditions within the vault are maintained at ideal temperature and humidity for seed survival, but the deep underground location of the vault in the arctic means that failure of the vault's systems will not compromise the climatic conditions inside the vault.

Although crops are largely under our control, our ability to grow them is dependent on the biodiversity of the ecosystems in which they are grown. Crops are grown in soil and although some agricultural soils are rendered sterile using controversial pesticide treatments, most contain a huge diversity of organisms that maintain nutrient cycles— breaking down organic matter into nutrient compounds that crops need for growth. These organisms also maintain soil texture that affects water and oxygen dynamics in the soil that are necessary for plant growth. Replacing the work of these organisms is not practically possible. These kinds of processes are called ecosystem services. They occur within ecosystems, such as soil ecosystems, as a result of the diverse metabolic activities of the organisms living there, but they provide benefits to human food production, drinking water availability, and breathable air.

Other key ecosystem services related to food production are plant pollination and crop pest control. It is estimated that honeybee pollination within the United States brings in \$1.6 billion per year; other pollinators contribute up to \$6.7 billion. Over 150 crops in the United States require pollination to produce. Many honeybee populations are managed by beekeepers

who rent out their hives' services to farmers. Honeybee populations in North America have been suffering large losses caused by a syndrome known as colony collapse disorder, a new phenomenon with an unclear cause. Other pollinators include a diverse array of other bee species and various insects and birds. Loss of these species would make growing crops requiring pollination impossible, increasing dependence on other crops.

Finally, humans compete for their food with crop pests, most of which are insects. Pesticides control these competitors, but these are costly and lose their effectiveness over time as pest populations adapt. They also lead to collateral damage by killing non-pest species as well as beneficial insects like honeybees, and risking the health of agricultural workers and consumers. Moreover, these pesticides may migrate from the fields where they are applied and do damage to other ecosystems like streams, lakes, and even the ocean. Ecologists believe that the bulk of the work in removing pests is actually done by predators and parasites of those pests, but the impact has not been well studied. A review article found that in 74 percent of studies that looked for an effect of landscape complexity (forests and fallow fields near to crop fields) on natural enemies of pests, the greater the complexity, the greater the effect of pest-suppressing organisms. Another experimental study found that introducing multiple enemies of pea aphids (an important alfalfa pest) increased the yield of alfalfa significantly. This study shows that a diversity of enemies is more effective at control than one single enemy. Loss of diversity in pest enemies will inevitably make it more difficult and costly to grow food. The world's growing human population faces significant challenges in the increasing costs and other difficulties associated with producing food.

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### **2.3.3 Wild Food Sources**

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In addition to growing crops and raising food animals, humans obtain food resources from wild populations, primarily wild fish populations. For about one billion people, aquatic resources provide the main source of animal protein. But since 1990, production from global fisheries has declined. Despite considerable effort, few fisheries on Earth are managed sustainably. Fishery extinctions rarely lead to complete extinction of the harvested species, but rather to a radical restructuring of the marine ecosystem in which a dominant species is so over-harvested that it becomes a minor player, ecologically. In addition to humans losing the food source, these alterations affect many other species in ways that are difficult or impossible to predict. The collapse of fisheries has dramatic and long-lasting effects on local human populations that work in the fishery. In addition, the loss of an inexpensive protein source to populations that cannot afford to replace it will increase the cost of living and limit societies in other ways. In general, the fish taken from fisheries have shifted to smaller species and the larger species are overfished. The ultimate outcome could clearly be the loss of aquatic systems as food sources.

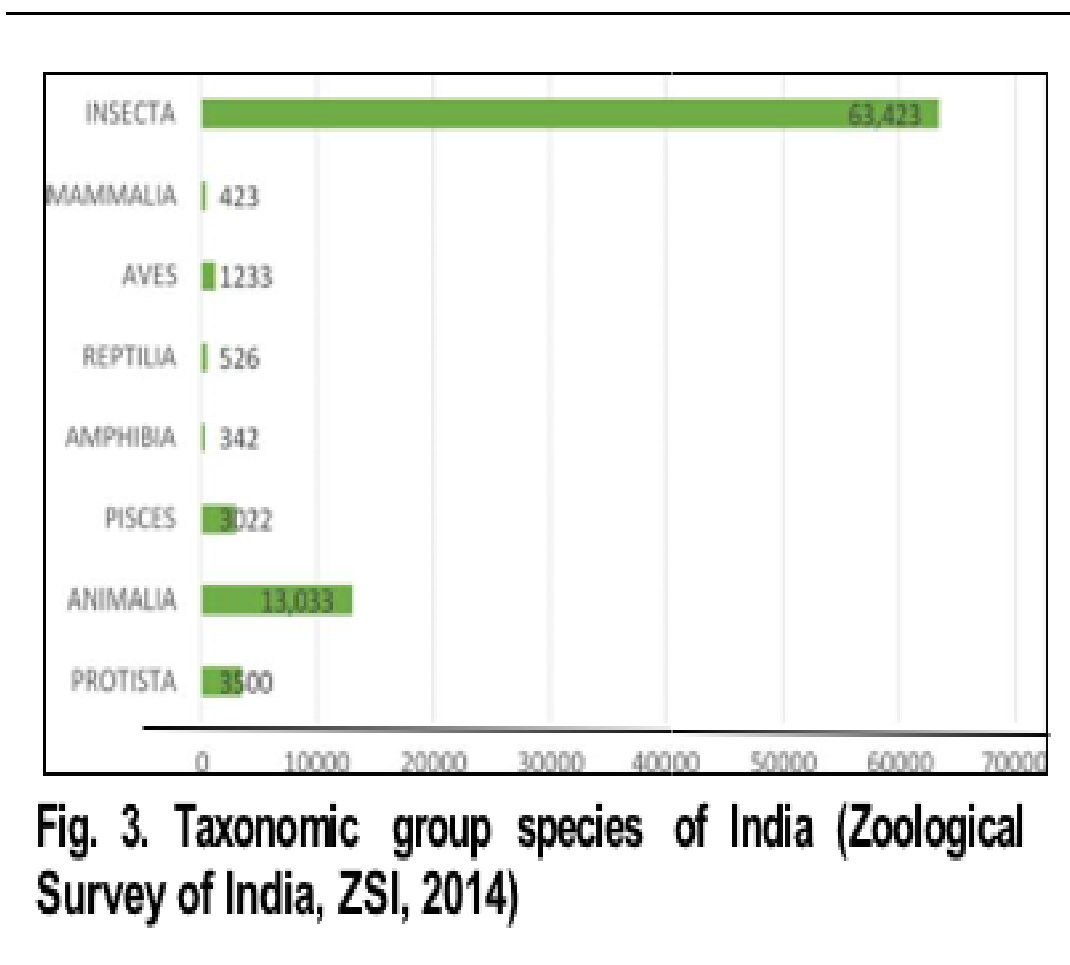
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## **2.4 Biodiversity of India and the world**

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India consists of 10 major bio-geographic zones and 27 bio-geographical provinces based on their distinctive biota. One biotic province or bio-geographical province is different

from another in their flora and fauna composition (Table 1). There are over 8.74 million species of eukaryotes on world’s land and about 2.21 million species of eukaryotes in ocean water while approximately 10,000 species of prokaryotes on land and out of which 1300 are marine prokaryotes predicted on Earth. There are about 7.7 million species of animals and over 300,000 species of plants (Mora et al., 2011). In this world there are about 1,399,189 species which belongs to kingdom Animalia and in India over 92,873 species belong to this kingdom which constitute 6.64% (ZSI, 2014). There are about 317,950 plants species present in this world. In India there are over 29,015 plant species with 9.13 percent (BSI, 2013). Total number of Insecta, Mammalia, Aves, Reptilia, Pisces, Animalia, Protista in India and the world is given in Fig. 2 and 3. There are about 7200 species of Algae, 2500 species of Bryophytes, 1269 species of Pteridophytes, 75 species of Gymnosperms and over 18,000 species of Angiosperms. About 9.13 percent floral diversity is found in India and Angiosperms contributes to over 27% (Fig. 4)



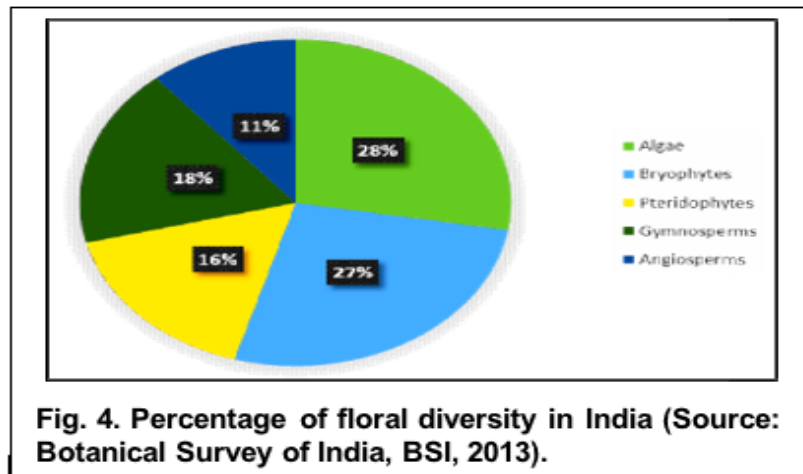


Fig. 4. Percentage of floral diversity in India (Source: Botanical Survey of India, BSI, 2013).

Table 1. Distribution of bio-geographic zones in India



Bio-geographic zone	Bio-geographic province
Trans-Himalayas	Ladakh mountains Tibetan Plateau Trans-Himalayan: Sikkim
Himalaya	North-Western Himalaya Western Himalaya Central Himalaya Eastern Himalaya
Indian desert	Kutch Thar Desert
Semi-arid	Punjab plains (semi-arid) Gujrat, Rajputana
Western ghats	Malabar Plains Mountains of Western Ghats



Deccan peninsula	Central Highlands Chotta Nagpur Eastern Highlands Central Plateau Deccan South
The Gangetic Plains	Lower Gangetic plains Upper Gangetic Plains
The Coasts	West Coast East Coast Lakshdweep
North-east India	Assam plains Shillong Plateau
Islands	Andamans - Nicobars

(Source: MoEF, 2009; Singh and Chaturvedi, 2017)

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## 2.5 Values of biological diversity

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Biological diversity plays a very crucial role for the survival of human beings on earth. The humans directly or indirectly depend upon biological diversity for fulfilling almost every need in their life such as food, energy, medicine, housing etc. Biological diversity helps to maintain the ecological balance (Dietsch et al., 2016). It provides various ecological services and vital for maintaining, preserving and restoration of various ecological process. Biological diversity is helpful in maintaining biogeochemical cycles, maintaining the flow of water bodies like river and streams all-round the year, soil formation, control in floods, prevention from soil erosion, circulation of air globally and its cleansing, nutrient recycling and life support of all the species. Following are the direct and indirect values of biological diversity (Seddon et al., 2016).

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### 2.5.1 Direct values of biological diversity

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(i) **Consumptive use value:** The consumptive use of values includes the direct consumption of resources without passing through the market. Biological diversity provides direct food, shelter, medicines, proteins, enzymes, fats, macro and micro nutrients, beverages, specimens for educational and scientific purposes, tourism and raw material for various commercial purposes (Thapa et al., 2020). For example, Aloe Vera is directly consumed for its medicinal properties, timber is used for fire and animals are consumed directly after hunting.

(ii) **Productive use value:** Productive use value is the value which put on marketable products. The different professionals from various fields studied biological diversity for its productive values. The agricultural scientist uses biological diversity for improving the yield and quality of crops. The biotechnologist studies different genetic properties of plants, animals and microbes. The best traits can be selected

from the organism with which new improved (disease resistant and high yield) variety of crops can be produced. It also helps to develop better livestock (high nutrient value and fast growth) (Jactel et al., 2018). Pharmacist use biological diversity as a raw material for the production of various plants based and animals- based drugs.

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### 2.5.2 Indirect values of biological diversity

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(i) **Social values:** From the ancient time people used to protect biodiversity for their needs. Ancient people used to value biological diversity especially in India, people worship various plants, animals, water bodies, stones and mountains as they are helpful for their survival and have high esteem. Earlier needs were few as less population so most of biological diversity is conserved (Griffiths et al., 2019). Still many tribal people directly depend on forests for their daily needs. Many indigenous people are helpful for conserving biological diversity as they used to cut only old tree branches for wood and only the leaves of young trees are used only for livestock. Modern people are least concerned about the conservation of biological diversity.

They only care about their own usage and try to grab it as much as one can at once and exploit it which sometimes leads to irreversible loss (Evers et al., 2018).

(ii) Ethical and moral values: It is the moral duty of human beings to conserve biological diversity. Planet earth belongs to every species in this world and humans have no right to harm any species if it is of no use to them. Ethical values are related to conservation of biological diversity from animal trafficking, smuggling, illegal activities like cloning, inhuman treatment with animals, biopiracy, unauthorized animal testing, poaching, desertification and uncontrolled deforestation (Antonelli and Perrigo, 2018). To meet the high demand of resources due to population explosion benefits are given more importance rather than ethics and moral values.

(iii) Aesthetic values: Biological diversity is secret for the beauty of our planet. The different kinds of plants, animals, flowers and birds provide great aesthetic value. Various recreational activities are linked to it like bird watching, butterfly parks, river rafting, national parks, aquarium and botanical gardens (Collins et al., 2017).

(iv) Economic values: Biological diversity has a great economic value; food is the basic necessity which is the product of it. The agricultural sector, various industries depend upon biodiversity products. The revenue generated from biodiversity products is essential for the growth of any country (Hanley et al., 2015).

(v) Scientific values: Various research work has been done on many species of plants, animals, insects etc. and many has to be done to attain knowledge. This scientific knowledge can be utilized for the things which of great value to human beings (Titley et al., 2017). During the COVID-19 pandemic we have learned various lessons for conservation of biodiversity. An enzyme used in COVID-19 testing is extracted from a bacterium, *Thermus aquaticus* which was discovered in a geyser in Yellowstone National Park, US (Buchanan, 2021).

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## **2.6 Biodiversity and ecosystem functioning**

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The way we study, the external and internal morphology and physiology for understanding the structure and functioning of an organism and its life processes, similarly we can understand the ecosystem by studying the structural and functional attributes of all its living (biotic) and non-living (abiotic) components. Closely-linked structural and functional attributes are critical for the continued operation of an ecosystem and their integrated understanding provides a complete conceptualization of the ecosystem dynamics. An ecosystem has a function; each component plays a specific function while summed up functions of all components defines ecosystem function on a whole. Importantly, function means showing activity, and does not imply that organisms perform purposeful roles in ecosystem-level processes. Ecosystem functioning reflects the collective life activities of plants, animals, and microbes and the effects these activities (feeding, growing, moving, excreting waste, etc.) have on the physical and chemical conditions of their environment. A functioning ecosystem exhibits biological and chemical activities characteristic for its type. For instance, a functioning forest ecosystem exhibits rates of plant production, carbon storage, and nutrient cycling that are

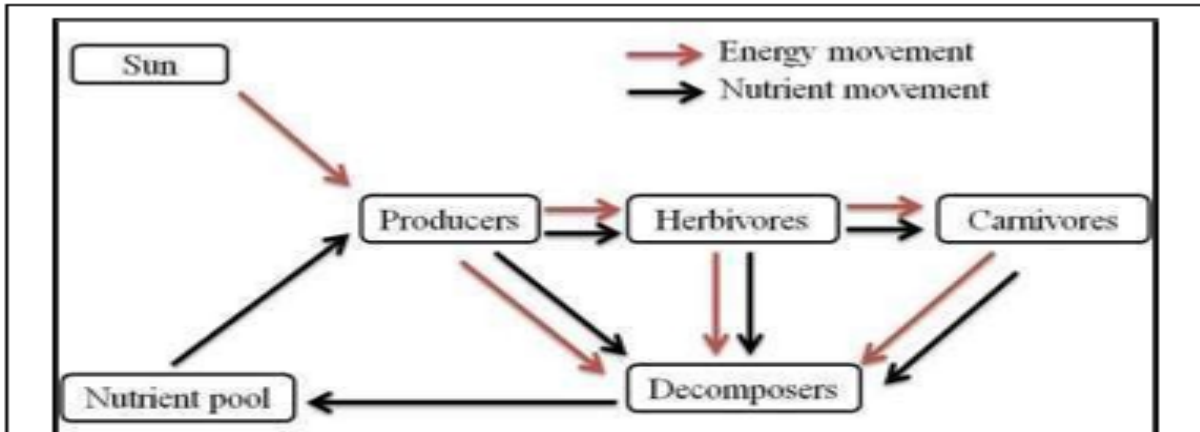
characteristic of most forests. If the forest is modified to an agroecosystem, its functioning changes. The concept of “ecosystem function” is based on a perspective that focuses on the whole system and the functional roles played by each component within it. However, the normative concept of ecosystem functioning also extends towards societal interests. Giller et al. (2004) characterize ecosystem functioning by three categories of ecosystem functions, namely, ecosystem processes, ecosystem properties, and ecosystem values (composed of ecosystem goods and services). To exemplify, ecosystem function of a lake ecosystem refers to processes and the causal relations that give rise to an ecological system, the role of organisms within it, the interactions between organisms of different species, overall processes that sustain it, long-term dynamics of different populations, overall biomass of the system, flow of energy and nutrients within it, and finally to the services it provides to human beings or other organisms.

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### **2.6.1 Energy flow**

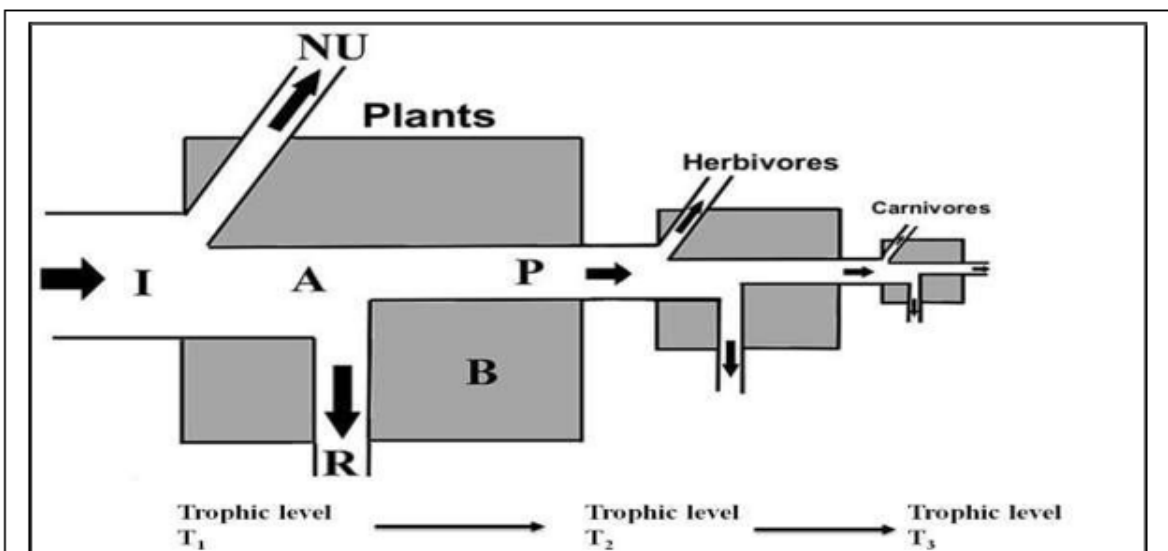
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In an ecosystem, there is a continuous interaction between plants, animals, and their environment to produce and exchange materials. The energy needed for this cycling of materials comes from the sun. Green plants, or producers, or autotrophs fix the solar energy into chemical energy. In this stored form, other organisms take the energy and pass it on further to other organisms. During this process, a reasonable proportion of energy is lost out of the living system. The whole process is called flow of energy. An ecosystem may be comprehended of any dimension, where the living and non-living systems are involved in a continuous flow of energy. The functional processes in an ecosystem are closely related to its structure and vice-versa. For instance, the flow of energy is based on trophic or food and feed structure of the ecosystem (producers- plants; consumers herbivores, carnivores, and omnivores; decomposers- microbes). Energy flows from sun to primary producers, to herbivores and then to different levels of carnivores are generally termed as trophic levels/trophic structure of the ecosystem. The flow of energy is unidirectional and non-cyclic (Fig. 5).



**Fig. 5. A schematic representation of energy and nutrient movement in ecosystems. Energy flow is unidirectional and non-cyclic, whereas nutrient movement is cyclic**

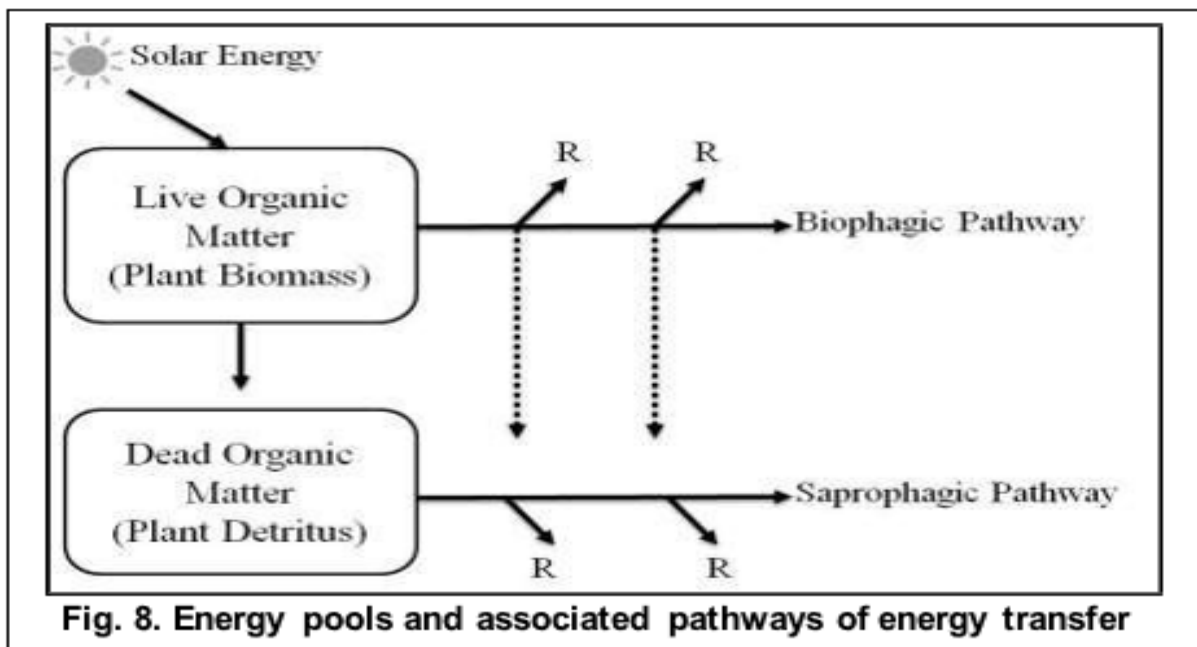
An energy flow model or energy flow diagram is a representation of trophic levels linked with each other showing the inputs and losses of energy incurred during energy transfer at each trophic level (Fig. 6). Lindeman firstly proposed such a model in 1942 assuming that plants and animals can be arranged into trophic levels; and laws of thermodynamics hold for energy transfer from one trophic level to the other.



**Fig. 6. An expanded three link energy food chain (1. Plants, 2. Herbivores, and 3. Carnivores) illustrating the relationship between food flow diagrams and energy transfer. The transfer of energy becomes degraded, dispersed, and diminished as the energy within a food chain flows from one trophic level to the other. Abbreviations: I=input, A=assimilation, R=respiration, NU=not utilized, P=production, B=biomass**  
 (Source: <https://upload.wikimedia.org/wikipedia/commons/c/c5/EnergyFlowTransformity.jpg>)

According to Raymond Lindeman (1942) “ten percent law”- during the transfer of energy from one trophic level/structure to another trophic level, only about ten percent of the energy is utilized. The remaining energy is lost during transfer, broken down in respiration, or lost to incomplete digestion by higher trophic levels. In a “universal “model of energy partitioning in the individual or species population, living structure or biomass is represented as a box (Fig. 7). Usable part of the ingested energy, I (light in case of autotrophs and food in case of heterotrophs) is assimilated, A while unusable part is ejected, NU. A large portion of assimilated energy must be respired, R to provide existence energy to keep the body functioning and repaired. A part of energy can be used for growth and reproduction, P, while a part can be stored, S to accept further inputs of energy. Energy partitioning between P and R is of vital importance to the individual and species.

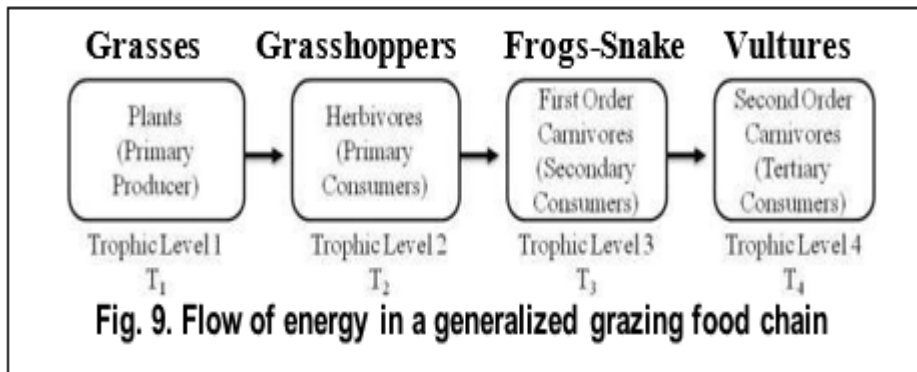
Primary producers convert the energy derived from sun into chemical energy in the form of food. This creates two major kinds of energy pools, the living organic matter (plant biomass) and the non-living organic matter (plant detritus). These pools form the base of two major pathways of energy transfers (Fig. 8).



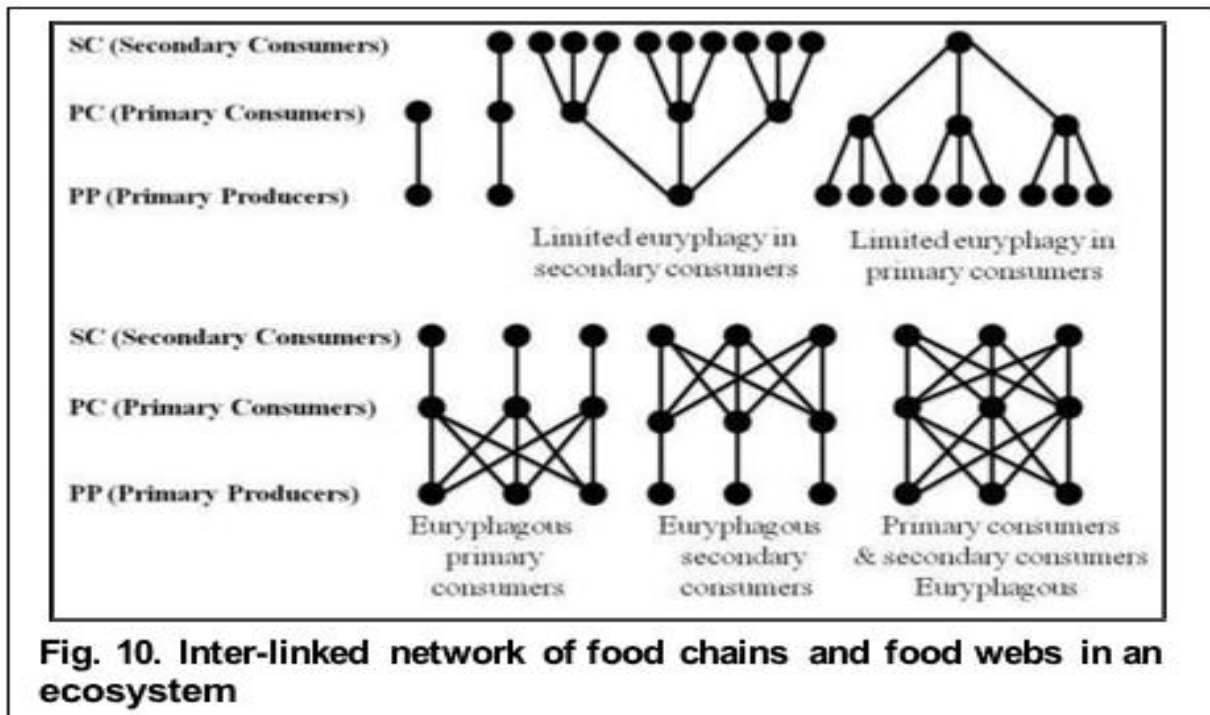
The biophagic or grazing pathway comprises the ingestion of living organic matter by herbivores, while in the detritus or saprophagic pathway, detritus is consumed by the detritivores or saprovores. Organisms following the biophagic pathway constitute biophagic subsystem, and those that follow saprophagic pathway comprise the decomposition subsystem in an ecosystem. All heterotrophic organisms depending on food produced by autotrophs (primary producers) are called secondary producers and the organic matter synthesized by them constitutes secondary production.

**2.6.2 Food chain and food web**

A large number of microscopic phytoplanktons and other macrophytes perform the primary job of energy fixation. They, the primary producers are eaten by herbivores, which are further eaten by carnivores or predators in different ecosystems. The transfer of energy fixed by plants through a series of organisms eating one and being eaten by other is called food chain. A typical example of a food chain can be traced in a grassland ecosystem as shown in Fig.9.



However, the food relations are not so simple; rather they are complex. The trophic relationship between organisms of any ecosystem is not always in a simple chain-like fashion but forms a complicated network. This net-like trophic inter-relationship is called a food web. Since several species may occur in each of the trophic levels, the organisms that feed on a common set of organisms and are fed on by another common set of organisms are referred to as trophic species (Briand and Cohen 1984). The analysis of food webs is important to understand ecosystem dynamics in terms of limited euryphagy and euryphagous primary and secondary consumers (Fig. 10). According to Paine (1980), three types of food webs can be depicted, namely, connectedness webs- based on the concept of ‘who eats whom’, emphasizing the feeding relationships, energy flow food webs- where energy flow through the food web is estimated and quantified by the flux of energy between a resource and its consumer, and functional food webs- developed the idea of functional food webs on the basis of impact of species on the structure of community. The food webs have also been described as source webs- refer to one or more kinds of organisms that eat them, their predators, and so on, sink webs- refer to one or more kinds of organisms, the organisms they eat, their other prey, and so on

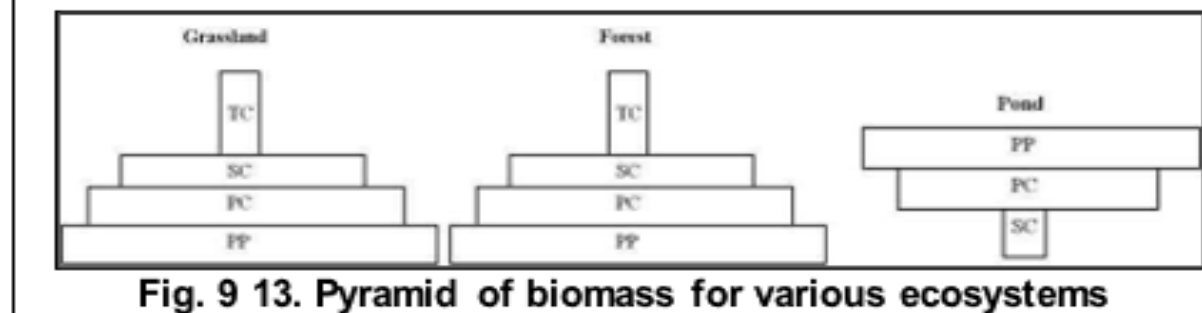
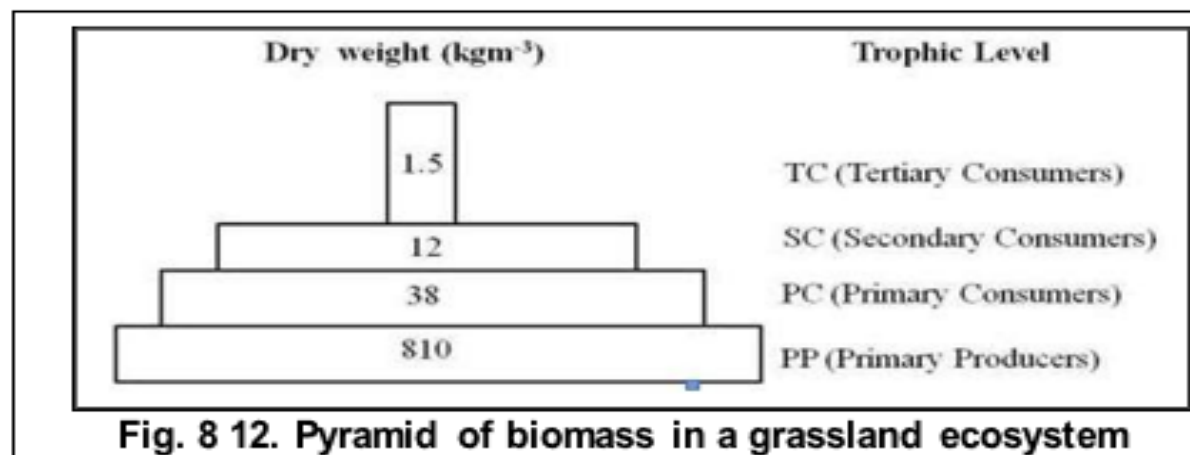
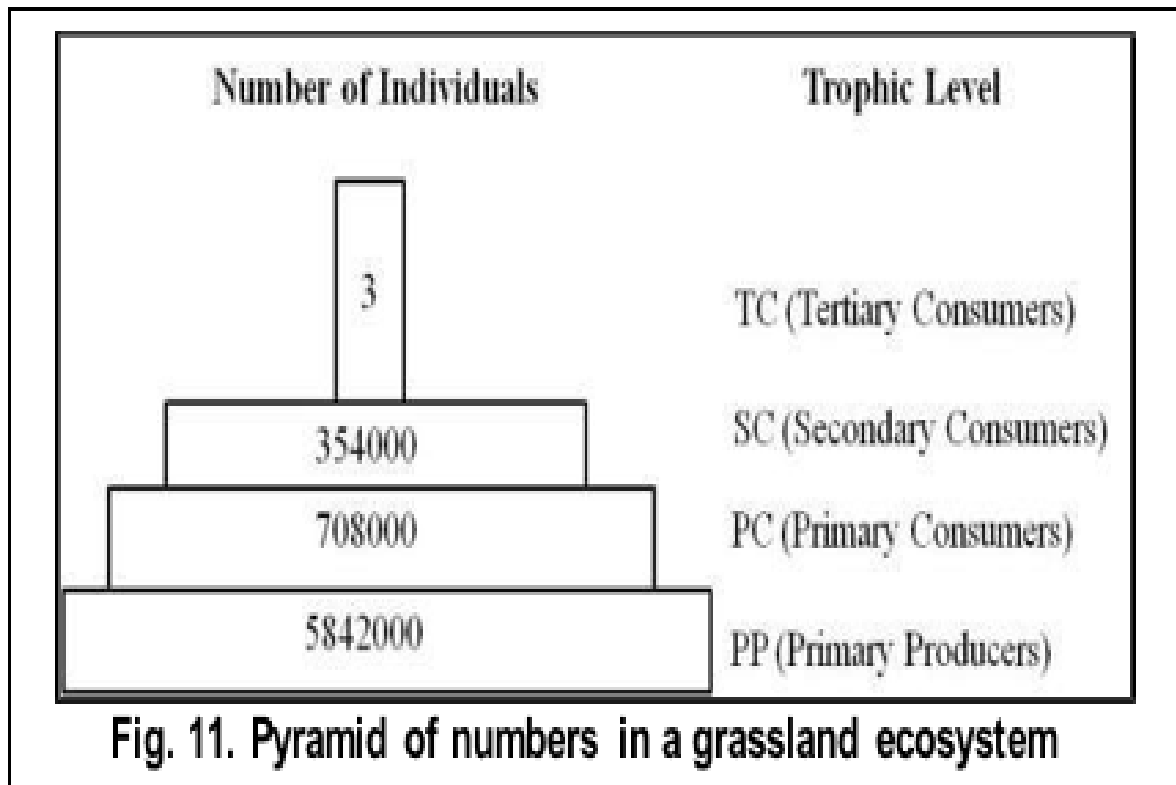


**Fig. 10. Inter-linked network of food chains and food webs in an ecosystem**

(descending trophic levels), and community webs- represents a group of species within a defined area of habitat.

### 2.6.3 Ecological pyramids

There exists a relationship between the numbers, biomass, and energy contents of the primary producers, first and second order consumers, and so on to the top carnivores in any ecosystem. Such relationships represented in diagrammatic ways are referred to as ecological pyramids. Ecological pyramids are of three categories, namely, of numbers, of biomass, and of energy or productivity. Ecological pyramid of numbers and biomass may be upright pyramidal, inverted pyramidal or of any other shape, but the pyramid of energy is always upright pyramidal or triangle- shaped. Pyramid of numbers is the one in which individuals at each of the successive trophic levels are counted per unit area and their numbers are plotted (Fig. 11), pyramid of biomass, in which the total biomass existing at each of the successive trophic levels is measured in terms of dry weight or caloric value, per unit area and plotted (Fig. 12 & 13), while pyramid of energy or productivity, in which the energy flow per unit time at each of the successive trophic levels is measured and plotted (Fig. 14). The pyramid of energy flow is considered the one of fundamental significance as it illustrates the actual functional relationships between the trophic levels. Being governed by the second law of thermodynamics, energy flow declines from the producer level to successive trophic levels. Consequently, the pyramid of energy necessarily undertakes a typical upright pyramidal shape, reflecting a stepwise decrease in energy or productivity towards increasing trophic level. However, the shape of the pyramid of energy is not affected by size or rate of metabolism of organisms, while the other two pyramids are affected.



Animals may have larger biomass per unit area than plants, but their production per unit time per unit area would be much smaller than that of plants. An energy pyramid is a

presentation of the trophic levels in an ecosystem. Energy from the sun is transferred through the ecosystem by passing through various trophic levels. Roughly 10% of the energy is transferred from one trophic level to the next, thus preventing transfer to a large number of trophic levels (see Fig. 14). There must be higher amounts of biomass at the bottom of the pyramid to support the energy and biomass requirements of the higher trophic levels (see Fig. 15).

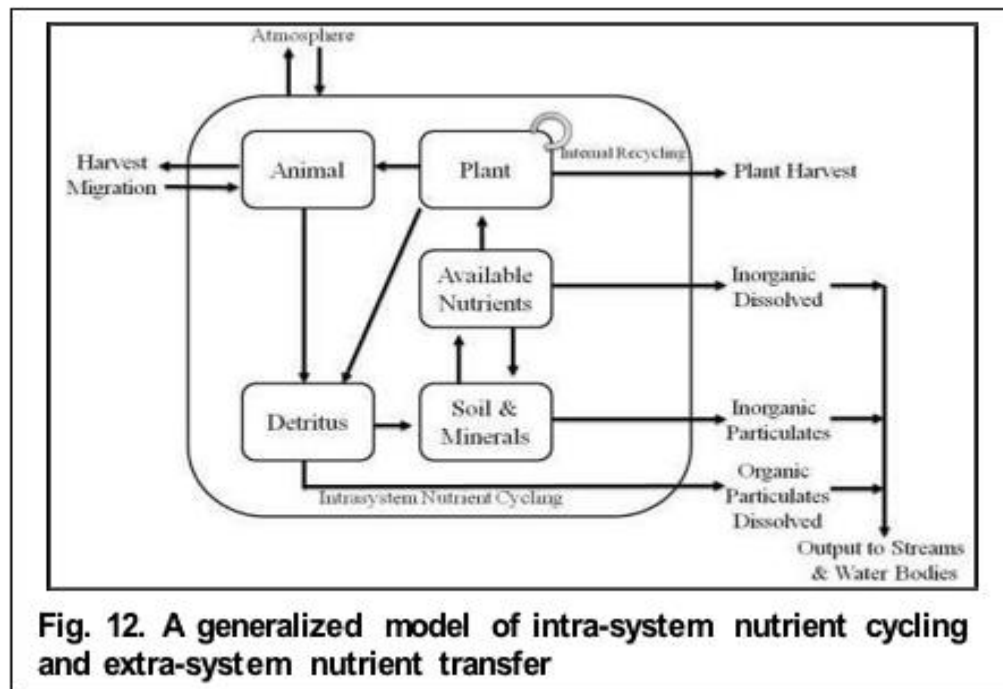
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#### 2.6.4 Nutrient cycling

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The two processes proceed concurrently in ecosystems, the unidirectional flow of energy and the cycling of nutrient elements. Life sustenance is not only dependent on energy but also on the availability of key elements important for different life processes. Importantly, flow of energy is unidirectional and non-cyclic, whereas the movement of nutrient elements is cyclic. The conversion of radiant energy into chemical energy during photosynthesis, various inorganic elements and compounds are incorporated into the protoplasm of producers. The notable ones include the direct components of photosynthetic reaction, carbon dioxide, water, and those that are critical for protoplasmic synthesis viz. nitrogen, phosphorus, sulfur, magnesium (macronutrients), and other essential nutrients needed in small quantities (micronutrients). In the process of consumption of green plant, not only stored chemical energy in the form of carbohydrates, fats, and proteins is transferred to the herbivores, but nutrients are also transferred. Similarly, both, energy and nutrients are transferred from herbivores to carnivores and from the preceding trophic levels to the decomposers. Thus, the flow of energy and nutrients goes hand-in-hand in an ecosystem in a broadly similar pattern. Although, there is a progressive decrease of energy in a food chain, the nutrients are not diminished. Eventually, nutrient-containing protoplasm is subjected to decomposition that releases nutrients in the environment and makes them available for reuse and recycling. The nature of the nutrient cycling process is closely inter-twined with the interaction of physical, chemical, and biotic factors in an ecosystem. Ecosystems, being open systems participate in various biogeochemical processes through a system of inputs and outputs. Broadly, there are two inter-related nutrient

budget systems in an ecosystem, namely intra-system cycling of nutrients and extra-system nutrient transfers (Fig. 16). The intra-system cycling is concerned with the circulation of nutrients through the biotic and abiotic compartments of an ecosystem. It involves the input and output along the different trophic levels and the exchanges between reservoirs and sediments of an ecosystem. However, the extra-system transfers pertain to the intake and output of the entire ecosystem in relation to other ecosystems.



### 2.6.5 Productivity

The pyramid of energy introduces a very important factor, i.e. the rate. The rate of energy fixation by green plants regulates the rate of production of organic material from simple inorganic substances in a given area over a given period of time. This rate of energy fixation and consequent increase in produced organic biomass is called primary productivity. Hence, the primary productivity can be defined as the primary fixation of radiant energy by plants in the form of organic substances and subsequent use of the fixed energy by herbivores, carnivores, and detritivores. Broadly, total amount of energy that is fixed by plants in a unit area in a given period of time is referred as gross primary productivity. A significant part of this energy is released during plant respiration for use in metabolic activities. Hence, net primary productivity is smaller because it is adjusted for energy losses required to support plant respiration and defined as the rate of storage of energy (or organic matter) in plant tissues when loss due to respiratory utilization by the plants is deducted out of the gross production rate. From producers, a portion of fixed energy gets transferred to heterotrophs that ingest living matter, while the remaining is converted to detritus pool to support those heterotrophs that feed on non-living organic matter. Within food webs, a pyramid-shaped structure characterizes ecological productivity. Plants typically account for more than 90% of the total productivity of the food web, herbivores most of the rest, and carnivores less than 1%. Various factors influence the rate and amount of energy fixation during photosynthesis viz. the availability of basic chemical components of photosynthesis (moisture, nutrients, dissolved substances, etc.), diurnal and seasonal changes in physical and biological factors, species diversity in an ecosystem, etc. Because of differences in the availabilities of different factors, the world's

ecosystems differ greatly in the amount of productivity that they sustain. Sustainable ecosystem relies on balance between the resource consumption and production. Unsustainable use of resources feeds back on itself and the ecosystem loses productivity in the long term.

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## **2.7 Biodiversity Assessment**

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Measures of biodiversity at the level of species or populations are directed towards the attainment of an index of the number of species and their relative abundances within a given landscape. In this section we examine measures of biodiversity at each of the three levels of biological organization: within species/genetic, species and ecosystem. As with most categorizations, there will be overlap among measuring techniques at the various levels of biodiversity.

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### **2.7.1 Factors of Measuring biodiversity**

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Biodiversity can be measured in different ways. Two main factors taken into account when measuring diversity are richness and evenness.

#### **(A) Measuring Diversity means**

- (i) Scales
- (ii) Richness
- (iii) Evenness
- (iv) Diversity

#### **(i) Scale**

- (a) Alpha Diversity: Diversity within a particular area, community or ecosystem.
- (b) Beta Diversity: Expression of diversity between habitats.
- (c) Gamma Diversity: it is a measurement of the overall diversity for different ecosystems within a region.

#### **(ii) Species richness**

- Is the number of different species in a habitat
- The more species the richer the habitat

#### **(iii) Species evenness**

- (a) Species evenness refers to how close in numbers each species in an environment is.
- (b) The uniformity of abundance between species in a community.
- (c) Measurement of equitability among species in the community

The greater the species richness and species evenness in an area, the higher the biodiversity

#### **(iv) Diversity indices**

A diversity index is a mathematical measure of species diversity in a community. Diversity indices provide important information about the rarity, commonness, relative abundance and community composition simply species richness.

- (a) Shannon-Wiener diversity Index: Species diversity is a function of the number of species present in a given area and the distribution of individuals among the species. The Shannon-Weiner index is also widely used index for the calculation of a species diversity. It is represented as:

$$H = -\sum (N_i / N) \log_2 (N_i / N)$$

$\Sigma$  = Sum of species,  $N_i$  = number of individuals of  $i$ th species  $N$  = Total number of individuals of all species

- (b) Simpson's index: This takes into account:

- the species richness
- the species evenness

To calculate Simpson's Index (D) for a particular area, the area must first be sampled randomly (random sampling).

The D is always a value from 0 to 1, where: High scores (close to 1) indicate high diversity. Low scores (close to 0) indicate low diversity.

A higher value means a more diverse habitat. For example, if one has an SDI of 0.5 and another has an SDI of 0.35, then the set with the SDI of 0.5 is more diverse

$$D = 1 - [\sum (n/N)^2]$$

$n$  = no. of individuals of a particular species  $N$  = total no. of individuals of all species

$\Sigma$  means 'sum of'

### **2.7.2 Importance of Biodiversity Assessment**

- Determining key areas for conservation and establishing conservation priorities. Ranking of an area according to specified values such as rarity, diversity, fragmentation, habitat condition, resilience, threats and ecosystem processes.
- If biodiversity levels are right, it can strengthen the ecosystem to better resist stresses like climate change and invasive species.
- To detect changes over time has challenged mankind for centuries.
- Assessing the status and trends of biodiversity is essential for sustainable development strategies.
- Biodiversity is crucial for the wellbeing of people and the Earth. Ecological communities maintain the ecological and evolutionary processes that sustain life. These are necessary to help maintain the

- planet's chemical balance
- moderate climate
- renew soil
- conserve species diversity
- Plant, animal and other species have intrinsic worth.
- The more critical role an area or system plays for ecosystems, the more value it has in positively influencing biodiversity.

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## 2.8 Summary

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Biological diversity/biodiversity is the variety of life forms present on the planet. It is of immense importance for mankind. It provides various ecological services needed by human beings. Also, biodiversity provides us with various things of moral and economical importance. The overexploitations as well as change in the climatic conditions have contributed in the threatening of biodiversity. Moreover, the inappropriate utilization of biodiversity for its commercial value is heading towards its depletion in much faster way. Many ecologically important organisms/plants have become extinct because of their overutilization/overexploitation such as Dodo (*Raphus cucullatus*) and Woolly Mammoth (*Mammuthus primigenius*). Nowadays, many conservation methods like in-situ and ex-situ conservation are being adopted to save the available species especially which are at the verge of extinction. Therefore, this book chapter deals with the values, threats and Ecosystem structure and function and biodiversity assessment for the biodiversity in an elaborative manner.

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## 2.9 Reference

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**Unit 3: Environmental Education**

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**3.0 Objectives**

**3.1 Introduction**

**3.2 Environmental Education**

**3.3 Objectives of Environmental Education**

**3.4 Guiding Principles of Environmental Education**

**3.5 Environmental Educational Programmes**

**3.6 Environmental Education in India**

**3.7 Environmental Organizations and Agencies**

**3.8 Role of Adult and Women Education**

**3.9 Advantages of Environmental Education**

**3.10 Summary**

**3.11 Glossary**

**3.12 References**

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**3.0 Learning Objectives**

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After reading this unit you will be able to:

- Define Environmental Education
- Know the evolutionary history of Environmental Education.
- Understand goals, objectives and guiding principles of Environmental Education.
- Know about the various approaches of Environmental Education and programmes related to it.
- Know about number of Environmental Organizations and Agencies
- Understand the role of adult and women education.
- Describe the advantage of Environmental Education.

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## **3.1 Introduction**

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From the previous units 4 you are now aware about environmental science, its scope and importance. Through that unit we got the idea that how the multidisciplinary approach of Environment is useful in tackling the environmental issue. Apart from this we also realized that why public awareness is very important regarding environmental problems and for this purpose Environmental Education is necessary.

In this unit we will discuss about Environmental Education and its evolutionary history. We will also discuss about the goals, objective and guiding principles of Environmental Education. As the main aim of Environmental Education is to create general environment related awareness among people which can be achieved through various approaches like formal and non-formal Environmental Education. Today, many environmental related international and national organizations and agencies are involved in environmental activities. For better and healthier future for us and for future generations it is our duty to educate our young generation about environment.

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## **3.2. Environmental Education**

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Today, we all are facing various environment related problems like climate change, global warming, pollution, ecological imbalance due to biodiversity loss etc. These problems are the outcome of human activities as humans are exploiting mother earth to the core. Now it is very necessary to bring about a sense of awareness related to all environmental issues amongst citizens so that we can understand the value of our life-supporting Earth and its environment. This can be achieved through imparting environment related knowledge to people especially to children and young generation as they are nation's greatest resources and the future of civilization depends on them. For this, teaching Environmental Education in schools, colleges will assist with that. Environmental Education is a study of nature, its functioning and persisting environmental problems so that environmental issues can be tackled efficiently. It also involves building of strategies to enhance and sustain nature. Environmental Education creates a positive impact on youth and helps us become conscious of our actions and in making responsible choices. It will regenerate human's interest in conservation and improvement of our environment before it is too late. Environmental Education is not just 'saving the world'. It is also about the development of an appreciation of the wonders and beauty of the world, and a sense of needing to save it or we can say the development of ecological thinking (Palmer, 1998). Several environmentalist and agencies have defined the term in different manner and some of them are as follows-

In "The Journal of Environmental Education" written by William B. Stapp(1969) definition of Environmental Education is "Producing a citizenry that is knowledgeable

concerning the biophysical environment and its associated problems, aware of help solve these problems, and motivated to work toward their solution”.

Bandhu, Desh (1981) in his paper entitled “Environmental Education - Needs and strategies” defines it as “Environmental Education is the process of recognizing values and clarifying in order to develop skills and attitudes necessary to understand and appreciate the inter-relations among man and his bio-physical surroundings. Environmental Education also entails practice in decision making and self-formulating a code of behavior about issues concerning environmental quality.”

The International Union for the Conservation of Nature and Natural Resources (IUCN, 1971) has evolved Environmental education definition as “Environmental education is the process of recognizing values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the inter-relatedness among man, his culture and his biophysical surrounding. Environmental education also entails practice in decision making and self-formulation of a code of behavior about issues concerning environmental quality”.

Encyclopedia of Educational Research (Mitzel, H. E., 1982) states: “Defining environmental education is not an easy task. Unlike other curriculum areas, the specific content of environmental education has never been well defined. It is universally agreed, however, that environmental education should be interdisciplinary, drawing from biological, sociological, anthropological, economic, and political and human resources. It is also agreed that a conceptual approach to teaching environmental education is best”.

A definition of Environmental education first appeared in 1969 in “The Journal of Environmental Education” written by William B. Stapp but the need of environmental education was highlighted during seventies period that reflected a growing concern about environmental degradation and world realized that concern and awareness regarding environment can be spread only through environmental education programmes. It mainly emerged from the United Nations Conferences on Human Environment at Stockholm (Sweden) in 1972. This conference emphasized on organization of formal and mass environmental programs and led to the establishment of United Nations Environment Programme (UNEP). In 1975, “The Belgrade Charter” was the outcome of an International Workshop on Environmental Education held at Belgrade (Yugoslavia) which was organized by United Nations Education, Scientific and Cultural Organization (UNESCO). Belgrade workshop formulated goals, objectives and guiding principles of environmental education programs to achieve the objectives of Stockholm conferences. UNESCO also launched an environment education newsletter “Connect” as an official organ of UNESCO-UNEP International Environmental Education Programme (IIEP). Later in 1977, world’s first intergovernmental conference on environmental education was organized by UNESCO in cooperation with UNEP at Tbilisi, Georgia (USSR). The Tbilisi Declaration constitutes the framework, principles and guidelines for environmental education at all levels-local, national, regional and international for all age groups both inside and outside the formal school system. In International level, the next initiative for Environmental education was the World Conservation Strategy (1980) by

IUCN with funding from UNESCO, UNEP and the World Wide Fund (WWF). In 1987, Moscow hosted the Tbilisi+10 Conference to evaluate the progress of Environmental Education and in the same year, the Brundtland Report “Our Common Future” published that states- “Humanity has the ability to make development sustainable – to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs. “Thereafter, in the same context time to time a series of meetings and conferences were held (Table – 1). In seventh World Environmental Education Congress, Morocco (2013) main topics of discussion include the importance of environmental education, its role to empower, establishing partnership to promote environmental education. In national level various recommendations were made as an outcome of a national seminar, organized by the Indian Environmental Society in collaboration with the International Programme on Environmental management at the Indian National Science Academy, New Delhi in 1979, in which stress was given to integrate Gandhian thought and values as a part of Environmental Education. In 1980, first International Conferences on Environmental Education held in New Delhi, where importance of Environmental Education was observed in developing social consciousness towards harmful effects of ecological disruptions on individual and community.

Table -1: An Evolution of Environmental Education

YEAR	EVENT
1968	UNESCO Biosphere Reserve Conference in Paris-discussion on environmental curricula, training and awareness development.
1969	Definition of Environmental Education first appeared in “ <i>The Journal of Environmental Education</i> ” written by <i>William B. Stapp</i>
1970	UNESCO & IUCN – Environmental Education definition. U. S. created the Environmental Education Act.
1972	Human Environment Conference in Stockholm-UNESCO & UNEP funded Environmental Education programme.
1975	Belgrade Charter – proposed initial Environmental Education goals.
1977	First International Environmental Education congress at Tibilisi – goals & Objectives of Environmental Education established.
1980	World Conservation Strategy – declares sustainable development as important for conservation.
1987	Tbilisi+10 Conference in Moscow – to evaluate Environmental Education progress. The Brundtland Report “ <i>Our Common Future</i> ” provides globally recognized definition of sustainability.

<b>1992</b>	Earth Summit in Rio de Janeiro – Agenda 21, a global plan for sustainable development.
<b>2002</b>	Johannesburg Summit – Sustainable development with five target areas.
<b>2005-2014</b>	UN – Decades of Education for Sustainable Development (DESD).
<b>2007</b>	4 <sup>th</sup> International Conference of Environmental Education in Ahmadabad, India, focuses on the DSED.
<b>2013</b>	7 <sup>th</sup> World Environmental Education Congress, Morocco - Discussion on importance of environmental education, its role to empower, establishing partnership to promote environmental education.

**Check your progress 1**

Q1. Who gave the definition of Environmental Education first time and in which journal?

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Q2. When first International Environmental Education congress was held?

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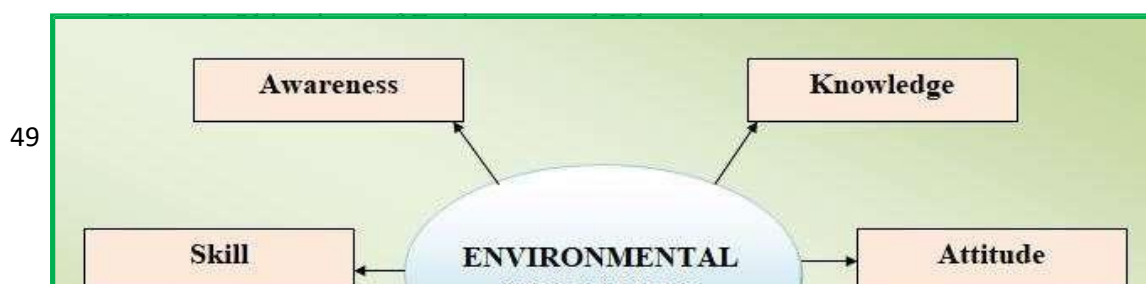
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**3.3. Objectives of Environmental Education**

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Goals of Environmental Education are to develop a world that is aware and concerned about the environment, its components, problems, and has knowledge, skills, attitudes, motivations and commitment towards solution of current problems and the prevention of new ones (UNESCO, 1975). Further, the goals of environmental education as accepted in the Intergovernmental Conference organized by UNESCO/UNEP in Tbilisi, USSR in October, 1977 are as follows: (a) to foster awareness and concern about economic, social, political and ecological interdependence in urban and rural areas, (b) to provide every person with opportunity to acquire knowledge, values, attitudes, commitment and skills necessary to protect and improve the environment, (c) to create new patterns of behavior of individuals groups and society towards the environment.

According to UNESCO-UNEP (1978) the main Objective of Environmental Education is to develop logical vision among the individual about the local .and international society and encourage participating in resolution of environmental problems through:



1. Awareness – Environmental education helps individual to acquire an awareness of and sensitivity to the total environment and its allied problems
2. Knowledge – helps to gain a variety of experiences and acquire a basic understanding of the environment and its associated problems.
3. Attitude – helps in acquiring a set of values and feeling of concern for the environment and the motivation for active participation in environmental improvement and protection.
4. Skill – helps to acquire skills for identifying and solving environmental problems.
5. Evaluation ability – develops ability to evaluate environmental measures and education programmes in terms of ecological, economic, social, aesthetic and educational factors.
6. Participation – provide individual with an opportunity to be actively involved at all levels in working towards the resolution of environmental problems.

Further, according to Vidart (1978), the specific aims of Environmental Education fall into three groups:

1. Cognitive aims: These include developing environmental knowledge and thinking ability which enable the individual and his social group to work out political solution to the various problems connected with environment.
2. Normative aims: These relates to the development of ecological awareness which will be conducive to the creation of modification of value models enabling the individual and the group to identify the factors that disturbs the environment equilibrium and protest against them.
3. Technical and applicative aims: This means planning collective practices that preserves, improve or restore the quality of life, as understood by the community through formal and informal education in such a way that the economic development do not conflict with the biological rhythms of the ecosystem.

**Check your progress 2**

Q3. What are the six main objectives of Environmental Education?

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Q4. How many specific aims of Environmental Education given by Vidart 1978?

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### **3.4. Guiding Principles of Environmental Education**

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According to the Tbilisi Conference (1977) the following are the Guiding principles of Environmental Education:

- 1) Consider the environment in its totality i.e. natural, artificial or manmade, technological, social (economic, political, moral, cultural, historical, and aesthetic).
- 2) Consider environment education as continuous life long process (from pre-school to all higher levels-formal as well as non-formal)
- 3) Be interdisciplinary in approach, in making possible holistic and balanced perspective.
- 4) Be community based and emphasize active participation for prevention and finding solutions to environmental problems.
- 5) Examine major environmental issues from world and regional point of view i.e. from local, national, regional and international point of view.
- 6) Focus on current, potential environmental situations while having account of historical perspective.
- 7) Consider environmental aspects in plans for growth and development.
- 8) Emphasize the complexity of environmental problems and need of developing critical thinking and problem-solving skills.
- 9) Promote the importance and necessity of local, national and international cooperation in the prevention and solution of environmental problems.
- 10) Utilize diverse learning about environment and different educational approaches to teaching and learning about environment along with practical activities.
- 11) Help learners to find the symptoms and the main causes of environmental problems.
- 12) Relate environmental sensitivity, knowledge, and problem solving and values clarification at every grade level.
- 13) Enable learners to have a role in planning their learning experiences and provide an opportunity for making decisions and accepting their consequences.

#### **Check your progress 3**

Q5. Write any two guiding principles of Environmental Education given in Tbilisi Conference, 1977?

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### 3.5. Environmental Educational Programmes

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Based on different discipline, Newman (1981) proposed a three-fold classification of Environmental Education programmes.

**Environmental studies:** It is concerned with the issues of environmental disturbance and minimization of their impacts through changes in the society (social sciences).

**Environmental sciences:** It deals with the study of the processes in water, air, soil and organisms which lead to pollution or environmental degradation and to know a scientific ways for establishing a standard that can be acceptably clean, safe and healthy for the natural ecosystem and organisms living within it (physical and natural sciences).

**Environmental engineering:** This is the study of the technical processes which are used to minimize the pollution and the assessment of impact of this on environment (engineering sciences).

#### Check your progress 4

Q6. Who proposed the three-fold classification of Environmental Education programmes?

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### 3.6. Environmental Education in India

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India is a country which is highly diverse climatically, geologically, ethnically, socially and economically etc., so Environmental Education has to be location-specific. At the basic beginning level, special attention must be paid to school going children and women that comprises about 50% of the population. They are to be made aware of health, family planning, nutrition, rural development, slum improvement, sanitation, hygiene, water and food contamination, fodder, fuel wood, nature etc. For this purpose, Non-government organizations can play a significant role. There are more than 200 non-governmental organizations, out of which 150 work in the area of Environmental Education and awareness (Sharma, 2018).

The main objective of Environmental Education is development of awareness and knowledge, attitudes, skills and abilities to participate in solving real life environmental problems. The challenge of achieving these goals requires effective educational strategies. The Environmental education has four main interrelated components (i) awareness, (ii) real life situations (iii) conservation, and (iv) sustainable development. The perspective should be

integrated, inter-disciplinary and holistic in nature and lay mass in rural, tribal, slum and urban areas, women and students and teachers in schools, colleges and universities as well as planners and decision policy makers, programme implements and R & D workers need to be educated about environment and issues related to it. For this, there is need for a new approach in education which cuts across various subjects at schools and higher levels. Some recommendations according to Peyton et al. (1997) that can be offered to guide teachers and curriculum developers in designing approaches to environmental education are (a) Infusion of environmental issues in school/colleges curriculum, (b) Designing environmental awareness or educational programmes, (c) Exhibitions and (d) Establishment of environment clubs and societies. India adopted the infusion approach to Environmental Education throughout the formal education system. Here, Environmental Education is compulsory at all levels of formal education from 2003 onwards.

Environmental Education is generally divided into two major sub- areas i.e. Formal and Non-Formal education. Formal Environmental Education is in organized form where students, teachers and institutions are involved whereas non-formal Environmental Education is designed for any age group, working in social, economic and cultural development of the community. They form groups or clubs and arrange exhibitions, public lectures, meetings, environmental campaigns. The following constitute main content of this education.

Table -3: Formal & Non-formal Environmental Education:

FORMAL ENVIRONMENTAL EDUCATION	NON-FORMAL ENVIRONMENTAL EDUCATION
<p><b>Primary school:</b>In this platform emphasis should be mainly on building up awareness, followed by real-life situations and conservation). Main purpose should be to sensitive the child about environment. The content to be used are surroundings from home to school to outdoor situations and teaching includes audio-visual and field visits.</p>	<p><b>Adult education:</b> Adults may influence other members for better ways of life. In local language, information packs, posters, slides, audio, audio-visuals etc. may be generated.</p>

**Lower secondary school:**At this level level, objective must be real life experience, awareness and problem identification. The study contents include general science, teaching, practical and field visits.

**Children activities:** This can be ensured through essay competitions of different age groups. Ministry of Environment & Forest with the help of India organize such activities. On the spot painting, modeling and poster design contests are conducted for children by the National Museum of Natural History. Short term courses are also given by NMNH in EE every year.

**Higher secondary school education:**

Here emphasis must be on conservation, assimilation of knowledge, problem identification and action skills. There should be proper teaching, practical and field work with science-based and action oriented work.

**Eco-development camps:** They help in sound rural development involving youth. A set of guidelines has been prepared by Ministry of Environment & Forests. The main objectives are : to create awareness in students and non-student youth about basic ecological principles; to identify root cause of ecological problems as related to human activities; to take steps to solve

	local ecological/environmental problems and to develop a spirit of national integration.
<p><u>Tertiary (College) stage:</u></p> <p>In this <u>level</u> <u>maximum</u> emphasis would be on knowledge regarding sustainable development followed by conservation, real life situations and awareness. The content must be based on Science and Technology. Teaching, practical and action-oriented field work is to be done.</p>	<p><u>Non-governmental organization:</u> There are over hundreds of NGOs, of which most are involved in EE and awareness, others in nature conservation, pollution control, afforestation and social forestry, floristic and faunal studies, rural development, wildlife conservation and waste utilization and eco-development.</p>
<p><u>University Education:</u></p> <p>Environmental education at this level is being looked after the University Grants Commission. There is a high-powered committee to suggest areas of EE at postgraduate level. There are about 10 Universities teaching courses in environmental area. Besides these, there are also research institutes and professional institutions as Indian Institute of Technology, Engineering Colleges, Schools of Planning and Architecture, which offer courses in environmental engineering. The University education has three major components: teaching, research and extension. At postgraduate level, four major areas are recognized.</p>	<p><u>Various schemes</u> and activity conducted by Government Like - Training senior executives/administrators, Foundation courses for the probationary selected for the I.A.S., I.F.S., I.P.S. and cadets of three wings of Armed Forces, of Research and Development Programmes supported by Ministry of Environment, Ministry of Environment &amp; Forests has established <u>Centres of Excellence</u> in the country that generate knowledge and methodology and training in areas of Tropical Ecology (Bangalore) and Environmental Education (Ahmedabad).</p>
<p><u>Environmental engineering:</u> It includes the subjects like architecture, civil engineering, town and country planning, including human settlements, slum improvement, landscape architecture, industrial design, regional science and urban ecosystem studies.</p>	
<p><u>Conservation and management:</u> It includes fields like</p>	

land use, forestry, agriculture, energy, waste management, wildlife management, national parks, biosphere reserves, biological diversity, water management, mining management, non-polluting renewable energy development etc.

Environmental health: This deals with public health and hygiene, sanitary and chemical engineering, occupational health, toxicology, nutrition and drug use etc.

Social ecology: It includes subjects like ecology, sociology, social planning, cost-benefit, community organizations and services, psychology and counseling, environmental ethics and related areas of humanities.

There are some institutes, ~~centres~~ assisted by Ministry of Environment and Forests which provide formal education, there are many ways of education/training in environmental areas. For developing sense of responsibility instance, Centre for Environment Education (CEE), Ahmedabad, Indian Institute of Forest Management, Bhopal and Indian Gandhi National Forest Academy, Dehradun. ~~educational programmes for Tribal/forest~~

representatives (M.Ps and M.Ls) may stimulate public interest; Conducting dwellers; Organizing suitable activity on "World Environment Day", International Biodiversity Day, Earth Day etc.

**Check your progress 5**

Q7. What are the four interrelated components of Environmental Education?

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Q8. What are the two major sub-areas of Environmental Education?

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### 3.7. Environmental Organizations and Agencies

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There are several international and national organizations, agencies and programmes involved in different areas of environment, forestry, wildlife and other relevant aspects. These organizations are playing the key role in sorting out environmental issues. Some of the important bodies of this type are as follows:

Table -3: List of International Organizations:

<b>NAME OF ORGANIZATION ABOUT</b>	
<b>Earthscan</b>	Founded by UNEP in 1976, commissions original articles on environmental matters
<b>Convention on International Trade in Endangered Species(CITES)</b>	It is a multilateral treaty to protect endangered plants and animals. The convention was opened in 1973 and entered into force on 1 July 1975. For Indian, the Ministry of Environment and Forests function as nodal agency for participation in international agreements.
<b>Environmental Protection Agency (EPA)</b>	An independent Federal Agency of the U.S. Government established in 1970. It deals with protection of environment by air, water, solid wastes, radiation, pesticides, noise etc.
<b>European Economic Community (EEC)</b>	It is a community of 12 European nations and has programmes of framing and implementation of policy for environmental improvement and conservation of natural resources. CPCB, India has taken up projects on air quality monitoring with assistance of EEC.
<b>Human Exposure Assessment Location Programme (HEAL)</b>	The project is a part of the Health Related Monitoring Programme by WHO in co-operation with UNEP with three components viz air monitoring, water quality monitoring and food contamination monitoring on a global basis.
<b>International Council of Scientific Unions (ICSU)</b>	A non-government organization (Paris) - encourages exchange of scientific information, initiates programmes requiring international scientific cooperation and studies and reports on matters related to social and political responsibilities in treatment of scientific community.
<b>International Union for Conservation of Nature (IUCN/WCU)</b>	An autonomous, founded in 1948(Headquarters at Morges, Switzerland) - initiates and promotes scientifically based natural resources conservation measures. Now re-named as World Conservation Union (WCU).

<p><b>International from marine Consultative Organization (IMCO)</b></p>	<p><b>It regulates the operation of ships in high seas water pollution viewpoint.</b></p>
<p><b>South Asia Co-operative Environment Programme</b> Set up in 1982 for exchange of professional knowledge and expertise on environmental issues among member countries – (SACEP) Afghanistan, Bangladesh, Bhutan, India, Iran, Pakistan and Sri Lanka.</p>	
<p><b>United National and the arts to develop the relations. It also holds conferences and seminars, promotes research and exchange of information and provides technical support.</b></p>	<p><b>United Nations agency (Headquarter-Paris, 1945) to support and Educational, Scientific and implement the efforts of member states to promote education, Cultural Organization scientific research and information, cultural aspects of world cultural aspects of world cultural aspects of world</b></p>
<p><b>United Nations monitoring and protection. It was founded to study and formulate international guidelines for management of the environment. UNEP is assisting many such programmes in India.</b></p>	<p><b>UN agency (Headquarters - Nairobi, Kenya 1972), responsible Environment Programme for co-operation of inter- governmental measures for (UNEP) environmental environmental environmental</b></p>
<p><b>World Commission on Environment and Development</b> Set up in 1984 in pursuance to re-examine the critical environmental and development issues and to formulate proposals for them. The commission makes an assessment of the level of understanding and commitment of individuals, voluntary organizations and governmental bodies on environmental issues.</p>	
<p><b>Earthwatch Programme</b></p>	<p><b>Established in 1972 under the terms of the declaration on the Human Environment. It monitors trends in the environment, based on a series of monitoring stations. Its activities are coordinated by UNEP.</b></p>
<p><b>Project Earth</b> Developed in collaboration with UNEP to inspire interest and educate young people worldwide on the crucial issues facing the Earth's Environment.</p>	
<p><b>Earthwalks</b> A series of expeditions designed to draw international attention on environmental issues. First such walk was taken by R. Swan and six young people were presented by him on 6th June, 1992 at UNCED, Earth Summit (3-14 June, 1992), held at Rio de Janeiro (Brazil).</p>	
<p><b>Man and Biosphere Programme (MAB)</b></p>	<p><b>It is the outcome of international Biological Programme Programme (MAB) MAB was formerly launched by UNESCO in 1971. There are 14 projects areas under this programme.</b></p>

**United Nation Framework International environmental treaty adopted on 9th May 1992 and Convention on Climate open for signature at Earth Summit (1992). Its ultimate objective Change (UNFCCC) is to stabilize greenhouse gas concentration in the atmosphere.**

**Convention on Biological It is multilateral treaty (1992) having three main goals- Diversity (CBD) conservation of biological diversity, sustainable use of its components, fair & equitable sharing of benefits from genetic resources.**

**Global Environmental It was established in 1992 for tackling most environmental Facility (GEF) problems. It unites 183 countries in partnership with international institutions, civil society organizations & private sector to address global environmental issues.**

**GreenpeaceA non-profit organization, with a presence in 40 countries across Europe, the America, Asia and the Pacific. Greenpeace focuses on the most serious worldwide threats to our planet's biodiversity and environment. It campaign to: stop climate change, protect ancient forests, save the oceans, stop whaling, say no to genetic**

**engineering, stop the nuclear threat, eliminate toxic chemicals and encourage sustainable trade.**

**Institute for Global Established in 1998, IGES is an independent and non-profit think Environmental Strategiestank based in Japan. Its mission is to more human society to (IGES) become more environmentally and socio-economically Sustainable. Goal of IGES is to create a new paradigm for the global community so that the unsustainable production and consumption patterns currently observed can be changed into sustainable ones. It comprises four components: Strategic research, information outreach, multi-stakeholder dialogue, and capacity building.**

**Environmental An international campaigning organization in U.K – investigating Investigation Agency (EIA) and exposing environment crime.**

### **National Organization:**

Apart from International organization, there are a number of governmental as well as non- governmental organizations, agencies and programmes engaged in environmental studies. Most of the governmental bodies involved in environmental studies are under the administrative control of, or assisted by the Ministry of Environment and Forests (MoEF), Government of India which was set up in 1980 for planning, promotion and coordination of environmental programmes. After this, an integrated Department of Environment, Forests and Wildlife (D.O.En) was created in September 1985. The Ministry in 2014 was re-named as Ministry of Environment, Forests and Climate Change (MoEF & CC) to stress upon India's stand on the issue of global climate change at international summit. It is mainly concerned with the implementation of policies and programmes related to biodiversity,

forests and wildlife, ensuring the welfare of animals and prevention and abatement of pollution and climate change. The Ministry also acts as the nodal agency for the United Nations Environment Programme (UNEP), South Asia Cooperative Environment Programme (SACEP), and International Centre for Integrated Mountain Development (ICIMOD) and for the follow-up of the United Nations Conference on Environment and Development (UNCED). The Ministry also deals with the issues relating to multilateral bodies like the Commission on Sustainable Development (CSD), Global Environment Facility (GEF), and of regional bodies like Economic and Social Council for Asia and Pacific (ESCAP) and South Asia Association for Regional Co-operation (SAARC) on matters pertaining to environment.

The main objectives of the Ministry are:

- Conservation and survey of flora, fauna, forest and wildlife,
- Prevention and control of pollution and impact of climate change
- Afforestation and regeneration of degraded areas.
- Protection of the environment
- Ensuring the welfare of animals.

These objectives are supported by legislation and regulatory measures, aimed for the preservation, conservation and protection of the environment. Besides the legislation measures, a National Conservation Strategy and Policy Statement on Environment and Development (1992), National Forest Policy (1988), a Policy Statement on Abatement of Pollution (1992) and a National Environment policy (2005) has also been evolved.

**Check your progress 6**

Q9. Write the full form of following organizations - CITES, IUCN, UNESCO & CBD?

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**3.8. Role of Adult and Women Education**

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Educating men and women are a key for sustainable development of nation and conservation of nature. Environmental Education increases better understanding of environment and the environmental challenges among men and women. It develops the knowledge, skills and commitment among them which is needed to take responsibility for addressing these environmental challenges.

Environmental adult education develops a link between the environment and other aspects (social, economic, political and cultural) of people’s lives. Environmental adult education uses engaged, participatory methods based on the understanding that learning is a far more complex, extensive and important process than information transmission. Environmental adult education begins with recognizing people’s with ecological knowledge

and bringing them together through dialogue and debate for developing new ecological understandings of our world. Women play an important role in managing natural resources on family and community levels as women manage various activity like water, sources for fuel and food, as well as both forests and agricultural terrain. Educated women provide plan-document to be used for physical development of the human habitat. Therefore, the presence of educated women is needed to play as a system for sustainable environmental development. In the same context, a statement was given by U.N. Secretary-General Ban Ki-moon in the Earth Institute's State of the Planet meeting at Columbia University (New York, 2010) that "The world's women are the key to sustainable development, peace and security". Women's are not only get affected by environmental disasters or degradation but also their activities have an impact on natural resources and the environment. Therefore, it is the need to promote and develop environmentally friendly behaviours among women.

Major sustainable development treaties have also accepted the specific need and importance of women's participation. In 1992 United Nations Earth Summit (UNCED) produced two key conventions i.e. one on biological diversity and other on combating desertification which served as guides for implementation of environmental actions from a gender perspective. Agenda 21 (UNCED document), included a chapter on gender that highlighted the role of women as sustainable consumers in industrialized countries. Studies related to the women's link to environment are concentrated not only in developing countries but also in developed countries and have shown that women have a smaller carbon footprint than men, making the majority of environment friendly or "green" decisions at the household or base level.

This can be further assisted by various movements and activities leaded or conducted by women's that have made great strides in preserving and protecting the resources around them. Women took the lead in the Chipko Movement of India in the 1970s, where activists stopped the felling of trees by surrounding it or hugging the trees. They also protected water sources from corporate control. Similarly, another famous effort initiated by women was the Green Belt Movement, which was the conservation and forestry movement that originated in Kenya on Earth Day in 1977. Previously and even today many women around the world continue the fight against climate change, making sustainable consumption choices, and improving access to, control over and conservation of resources. Their voices must continue to be integrated into policy and implementation efforts at every stage for the well- being and better survival of future generations. Thus, we can say that the adult and women education add an ecological lens to Environmental Education through which we can address environmental problems and give voice to the needs of those who are most affected.

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### **3.9. Advantages of Environmental Education**

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Environment education is a process that creates awareness among individuals towards their responsibility for environment, allows them to explore environmental issues and engage

then in solving environmental problems. If water gets polluted, what are we going to drink? How will we enjoy nature if every forest is cut down? All these questions are persisting today and actions are required. If our children and young generations who are the future of nations aren't taught how to preserve our ecosystem, the earth will be doomed. This is why Environmental Education is important and it has following advantages-

- Encourages individual to respect mother earth and every life forms - By teaching individual, how to respect our nature, will definitely pave way for a brighter future. Environmental Education teaches us to be kind towards every life forms living in this world. This will have a positive impact on our nature.
- Cultivates critical thinking – Environmental Education also develops critical thinking amongst people. We become mindful and responsible of our actions and their magnitudes and this will ultimately shows positive or healthy sign in nature.
- Promotes a healthy way of life - Nowadays everyone is restricted to their phones, TV's and homes, and people hardly move their muscle. Environmental education encourages people especially kids and young mass to participate in outdoor environmental activities. It teaches us about the benefits of the environment and how we can use it to our advantage.
- Restoration of Environmental balance - By teaching kids and everyone how their actions impact nature, we can suppress the environmental degrading activities and can maintain environmental balance. For instance, in today's developing world where large area of forest is cut down, motivating people to plant more and more plants will definitely aids in balancing the nature. It helps in creating a sustainable future.

In conclusion, Today world is facing many numerous crisis and critical environmental issues like climate change, global warming, loss of biodiversity and environmental pollution etc. These issues are the outcomes of human activities like genetic modification, deforestation, soil erosion, water and air pollution, toxic waste, over exploitations of natural resources, fisheries collapse, oil spills, militarization, deregulation, trade, marketing and urban decay. Thousands of animals and forests are dying due to human activities creating ecological imbalance. Steps must be taken to preserve our life supporting mother Earth. Environmental Education is the need of the hour and is vital for our future. It will be the most important thing that we teach our people. Societies and politics and belief systems and ideologies change and evolve subjects and disciplines also changes and evolve and priorities for people and countries change. The future belongs to young generations and upcoming generations and Environment Education helps in building up a healthier and greener environment for future generation.

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## 3.10. Summary

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In this unit we have gone through the concept of Environmental Education and its various aspects. So far you have learnt that

- Environmental Education is a study of nature, its functioning and persisting environmental problems so that environmental issues can be tackled efficiently.

- A definition of Environmental education first appeared in 1969 in “The Journal of Environmental Education” written by William B. Stapp but the need of environmental education was highlighted during seventies period
- It mainly emerged from the United Nations Conferences on Human Environment at Stockholm (Sweden) in 1972.
- The Belgrade Charter (1975) was the outcome of an International Workshop (Belgrade, Yugoslavia) organized by UNESCO that includes formulated goals, objectives and guiding principles of environmental education programs to achieve the objectives of Stockholm conferences.
- The Tbilisi Declaration constitutes the framework, principles and guidelines for environmental education at all levels-local, national, regional and international for all age groups.
- In seventh World Environmental Education Congress, Morocco (2013) main topics of discussion include the importance of environmental education, its role to empower, establishing partnership to promote environmental education.
- The main Objectives of Environmental Education (UNESCO-UNEP, 1978) are to develop awareness, knowledge, attitude, skill, evaluation ability and participation among individuals.
- According to Vidart (1978), the specific aims of Environmental Education are – Cognitive aims, Normative aims and Technical and applicative aims.
- Newman (1981) proposed a three-fold classification of environmental education programmes i.e. Environmental studies, Environmental sciences and Environmental engineering.
- Environmental education can be further divided into two major sub- areas i.e. Formal and Non-Formal education.
- There are several international and national environmental organizations, agencies and programmes like Earthscan, CITES, EPA , EEC, IUCN/WCU, UNESCO, UNEP, Earthwatch Programme, Project Earth, Earthwalks, MAB programme, UNFCCC, CBD, Greenpeace and Ministry of Environment, Forest and Climate Change, Govt. of India (MoEF & CC) etc.
- Educating men and women are a key for sustainable development of nation and conservation of nature.
- Women took the lead in the Chipko Movement of India in the 1970s, Green Belt Movement in Kenya on Earth Day in 1977; Barefoot College trains (1972) women in Tilonia, Rajasthan, in solar engineering etc.
- Environmental Education has many advantages i.e. encourages individual to respect mother earth and every life forms, cultivates critical thinking, promotes a healthy way of life and restoration of Environmental balance.

- Environmental Education is the need of the hour and is vital for developing healthier and greener environment for future generation.

## Terminal Questions

- 1) Define Environmental Education with its brief account of its evolutionary history.
- 2) Discuss the main objective of Environmental Education as per UNESCO-UNEP, 1978.
- 3) What are the guiding principles of Environmental Education?
- 4) Discuss briefly the formal and non formal Environmental Education.
- 5) What are the advantages of Environmental Education?
- 6) Write notes on:
  - i) Tbilisi Declaration
  - ii) Cognitive aims of Environmental Education
  - iii) Chipko Movement
  - iv) Ministry of Environment, Forests and Climate Change (MoEF & CC), Govt. Of India

## Answers

Check your progress –1, 2, 3, 4, 5, 6 &7

- 1) William B. Stapp (1969)
- 2) In 1977 at Tbilisi, Georgia (USSR)
- 3) The main Objectives of Environmental Education (UNESCO-UNEP, 1978) are to develop awareness, knowledge, attitude, skill, evaluation ability and participation among individuals.
- 4) According to Vidart (1978), there are three specific aims of Environmental Education– Cognitive aims, Normative aims and Technical and applicative aims.
- 5) Guiding principles given in Tbilisi Conference, 1977 are – (a) Consider the environment in its totality i.e. natural, artificial or manmade, technological, social (economic, political, moral, cultural, historical, and aesthetic). (b) Consider environment education as continuous life long process (from pre-school to all higher levels-formal as well as non-formal)
- 6) Newman (1981)
- 7) Interrelated components of Environmental Educations are (i) awareness, (ii) real life situations (iii) conservation, and (iv) sustainable development.
- 8) Formal and Non-formal Environmental Education
- 9) CITES – Convention on International Trade in Endangered Species IUCN – International Union for Conservation of Nature

UNESCO – United Nations Educational, Scientific and Cultural Organization CBD – Convention on Biological Diversity

Chipko movement (1973)

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## 3.11 Glossary

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Attitude: A way of thinking or feeling about something.

Biodiversity: Variety of life forms

Behaviour: A response of an individual towards any action, environment or stimulus.

Belgrade Declaration: it was the outcome of an International Workshop on Environmental Education held at Belgrade (Yugoslavia) in 1975 that was organized by United Nations Education, Scientific and Cultural Organization (UNESCO). In this, goals, objectives and guiding principles of Environmental Education programs were formulated to achieve the objectives of Stockholm conferences.

Climate: variation of weather in a region over long periods of time.

Climate Change: the slow change in climatic conditions over a time at a given place.

Deforestation: conversion of forest areas into non-forest area for agriculture, urban use or developmental process.

Eco: prefix added to words indicating consideration of environment e.g. eco-friendly

Ecology: The study of the inter-relationships between organisms and environment.

Ecosystem: The structural and functional entity of biotic communities and their environment.

Environment: the external conditions in which an organism lives and interacts.

Environmental ethics: ethical decisions with respect to the environment or man's belief about what is right or wrong environmental behaviour.

Environmental science: the study of interactions of physical, chemical and biological components of the environment.

Erosion: displacement of solid/sediments or soil due to agents like wind, water or ice.

Forest: land with canopy cover

Global warming: the observable increase in global temperatures mainly due to human activities

Intergovernmental Panel on Climate change (IPCC): established in 1988 by World Meteorological Organization and UN Environment programme and is dedicated to providing the world with objective, scientific information related to climate change.

IUCN: International Union for Conservation of Nature, global international organization working in the field of nature conservation and sustainable use of natural resources. It's headquarter is in Gland, Switzerland.

Natural resources: valuable naturally occurring substances.

Pollution: introduction of impurities in the environment which is harmful to living organisms.

Skill: ability or expertise to do something well.

Sustainable: able to be maintained at a certain rate or level.

Tbilisi Declaration: In 1977, Intergovernmental conference on environmental education was organized by UNESCO in cooperation with UNEP at Tbilisi, Georgia (USSR). The Tbilisi Declaration constitutes the framework, principles and guidelines for environmental education at all levels-local, national, regional and international for all age groups both inside and outside the formal school system.

UNESCO: United Nations Educational, Scientific and cultural Organizations, founded in November 1945. It is the United Nations organization for the promotion of international cooperation in education, science, culture and communication. The seat of UNESCO is in Paris, France.

UNEP: United Nations Environmental Program, established as an outcome from the UN Stockholm Conference in 1972. It is responsible for coordinating the UN's environmental activities and assists the developing countries in implementing environmental policies and practices. It's headquarter is in Nairobi, Kenya.

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**Unit 4: Environmental Pollution**

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**4.0 Learning objectives**

**4.1 Introduction**

**4.2 Environmental pollution: definition**

**4.2.1 Historical development (Pollution case studies)**

**4.3 Classification of Pollutants**

**4.3.1 On the basis of environment/medium in which they occurs**

**4.3.2 On the basis of their persistence in the environment**

**4.3.3 On the basis of their existence in the nature**

**4.3.4 On the basis of natural disposal**

**4.4 Types of Environmental pollution/pollutants**

**4.4.1 Air Pollution and air pollutants**

**4.4.2 Water Pollution and water pollutants**

**4.4.3 Soil/land Pollution and soil pollutants**

**4.4.4 Noise Pollution**

**4.4.5 Radioactive Pollution**

**4.5 Sources and effects of environmental pollution/pollutants**

**4.5.1 Sources and effects of air pollution**

**4.6 Summary**

**4.7 Glossary**

## **4.8 SAQs**

## **4.9 References/ Bibliography**

## **4.10 Suggested Readings**

## **4.11 Terminal/ Model Questions**

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## **4.0 Learning objectives**

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After reading this unit we probably become able to:

- Describe environmental pollution
- Know about past historical pollution episodes/case studies and their cause
- Identify and enlist major types of agents (pollutants) deteriorating our environment
- Distinguish between air, water and soil pollution and their respective pollutants
- Be acquainted with biological accumulation and bio-magnification of toxic pollutants through food chain mechanism
- Know about sources and toxic effects of environmental pollution.

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## **4.1 Introduction**

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Nowadays, man is facing several types of environmental stresses and ecological crisis among which environmental pollution is one of the major problem. In this unit we will discuss about environmental pollution which is resulting in a number of calamities and harmfully affecting health of humans, plants and animals. Environmental contamination is attributed by means of any undesirable, unwanted and unpleasant physical, chemical and biological alterations within the environmental constituents i.e. air, water and soil majorly via anthropogenic activities. As the human population is growing drastically, there occurs a demand for enormous resources and technological advancement which ultimately lead to overexploitation of resources as well as degrading the quality of environment by generating a lot of wastes. Therefore, the absence of quality environment is the precursor of deteriorated or polluted environment.

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## **4.2 Environmental pollution: definition**

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Environmental pollution is the inauspicious and undesirable physical, chemical or biological alterations in the physical, chemical and biological aspects of different environmental constituents namely air, water and land leading to deterioration of environment and makes it harmful for humans, other living organisms and various cultural assets. Scientifically, contamination of environment is termed as environmental pollution and the respective contaminating agents are called pollutants. However, it is not the wastes alone which deteriorate the environment quality. Sometimes, certain valuable materials may also pollute the

environment due to overuse or misuse or mismanagement e.g., fertilizers improve the soil fertility but pollute soil due to overuse and pollute water due to misuse and mismanagement. Any constituent of environment weather biotic or abiotic may become pollutant if its concentration exceeds beyond the desired limits in the environment. Therefore, environmental pollution may also be defined as an addition of undesirable materials or excessive addition of useful materials in the environment beyond the threshold limits where the usefulness of that material is damaged and resulting in the degradation of environmental quality thereby making it unfit for life.

### 4.2.1 Historical development (Pollution case studies)

It is reasonably essential to be familiar with the historical events pertaining to environmental pollution in order to be aware of cause and effects of harmful pollutants and to prevent imminent tragedies. Major pollution case studies have been given below as in table 1:

- 1) London smog
- 2) Los Angeles smog
- 3) Bhopal gas tragedy
- 4) Chernobyl nuclear disaster
- 5) Fukushima nuclear disaster
- 6) Minamata Bay incident

**Table 1: Major case studies related to environmental pollution**

S. No.	Name of the event/ case study	Cause / pollutants involved	Impact	Place	Year of occurrence
1	London Smog	5 day Classical smog formed by condensation of water vapors with H <sub>2</sub> S & SO <sub>2</sub> over dust particles at low temp. (-1 <sup>o</sup> to -4 <sup>o</sup> C)	>50% population & vegetation affected, 4000 people killed	London (England)	5-11 Dec, 1952
2	Los Angeles Smog	Photochemical smog formed by interaction of sunlight with major vehicular exhausts, NO & Hydrocarbons at 24 <sup>o</sup> -32 <sup>o</sup> C	Thousands of people killed & biodiversity destroyed	Los Angeles (USA)	1943
3	Bhopal gas tragedy	Leakage of Methyl Isocyanate gas from Insecticide unit of Union Carbide	Killed over 2500 people	Bhopal (India)	2 <sup>nd</sup> Dec, 1984
4	Chernobyl nuclear disaster	Radioactive leakage (Radioactive pollution)	>4000 deaths and other sufferings	Ukraine (Russia)	26 <sup>th</sup> April 1986
5	Fukushima nuclear disaster	Nuclear accident due to hydrogen and radioactive materials leakage sparked by earthquake and Tsunami	>1000 people died & other sufferings	Fukushima (Japan)	11 <sup>th</sup> Mar, 2011
6	Minamata Bay incident	Minamata disease from mercury poisoning through eating mercury contaminated fish living in Minamata Bay	>900 deaths >3000 people suffered	Kyushu island (Japan)	1956

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## **4.3 Classification of Pollutants**

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Pollutants can be described as the agents or materials which on addition into the environment responsible for making it unfit for life by deteriorating the environment quality. These may also be any useful substances or energies available in the environment but in excess limits or in harmful concentrations. Pollutants can be classified as per different criteria into following types discussed below:

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### **4.3.1 On the basis of environment/medium in which they occurs**

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Environment comprised of three different mediums i.e. air, water and soil, which directly affect life in several ways by providing basic necessities of life to man and other living creatures on this earth. Therefore, pollutants responsible for any alteration in these mediums are divided into three respective categories as follows:

#### **1) Air pollutants**

Substances which get released in the atmosphere or air or whose concentration in the air alters air composition up to undesirable limits are referred to air pollutants. These are responsible for making the air dirty and harmful for all living organisms and damaging cultural assets. These are of three kinds: Gaseous pollutants (e.g. CO, CO<sub>2</sub>, NO, NO<sub>2</sub>, SO<sub>2</sub>, SO<sub>3</sub>, VOCs, etc.), Particulate pollutants (e.g. dust, smoke, aerosols, mist, fume, smog, pollens, spores, etc.), Radioactive pollutants (e.g. nuclear explosives during war like lead, uranium, etc.).

#### **2) Water pollutants**

Any foreign substances organic or inorganic or biological or radiological in nature having ability to change physical and chemical characteristics of water on their addition resulting health hazards for the living organisms are termed as water pollutant. There are three kinds of water pollutants: Physical pollutants (heat and oil spills), Chemical pollutants (Organic pollutants like DDT, BHC, PCBs, inorganic pollutants like Pb, Hg, Ar, Cd, Ni, P, fluorides, nitrites, etc.) and Biological pollutants (bacteria, viruses, protozoa, algae, etc.).

#### **3) Soil/land pollutants**

Substances which on addition into the soil are responsible for reduction in the soil fertility and productivity by altering soil property are called soil pollutants. These pollutants may include toxic chemical pollutants like Cu, Zn, Cd, Al, Fe, Pb, Hg, tin, acids, cyanides, alkalies, etc., pesticides like aldrin, dieldrin, endrin, malathion, parathion, DDT, etc., fungicides, weedicides, fertilizers, etc.).

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### **4.3.2 On the basis of their persistence in the environment**

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Different environmental pollutants responsible for destruction of environmental quality when released into the environment from their sources persist in the environment in two different forms as:

## 1) Primary Pollutants

Pollutants which remain throughout in the form in which they are added to the environment are called as primary pollutants. Example: Plastics, etc.

## 2) Secondary pollutants

Primary pollutants interact with each other and results in the formation of new pollutants synergistically called secondary pollutants. Synergistically or synergism refers to combining two or more less toxic components to form two times much toxic compound Example: Ozone (O<sub>3</sub>), Peroxyacyl nitrate (PAN). These have more toxic effect that their parent molecules or primary pollutants.

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### 4.3.3 On the basis of their existence in the nature

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According to the occurrence of pollutants in the nature, they may be classified into two types as:

## 1) Quantitative pollutants

These include those substances which are present and occur naturally in the environment before the origin of man on this earth and also added by man but in large quantities. Example: Carbon dioxide (CO<sub>2</sub>) is always present in the environment and also added by man through breathing and other activities like burning fire, emissions from industries and automobiles.

## 2) Qualitative pollutants

These include those substances which normally do not occur in nature but are added by man anthropogenically. Example: insecticides, pesticides, herbicides, weedicides, fertilizers, etc.

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### 4.3.4 On the basis of natural disposal

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Depending upon their degradability and mode of elimination from the environment, pollutants may be categorized into two following groups:

## 1) Biodegradable pollutants

Pollutants or contaminating substances which can naturally be decomposed quickly by microbial action or other biological action like radiation are termed as biodegradable pollutants. These are generally organic in nature. Example: sewage responsible for water pollution (microbial degradation), Heat responsible for thermal pollution (degradation via loss of Radiations).

**2) Non-biodegradable pollutants**

Substances which do not be degrade naturally or are degrade very slowly are termed as non-biodegradable pollutants. These are generally inorganic in nature and tend to pass through food chain and get bio accumulate and bio magnify in the living tissues. Example: inorganic pesticides like DDT, heavy metals, plastics, glass, radioactive materials, etc.

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**4.4 Types of Environmental pollution/pollutants**

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Generally environment comprises air, water and soil, therefore, environmental pollution associated with its components is of three major types:

- Air/atmospheric Pollution
- Water Pollution
- Soil/land Pollution

In addition to these, there are two other types of pollution having severe impact on environment and living organisms. These are:

- Noise Pollution
- Radioactive Pollution

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**4.4.1 Air Pollution and air pollutants**

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Air is a mixture of different constituents of specific concentration comprising 78% Nitrogen, 21% Oxygen, and 0.04% Carbon dioxide and rest other gases in very low concentration. Any significant alteration in normal composition of air due to introduction of any foreign substance indicates air pollution posing a serious threat on the well-being of all living organisms, environment and property. Therefore, air pollution could be understood as introduction of any foreign, undesirable and unwanted physical, chemical biological materials in the atmosphere in such concentrations that prove fatal for humans, plants and animals and also damage property and further contribute to climate change. Such polluting agents or materials that contribute to air or atmospheric pollution are termed as air pollutants.

**Causes of Air pollution**

There are two major causes contributing air pollution: Natural Cause and Anthropogenic cause. Natural cause of air pollution includes forest fires, volcanic eruptions, dust storms, natural organic and inorganic decays that produce harmful gases like sulphur oxides, methane gas, etc., dust particles, ashes, etc. Natural pollutants also comprised of spores, bacteria, viruses, pollens, etc. While anthropogenic cause includes air pollutants released into the atmosphere through various human activities. With the rapid growth in human population, demand for energy and resources to make better livelihood has also been increased. With the advent of industrialization, invention of automobiles and other developments to meet the rising demands of growing population, deterioration of air quality has also been speeded up.

Emissions from industries, fireworks, nuclear explosions and many other human activities are the major forces behind anthropogenic air pollution.

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#### **4.4.2 Water Pollution and water pollutants**

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Water especially pure water is the potent and vital necessity for life without which life would be impossible. Alteration of physical, chemical and biological characteristics of water due occurrence of any foreign material in the water that results in degradation of water quality and seriously affecting the well-being of humans, plants and animals is termed as water pollution. These materials responsible for polluting water are called water pollutants.

##### **Causes of water pollution**

There are also two reasons behind the pollution of water: Natural and Anthropogenic. Natural causes of polluting the water include soil erosion and rock weathering through which soil particles and rock minerals respectively get dissolved in water bodies and pollute them. Fall of dead fallen leaves and decaying of fallen leaves and other organic matter in the water bodies also deteriorates water quality. Anthropogenic or man-made causes of water pollution include human activities which lead to discharge of various organic wastes like, industrial effluents, domestic waste, sewage, animal waste, waste from slaughter houses, etc., inorganic chemicals like pesticides, fertilizers, etc., agricultural runoffs, oil spills, heat and radioactive wastes into water bodies.

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#### **4.4.3 Soil/land Pollution and soil pollutants**

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Soil is the topmost layer of land or earth's surface and supports plant life, which, in turn, supports animal life including humans. Humans also interact directly or indirectly with soil as it nurtures life by providing indispensable provisions to life such as foodstuff, shelter and also clothing from plants and animals which directly and indirectly depends on soil. Therefore, any change in soil composition due to presence of any foreign and harmful substance in the soil may affect all organisms. Such alteration in soil due to addition of foreign materials leading to reduced productivity and decreased fertility is termed as soil or land pollution and the respective polluting materials are called as soil pollutants.

##### **Causes of soil pollution**

There are natural as well as manmade causes of soil pollution. Natural causes include floods containing contaminated water, acid rain, mineral deposition via rainwater flow from weathering of rocks, etc. while manmade causes include a variety effluents and run offs that finally reach the soil directly with water or indirectly through air which further contribute to acid rain and ultimately reach the soil. These effluents may include various chemicals, pesticides, fertilizers, discarded materials, radioactive wastes, etc.

#### **4.4.4 Noise Pollution**

Sound is the only requisite and essential medium of communication in humans and other animals. But, if the sound becomes unpleasant, loud, disturbing, annoying, harmful, unwanted, cause stress or impair the hearing ability than it is called noise. Such persistent, disturbing, often excessive level of noise causing harmful effects in the environment from various sources like automobile horns, industries, loud speakers, etc. is termed as noise pollution. This kind of physical pollution affects man directly to large extent than other living organisms also without affecting life-supporting systems called environmental components i.e. air/atmosphere, water and land.

### **Causes of Noise pollution**

Noise pollution is completely contributed by manmade activities through various activities that produce annoying, loud and harmful sound called noise. Major activities include construction, blowing horns of transport vehicles, running machines in various industries, using domestic gadgets, entertainment equipments and many more.

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## **4.4.5 Radioactive Pollution**

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Radioactive pollution is associated with radioactive substances which create physical pollution of air, water and soil on introduction to them. Radioactive material or substance are certain kind of elements e.g. Uranium, Radium, etc. that give off harmful radiations (protons or alpha particles, electrons or beta particles and gamma radiations) simultaneously on disintegration of their atomic nuclei. Therefore, radioactive pollution can be defined as the introduction of any radioactive material into physical environment or environmental components leading to very disrupting impact on life on earth.

### **Cause of Radioactive pollution**

Radioactive pollution occurs due to release of radioactive substances or radiations into the environment due to any nuclear explosion or release of the radioactive waste generated from nuclear power plants, and other naturally occurring radioactive elements present in earth crust, like Radium-224, Uranium-235, Thorium-232, radon-222 and potassium-40, etc. into the environment.

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## **4.5 Sources and effects of environmental pollution/pollutants**

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In this section we will discuss about sources and effects of different environmental pollution or pollutants such as air pollutants, water pollutants, soil pollutants, noise pollutants and radioactive pollutants.

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### **4.5.1 Sources and effects of air pollution**

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Major sources of air pollution include fossil fuels combustion in automobiles and industries which give off emissions containing unburned hydrocarbons, lead, carbonaceous,

nitrogenous and sulphurous compounds that may cause severe impact on environment quality as well as health damaging effect on living organisms.

**Sources of air pollution**

There are four main sources of air pollution which contribute emission of air pollutants into the environment:

- 1) **Point or Stationary Sources:** These include sources which introduce or emit pollutants into the atmosphere from specified points through chimneys. Example: Industries, thermal power plants, etc.
- 2) **Line or Mobile Source:** These include sources which add pollutants into the atmosphere along narrow belts (i.e. roads) over long distances. Example: smoke coming out from automobile exhausts, etc.
- 3) **Area source:** These include sources which add pollutants from the fire over wide areas. Example: Industrial estates and mining area, etc.
- 4) **Diffuse source:** These include sources which spread pollutants over a large area through spraying or diffusion. Example: sprayed fertilizers and pesticides spread over a large areas through runoff.

Major air pollutants, their sources and effect: Air pollutants are of three kinds:

**Gaseous pollutants:** include oxides of Nitrogen i.e. NO, NO<sub>2</sub>, oxides of Carbon i.e. CO, CO<sub>2</sub> and oxides of Sulphur i.e. SO<sub>2</sub>, SO<sub>3</sub>, hydrocarbons, photochemical oxidants (Peroxyacyl nitrate, Ozone, Smog), Fluorides, aldehydes, peroxides, etc.

**Particulate pollutants:** include dust, smoke, aerosols, mist, fume, smog, pollens, spores, etc.

**Radioactive pollutants:** include nuclear explosives during war like lead, uranium, etc. These sources and their effects can be illustrated from the below table 2.

Table 2: Major air pollutants, their sources and effects

<b>Air pollutants</b>	<b>Sources</b>	<b>Effects on humans &amp; animals</b>	<b>Effects on plants, environment &amp; material, if any</b>
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Carbon monoxide (CO)	Cigarette Smoking, vehicular exhausts, incomplete burning/combustion	Reduces oxygen carrying capacity of blood may cause death, poisoning, giddiness, reduce division, nervous & cardiovascular disorders, etc.	Generally no serious impact on plants, environment & material
Carbon dioxide (CO <sub>2</sub> )	Respiration, decay, biomass burning, smoking, automobile/ coal & petroleum combustion, etc.	Nausea, headache,	Greenhouse effect that produces carbonic acid & resulting acid rain damaging Plant cells, buildings, monuments
Nitrogen oxides	Burning/combustion of fuels & biomass, lightning, etc.	<b>Reduces oxygen carrying capacity of blood, irritation of eyes, nose, respiratory epithelium,</b>	Form PAN and acid rain which suppresses plant growth, also causes leaf Necrosis and defoliation in plants. Spoil metal & clothes Also
Sulphur oxides	Combustion of fuels, petroleum refining, metal ore smelting, H <sub>2</sub> S, incineration, etc.	<b>Drying of mouth, sore throat, irritation in eyes, respiratory tract, lungs, respiratory diseases, etc.</b>	Causes acid rain, damage to clothes, corrosion of paints & metals. Also injurious to plant cells causes chlorosis, plasmolysis, membrane damage, metabolic inhibition may lead to plant death
Hydrocarbons	Decay of sewage, landfills, incomplete combustion of fuels, biomass, etc.	<b>Carcinogenic effect</b>	Senescence and abscission in plants

<p>Peroxyacyl nitrate (PAN)</p>	<p>Photochemical interaction among nitrogen oxides &amp; hydrocarbons present in the air in presence of sunlight</p>	<p><b>Irritating sensation or pain in eyes, nasal passage, throat, respiratory tract, respiratory diseases</b></p>	<p>Produces haze, blocking of sunlight resulting reduction in plant photosynthesis, damage leafy vegetables</p>
<p>Ozone (O<sub>3</sub>)</p>	<p>Photochemical interaction among nitrogen oxides &amp; hydrocarbons present in the air in presence of UV rays</p>	<p><b>Chest pain, coughing, eye irritation,</b></p>	<p>Premature yellowing of leaves, fall of leaves, decolouration &amp; disintegration of clothes, damages rubber, tyres</p>
<p>Aldehydes</p>	<p>Photochemical interaction among nitrogen oxides &amp; hydrocarbons present in the air in presence of sunlight</p>	<p><b>Irritating sensation or pain in gastrointestinal &amp; respiratory tracts</b></p>	<p>Decoloration of leaves &amp; damaging of clothes</p>
<p>Fluorides</p>	<p>Steel, aluminium, phosphate fertilizer industries, coal burning,</p>	<p><b>Fluorosis (spotting of teeth), brittle bones &amp; uneven teeth development due to eating &amp; grazing fluoride</b></p> <p><b>Contaminated plants &amp; grasses</b></p>	<p>Delays crop maturing &amp; Reduces fruit yield due to fluoride accumulation in leaf stomata. Also attack glass, paints &amp; metal surfaces</p>

Dusts	Construction, stone crushing, industrial processes, forest fires, coal burning, etc.	<b>Lung fibrosis (asbestosis, silicosis, byssinosis), lead poisoning, &amp; other respiratory diseases</b>	Blocking of sunlight retards plant photosynthesis
Polychlorinated biphenyls	Burning of plastics	<b>Damage liver &amp; central nervous system, impair vision, skin pigment alteration.</b>	
Pollens, spores, bacteria, viruses	Living organisms & their components	<b>Allergies, respiratory diseases, hay fever &amp; other diseases</b>	Remain suspended in the air & block sunlight, etc.
Smog	Dust + smoke or Smoke + Fog	<b>Toxic to all organisms,</b>	Destruction of vegetation, rubber cracking, etc
Radioactive pollutants	Nuclear explosions	<b>Death of living cells due to DNA rupturing resulting death of organisms</b>	Death of plant cells and tissues, disintegration of metals, clothes, building materials, etc.

**Acid rain: a product of air pollution**

The term acid rain was first coined by Robert August in 1872. Acid rain formation takes place naturally but initiated by manmade activities that lead to the emission of major pollutants like oxides of sulphur and oxides of nitrogen.

Normally, rain water has pH of acidic range i.e. 5.6-6.5. Thus, acid rain may be defined as the precipitation with pH less than 5. It is generally made up of sulphuric acid and nitric acid formed in the atmosphere from sulphurous and nitrogenous compounds respectively by oxidation. The process of formation of acid rain can be illustrated through fig.1. Major sources of nitrogenous compounds or oxides may include emissions from fossil fuel combustors, lightening, automobile exhausts, etc. and that of sulphur containing oxides include smelters, power plants domestic fires, biomass burning etc. From different sources various sulphur and nitrogen containing compounds or sometimes their respective oxides released into the atmosphere and further undergo atmospheric oxidation to form higher oxides. These oxides are changed into sulphuric acid ( $H_2SO_4$ ) and nitric acid ( $HNO_3$ ) on combination with water vapours present in the atmosphere and ammonium sulphate and ammonium nitrates aerosols on combination with ammonia ( $NH_3$ ). These aerosols may acts as cloud condensation nuclei (CCN) which are responsible for cloud formation and precipitation.

From the atmosphere, these acids or acidic sulphur and nitrogen oxides deposit over earth in two distinct forms: Dry deposition and Wet deposition. Dry deposition takes place by settling down of windblown acid oxides and other particles in dry state while Wet deposition on earth occurs in the form of rain called acid rain, fog or snow.

Effects: Acid rain causes soil acidity that severely affects terrestrial flora and fauna inhabited in it. It may also lead to contamination of water bodies present on land that further affect aquatic flora and fauna. Terrestrial plants also get affected directly from acid rain and indirectly from soil contaminated with acid rain and produces symptoms like defoliation, necrosis, chlorosis, etc. Acid rain is also responsible for damaging building materials like stones, slate and corroding metals, painted surfaces, marbles, and monuments like Taj Mahal at Agra due to acid deposition.

**Check your progress: Self-Assessment Questions (SAQ)**

Q1. Which of the following is a gaseous air pollutant? A) Fume B) Smog C) PAN D) Uranium.

Q2. What is the pH of acid rain? A) 6 B) 5.5-6.5 C) Above 7 D) below 5. Q3. Bhopal gas tragedy resulted due to leakage of      gas.

Q4. Secondary pollutants formed due to interaction of      .

Q5. Premature yellowing of leaves in plants caused by      .

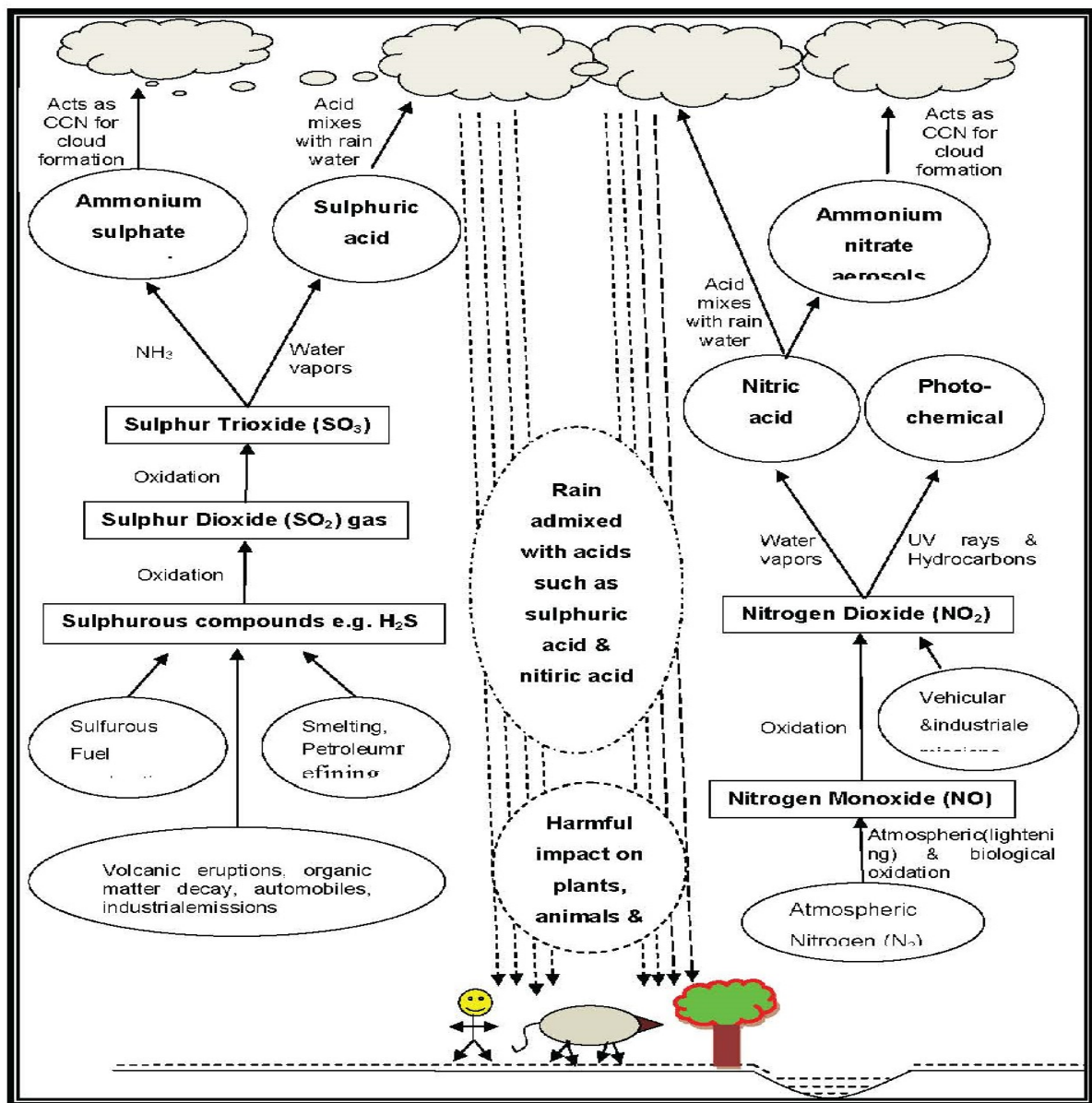


Figure 1: Formation of acid rain in the atmosphere.

### 4.5.2 Sources and effects of water pollution

Water pollution is not only confined to surface water, but it has also spread to underground and sea water to a greater or lesser extent.

#### Sources of water pollution:

Depending upon pollutants discharge into water bodies, there are two types of water pollution sources:

- 1) Point sources: involve pollutants discharge directly from a definite source through the regular channels i.e. municipal and industrial discharge pipes to water bodies.
- 2) Diffuse/non-point sources: involves discharge of pollutants like pesticides, fertilizers scattered on the ground from undefined and diffuse sources into the water bodies through runoffs, etc.

**Determination of water quality:** water quality can be determined by three major parameters i.e. DO, BOD and COD describes below in table 3.

Depending upon the nature and producers of pollutants, there are six types of water pollution sources:

- 1) Sewerage/Community waste water: It comprised of domestic and commercial waste discharge in the form of sewerage emitted into public sewerage systems. Example: human and animal excreta, soaps, detergents, food wastes and many more.

**Table 3: Major parameters for water quality determination**

<b>Parameter</b>	<b>Definition</b>	<b>Concentration value for unpolluted water</b>
DO (Dissolved Oxygen)	Amount of oxygen content dissolved in water	> 8.0 mgL <sup>-1</sup>
BOD (Biological Oxygen Demand)	Amount of oxygen content needed by bacteria to decompose organic matter present in water	< 4.0 mgL <sup>-1</sup>
COD (Chemical Oxygen Demand)	Amount of oxygen content requisite to oxidize total organic matter (biodegradable & non-biodegradable) present in water	< 5.0 mgL <sup>-1</sup>

- 2) Industrial wastes: It includes waste or effluents generated and discharged off from different kinds of industries given in table 4.

**Table 4: Sources of water pollutants from industrial waste**

<b>Types of industry</b>	<b>Inorganic pollutants, if any</b>	<b>Organic pollutants, if any</b>
Paper & pulp	Sulphides, bleaching liquors	Cellulose fibres, berk, wood sugars, organic Acids

Mining	Various metals like iron, etc. and their Chlorides, sulphates, hydroxides, H <sub>2</sub> S, heavy metals, surface wash offs, suspended solids, sulphuric acids, etc.	Not defined
Iron and steel	Various oxides of metals like copper, mercury, cadmium, chromium, sulphides, iron cyanides, thiocyanates, suspended solids, etc.	Oil, naphthalenes, phenols, etc.
Soap & Detergents	Alkalies, tertiary ammonium compounds, etc.	Higher fatty acids, fats, sulphonated hydrocarbons, glycerols, polyphosphates, etc.
Chemical plants	Various acids, alkalies, metal chlorides, sulphates, nitrates, fluorine, phosphorus, silica, suspended particles, etc.	Organic solvents and acids, aromatic compounds, nitro compound dyes, etc.
Food processing	Not defined	Extremely decomposable organic matter, pathogens, etc.
Pharmaceuticals	Not defined	Drugs, antibiotics, Organic solvents, proteins, carbohydrates, vitamins, etc.

**3) Agricultural sources:** These consist of agricultural run offs and drainages containing fertilizers (constituting Nitrogen, Phosphorus and Potassium), pesticides (insecticides, weedicides, fungicides, herbicides, rodenticides, soil fumigants, etc.

**4) Thermal pollution or heat:** Major sources include thermal and nuclear power plants where water is used as coolant and produce hot water. Discharge of this high temperature water into the water bodies may kill aquatic life prevailing there.

**5) Ground water pollution:** Seepage or leaching of various effluents and contaminants like industrial and municipal waste, sewage channels, agricultural runoffs, etc. pollute ground water posing a serious threat to availability of pure drinking water.

**6) Marine/ sea water pollution:** Oceans and seas are the natural sink of all variety of pollutants generated on this earth including even rivers that discharge their pollutants into

oceans. These pollutants may be any radioactive waste, plastics, garbage, oil, grease, detergents, sewage, and many more.

**Effects of water pollution:** Water polluting contaminants alter the physical, chemical and biological characteristics of water resulting into following effects:-

- Water pollution results in the scarcity of pure, clean and fresh drinking water. It also make water unsafe and unfit for domestic and other purposes due to addition of soaps, dyes, detergents, chemicals, heavy metals and other impurities in it.
- Drinking of polluted water may result in various health disorders and can spread many diseases. For example, drinking of water contaminated with poisonous chemicals like cadmium, arsenic, mercury, nitrates, fluorides, etc. lead to many sufferings among living organisms. Contamination of Cadmium causes itai-itai disease (also called ouch-ouch disease) which is an aching illness of bones and joints, also cause liver and lung cancers. Arsenic poisoning may lead to black foot diseases with symptoms like diarrhea, peripheral neuritis, resulting in skin and lung cancers. Mercury poisoning leads to its conversion by bacteria into methyl mercury that undergo biomagnification through food chain and leads to deformity called Minamata disease causing diarrhea, impairment of senses, hemolysis, meningitis and even death also. Nitrate pollution proves lethal for infants causes blue-baby syndrome or methaemoglobinemia that impairs oxygen supply. Fluoride may result fluorosis that causes dental problems and dysfunctioning of respiratory, neuromuscular, gastrointestinal systems.
- Eutrophication: Plant nutrients like nitrogen, phosphorus, potassium, etc. discharge off into water bodies leading to growth of oxygen consuming algal population over the water surface, which deoxygenate water and results in the killing of aquatic organisms thriving there.

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### **4.5.3 Sources and effects of soil/land pollution**

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Soil pollution involves a variety of sources that add soil pollutants into soil. These sources are described below in the table 5.

Table 5: Major sources of soil pollution

<b>Sources</b>	<b>Soil pollutants</b>
Industrial wastes	Chemicals like lead, mercury, copper, zinc, cadmium, cyanides, organic compounds, acids, alkalies, chromates, etc.
Pesticides	Insecticides, herbicides, rodenticides, weedicides, algaecides, fungicides
Fertilizers	NPK fertilizers, urea, manures, etc.
Discarded Materials	Concrete, paper, food waste, plastics, glass, cans, carcasses, etc.
Radioactive Wastes	Radioactive elements like uranium, thorium, radium, etc.

Other pollutants	Acid rain formed from major air pollutants like NO <sub>2</sub> , SO <sub>2</sub> , etc.
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**Effects of soil pollution:** Soil affects drastically each and every component on the earth as it supports life and feeds every organism. Humans, plants and animals depend solely on soil for maintaining their livelihood and obtaining food from it. Therefore, any alteration in soil characteristics by introducing above said pollutants may causes many severe impacts as given below:

- **Agricultural impacts:** Soil pollution may results reduction in soil fertility and productivity, decrease in nitrogen fixation ability of soil, increase in soil erosion and loss of fertile land, loss of soil nutrients reduction in crop yield, increase in soil salinity, acidity or alkalinity, etc.
- **Health impacts:** Absorption of toxic contaminants by plants resulting plants health damage and then transfer into human and other animals via food chain creating severe toxicity among them also. Release of toxic gases and dangerous chemicals from polluted soil into air and ground water may cause many health disorders.
- **Environmental impacts:** Soil pollution may disrupt ecological balance by reducing vegetation growth and may also cause imbalance in soil fauna and flora.
- **Other impacts:** Waste management problems, foul smell due to release of gases, inundation of areas, clogging of drains, etc.

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#### **4.5.4 Sources and effects of noise pollution**

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**Sources of noise pollution:** Noise pollution is mainly created by annoying, unpleasant and damaging sound producing machines, equipments, instruments, etc. There are following sources of noise pollution:-Industries, transport or automobile vehicles, defence equipments, space rockets, domestic gadgets, entertainment systems, public address systems, music concerts, construction works, fire crackers, and many more.

**Effects of sound pollution:** Noise is measured in decibels (dB). Every 10dB is equivalent to double the increase in loudness. World Health Organization recommended that sound level of <30dB is safe for indoors. Any increase in prescribed sound level results in various impacts as:

- Create annoyance among people which may badly affect their mood swings
- Continuous exposure to high sound levels can affects physiological functioning like pulse rate, breathing amplitude, blood pressure, heart- beat rate, blood cholesterol, etc.
- Continuous and prolonged exposure to sound level >75dB may result loss of hearing
- High level noise distracts concentration of a person and affects his performance also
- On exposure to infrasonic and ultrasonic waves, building and materials may get collapsed and destroyed

- High level noise makes person sleepless, restless, also pain and ringing in ears, feeling of tiredness.

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### **4.5.5 Sources and effects of radioactive pollution**

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**Sources:** Radioactive pollution occurs due to the contamination of air, water or soil with radioactive material. Radioactive materials produce harmful radiations and may cause huge damage to life. Radioactive pollution has two sources: Natural and manmade. Natural source include outer space cosmic rays that reach the earth surface, terrestrial radiations from nuclides of naturally occurring radioactive elements such as Uranium-235, Radon-222, Thorium-232, Radium-224, etc. These have not so much hazardous as present in very low concentration. On the other hand, manmade sources of radioactive pollution include mining and refining of radioactive elements like plutonium and thorium, nuclear explosions consisting Strontium-90, Cesium-137 and Iodine-131, waste from atomic and nuclear reactors, nuclear fuel, radioactive isotopes manufacturing like Carbon-14, Iodine-125, Phosphorus-32, etc.,

**Effects:** The effect of radioactive material depends upon certain factors like the intensity of radiation, rate of diffusion, radiation exposure time duration and half-life of material. Greater is the value for these factors greater is the impact. Major impacts of radioactive pollution are:

- Short range effects which appear within few days or weeks after exposure to these radiating materials include burns, hair loss, impaired metabolism, alteration in number and proportion of blood corpuscles, death of cells, tissues or whole organism.
- Long range effects that appear months or years or even in next generations after exposure to radioactive materials radiations include genetic mutations, cancers, tumours, early deaths, embryo developmental changes, etc.
- Strontium-90 can cause bone cancer due to accumulation in bones. Iodine-131 can damage blood corpuscles, bone marrow, spleen, lymphatic system and also lead to skin cancer, lung cancer, loss of fertility, loss of eyesight and many other impacts.

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## **4.6 Summary**

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In this unit, we have read about the concept of environmental pollution and their corresponding pollutants. So far you have learnt that:

- Environmental pollution is the contamination of environmental components i.e. air, water and soil by natural (lesser extent) as well as manmade activities (greater extent).
- Emission of toxic/harmful materials into air results air pollution and the corresponding materials called air pollutants that comprised of gaseous materials, particulate matter and radioactive substances (see text for detailed understanding).
- Release of harmful substances from various sources (described in text) into water bodies causes water pollutant and the respective substances called water pollutants that may include organic compounds, pathogens, toxic chemicals, dust, heavy metals and many more.

- Release of effluents and toxic materials from industries, agricultural runoffs and domestic waste, etc. into soil or land leads to soil pollution and the effluents and material called soil pollutants.
- Noise pollution is the result of loud, unpleasant, disturbing and damaging sound. Noise greater than 75 decibel may result loss of hearing.
- Radioactive pollution occurs due to harmful emissions given off by radioactive materials present on the earth naturally or by manmade activities.
- All kinds of environmental pollution may bring havoc by through their damaging effects. For instance air pollution can cause several respiratory and other diseases among humans, many health effects among plants and damaging effect on material or cultural assets. While water pollution may lead several diseases like fluorosis, blue-baby syndrome, minamata disease and many more among humans, also affect plants health, results eutrophication that degrade aquatic life in waterbodies, etc. Soil pollution also impart its impacts on living organisms through transfer of pollutants via food chain.
- Noise pollution also have the ability to affects living being as well as buildings and materials severely. While radioactive pollution can damage living cells and tissues and often cause death of organisms.

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## 4.7 Glossary

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**Abiotic:** Non-living components present in the environment

**Acid rain:** Rain admixed with acids produced in the atmosphere from air pollutants and water vapours and having pH less than 5

**Anthropogenic activities:** Man-made activities

**Biotic:** Living components present in the environment

**Environment:** The sum total of living and non-living components present in the surroundings

**Environmental pollution:** Alterations in the environmental characteristics by addition of harmful materials into the environment

**Food Chain:** Linear sequence of organisms linked together for food where an organism becomes food for organism at next trophic level

**PAN:** Peroxyacyl nitrate formed by the photochemical interactions among nitrogen oxides & hydrocarbons present in the air in presence in presence of sunlight

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## 4.8 Answer to check your progress/Possible Answers to SAQ

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Q1. C) PAN (Peroxyacyl Nitrate)

Q2. D) Below 5

Q3. Methyl Isocyanate

Q4. Primary pollutants

Q5. Ozone (O<sub>3</sub>)

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## **4.10 Suggested Readings**

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## **4.11 Terminal and Model Questions**

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Q1. Differentiate between qualitative and quantitative pollutants.

Q2. Discuss major gaseous pollutants, their sources and impact on human health.

Q3. Briefly describe various diseases among humans caused by water pollution.

Q4. Explain the process of formation of acid rain.

Q5. Air, water and radioactive pollutants contribute to soil pollution. How? Q6. What are the major effects of noise pollution?

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**UNIT 5: Environmental Protection**

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**5.0 Learning Objectives**

**5.1 Introduction**

**5.2 Different Approaches to Environmental Protection**

**5.2.1 Voluntary Environment Agreements**

**5.2.2 Ecosystem Approach**

**5.3. Role of Government in Environment Protection**

**5.4 Protection vs Conservation**

**5.4.1 Protection**

**5.4.2 Conservation**

**5.5 Institutional apparatus (Local/ National/ International)**

**5.5.1 Local Agencies (In India)**

**5.5.2 National Agencies**

**5.5.3 International Agencies**

**5.6. International Programmes on Conservation**

**5.7 Importance of Information and Technology for Conservation of Environment**

**5.8 Summary**

**5.9 References**

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**5.0 Learning Objectives**

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In this unit you will be able to understand the basics of environment protection and various agencies involved in protection work. The unit will explain:

- Basics of Environment Protection
- Difference between Protection and Conservation
- Various agencies (Local/ National/ International) involved in resource conservation
- Role of information Technology in resource conservation.

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## 5.1. Introduction

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In a broader sense environment protection means protection of environment as well as other resources from any adversely affecting agency. The damaging agency can be individuals, industry, organization etc. The objectives of environmental protection include conservation of resources as well as repairing of damaged ones. The main reasons behind the depleting and damaging resources are high population growth, overconsumption and unsustainable utilization. Considering this alarming situation now the governments have begun placing restraints on activities that cause environmental degradation. Since the 1960s, environmental movements have created more awareness of the multiple environmental problems.

The environmental protection may involve:

- (a) Changes in characteristics of goods and services,
- (b) Changes in consumption patterns,
- (c) Changes in production techniques,
- (d) Treatment or disposal of residuals in separate environmental protection facilities,
- (e) Recycling, and
- (f) Prevention of degradation of the landscape and ecosystems.

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## 5.2 Different Approaches to Environmental Protection

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Basically there are two different approaches for environmental protection- Voluntary environment agreements Ecosystem approach.

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### 5.2.1. Voluntary Environment Agreements

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In the era of industrialization there are many voluntary environmental agreements which are followed by many companies on a voluntary basis. Under this agreement the companies follow the minimum regulatory standards and thus support the development as well as conservation for the best environmental practice. For instance, in India, Environment Improvement Trust (EIT) has been working for environmental and forest protection since 1998.

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### **5.2.2 Ecosystem Approach**

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In ecosystem approach of resource management rather than taking a specific resource for decision making the complete ecosystem should be taken under consideration. It is more collaborative approach of planning and decision making. Under this approach all the stakeholders are taken under consideration as a unit. This approach ideally supports a better exchange of information, development of conflict-resolution strategies and improved regional conservation. Religions also play an important role in the conservation of the environment

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## **5.3 Role of Government in Environment Protection**

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Commonly it is a general perception that environment protection is the responsibility of government, legislation and law enforcing agencies. But in real sense it is the responsibility of every citizen along with the government to conserve the available resources. It is an ideal condition to involve different stakeholders including industry, indigenous groups, and environmental group and community representatives for decision making in environment related issues.

The Constitution of India has a number of provisions demarcating the responsibility of the Central and State governments towards Environmental Protection. As per the article 48-A of our constitution it is the duty of state to protect and improve the environment and to safeguard the forest and wildlife of the country. By Article 51-A (g) environmental protection has been made a fundamental duty of every citizen of India. As per article 21 of the constitution is a fundamental right, which states that "No person shall be deprived of his life or personal liberty except according to the procedure established by law".

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## **5.4 Protection vs Conservation**

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### **5.4.1 Protection**

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Protection means shielding something against dangers which tend to destroy it. Thus resource protection means shielding the resources against the dangers which may either completely destroy it or at least damage it to such extent that it may not be able to confer benefits it is expected to give (Negi, 1993). As protection requires efforts as well as money, its intensity is directly proportional to the value of and the benefits conferred by, the resource to be protected. The more valuable there source the more likely it is to be damaged by humans and consequently greater is the effort and more resources required to protect it.

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### **5.4.2 Conservation**

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Environmental conservation is the practice of us humans saving the environment from the loss of species, and the destruction of the ecosystem, primarily due to pollution and human activities. Conservation is vital in saving and helping both animals and trees as all are

dependent on one another for survival. For maintaining the supply of resources, it is important to use the resource at or below its sustained yield. The resource conservation aims to-

- Maintain ecological processes and life support systems
- Ensure continuous yield of plants, animals and materials
- Preserve the quality of environment
- Conserve biological diversity
- Achieve sustainable use of species and ecosystems

The collective resource management programmes with the involvement of local social groups have been found to be effective for the management of watershed, forest, fishery, agriculture etc. as well as for improving community wellbeing. Environmental conservation and protection are two terms that are often used interchangeably, although they are quite different. Conservation refers to the responsible management of the environment and its resources for present and future use and protection, on the other hand, is a much stricter approach where the environment, lands and natural resources are put away, not to be consumed by humans, but are instead maintained in their pristine form. If the land is to be used by humans, it should only be utilized for its natural beauty and inspiration.

In short on one hand conservation includes the responsible use of natural resources whereas in protection the environment is protected from all harmful human activities.

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## **5.5 Institutional apparatus (Local/ National/ International)**

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Environment Conservation is not a matter which can be single handed managed by the Government agencies. For the sustainable development it is the need of the hour that different government and non-government agencies must work together. To address this diverse and critical issue many institutions and organization have been setup at international, national and local level. An environmental organization is an organization seeks to protect, analyse or monitor the environment against misuse or degradation or lobby for these goals. Environmental organization may be a government organization, a nongovernment organization, a charity or trust which can act at global, national, or local level.

India's approach to protect the environment and to restore it, exists from the vedic and post-Vedic times. But after independence it took a back seat and economic growth became the priority in our day to day life. Only after 1972 with the formation of the National Committee on Environmental Planning and Coordination (NCEPC) the focus on environmental conservation again restarted. In 1985 a full-fledged department, Department of Environment and Forest was set up by the government. Initially the Constitution of India did not contain any provision towards the promotion/protection of environment. However, the 42nd amendment of the constitution in 1977 added some important clauses that entrusted the government the responsibility of providing a clean and well-protected environment.

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### **5.5.1 Local Agencies (In India)**

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There are many Non-Governmental Organizations (NGOs) which are actively involved in the area of resource conservation. A NGO is mostly privately funded organization with no active involvement of any government agencies. Therefore NGOs are independent of governments. In our country there are many active NGOs which are working in the field of environment conservation, sustainable development, resource conservation, wildlife conservation etc.. Some of them are as follows:

#### **Centre for Science and Environment (CSE)**

The Centre for Science and Environment (CSE) is New Delhi based a research organization. The main objective of CSE is to maintain a balance between exploitation of the available natural resources and growing industrialization. The CES try to create awareness among people regarding the day today environmental issues and propose solutions of these issues. The main target group of CSE is the youth and students of our country with this in mind, CSE has been developing non-formal environmental education. Their tools for creating awareness are periodicals publications, films, exhibitions and other products.

#### **Kalpavriksh**

Established in the year 1979 Kalpavriksh is an Indian NGO actively working in the field of Environmental awareness. The area in which Kalpavriksh is involved in creating awareness among people, promoting research, litigation etc. For environment related issues they go upto protest letters to street demonstration etc. Kalpavriksh is actively involved in protest against the destruction of largest green area in Delhi and also actively involved in studying the impact of Narmada dam project on environment and many more. Kalpavriksh believes that a country can develop meaningfully only when ecological sustainability and social equity are guaranteed, and a sense of respect for, and oneness with nature and fellow humans is achieved. In this NGO all the decisions are taken after appropriate debate and discussion within the organization and with the community.

#### **Development Alternatives**

Development alternatives is an Indian based non-governmental organization with the aim of sustainable development without damaging the available resources. This NGO was established in the year 1983. The agenda of development alternatives is focus on a cordial interrelationship between social and environment component of the country. In short it includes the balanced relation between nature, technology and people living in the country. The development alternatives believes in sustainable development must support the economy, environment and most importantly the society. The Development Alternatives Group is, therefore, dedicated to bring about a better balance among the basic prerequisites of sustainable development: social equity, environmental quality and economic efficiency. The mission of the Development Alternatives Group is to promote sustainable national development. The

development alternatives believes in generating sustainable livelihood to eradicate poverty on one hand and conservation and proper regeneration of the resources on other.

### **Tropical Research & Development Centre (TRDC)**

Established in 1994, the vision of TRDC is to make natural resources available to all, with no discrimination. This NGO, headquartered at Bengaluru, aims to nurture development practices through education, awareness and conservation. The TRDC – Paryavaran project launched in some districts of Karnataka addresses the adversities of environmental degradation and climate change. The project also aims at conservation and betterment of local flora and fauna, revitalization of water resources, and involving the younger generation and farmers in their efforts to help in the preservation of natural resources.

### **Sankalp Taru Foundation**

This environmental NGO is a classic example of how digital channels can be used in protection and conservation of the environment. SankalpTaru is an e-NGO, which aims at promoting tree plantation across the country. The NGO is active in 21 states in India. The plantation drive is run on a digital platform, allowing SankalpTaru to use innovative technologies such as GPS-tagging and others. This way, the volunteers can track the progress of plantation drives. So far, millions of trees have been planted since SankalpTaru's inception by Apurva Bhandari in 2013. The NGO involves all the aspects of environmental protection – rural development, cleaner schools, tree plantation in cities and community-based land protection. Their principal aim is to create a greener, cleaner and healthier environment so that our future generations get a better and greener planet with even richer bio-diversity and abundant natural resources.

### **Chintan Environmental Research and Action Group**

Focused on promoting sustainable and equitable growth for every member of the society, Chintan works towards ensuring responsible and sustainable consumption, thus protecting the environment. Founder Bharati Chaturvedi is an avid writer with several powerful articles promoting environmental protection. At Chintan, they endeavor to lessen surplus waste, promote sustainable consumption and facilitate better waste management. They also raise their voice against air pollution by creating awareness. The primary purpose of promoting sustainable consumption and waste management is to provide resources for the vulnerable sections of the society.

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## **5.5.2 National Agencies**

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There are many national level agencies in our country which are actively involved in the protection and conservation of natural resources. Some of them are The Ministry of Environment and Forest, Central Pollution Control Board, Indian Board for Wildlife, National Biodiversity authority, Animal welfare board of India, Forest survey of India etc.

Ministry of Environment and Forest: In India the Ministry of Environment and Forests (MoEF) is one of the most important department of central government. The ministry mainly focuses on planning and promoting the matters related with environment and forest in the country. The main activities undertaken by the ministry include conservation and survey of the flora and fauna of India, forests and other wilderness areas; prevention and control of pollution; afforestation and reducing land degradation. All national parks of the country are administered by the ministry. It provides the financial support the different organizations for research, capacity building and for creating awareness among common peoples in the country. The Ministry is also the nodal agency in the country for the United Nations Environment Programme.

### **Central Pollution Control Board**

In India to conserve the various resources against the rising pollution a statutory body namely “Central Pollution Control Board” was established in the year 1974. This body was constituted under the Water (Prevention and Control of Pollution) Act, 1974. Further, CPCB was entrusted with the powers and functions under the Air (Prevention and Control of Pollution) Act, 1981.

It is an apex body which provides the technical inputs to the Ministry of Environment and Forests of the provisions of the Environment (Protection) Act, 1986. The thrust areas of CPCB, is proper implementation of the Water (Prevention and Control of Pollution) Act, 1974, and the Air (Prevention and Control of Pollution) Act, 1981. CPCB promotes the cleanliness and improvement of water and air quality in the country.

### **Indian Board for Wildlife (IBWL)**

The IBWL is the apex body for wildlife conservation in India. The IBWL is headed by the honourable Prime Minister of India. The IBWL has been reconstituted w.e.f. 7.12.2001. The XXI meeting of the IBWL was held on 21.1.2002 under the Chairmanship of the Honourable Prime Minister of India at New Delhi.

### **National Biodiversity authority**

It is a statutory autonomous body under the Ministry of Environment and Forests, Government of India established in 2003, after India signed Convention on Biological Diversity (CBD) in 1992. Its head quarter is situated in Chennai. The main objective of the authority is implementation of Biological Diversity Act, 2002. it acts as a facilitating, regulating and advisory body to the Government of India “on issues of conservation, sustainable use of biological resources and fair and equitable sharing of benefits arising out of the use of biological resources.” Additionally, it advises State Governments in identifying the areas of biodiversity importance (biodiversity hotspots) as heritage sites.

### **Animal Welfare Board of India**

Animal welfare board was established in 1962 under Section 4 of The Prevention of Cruelty to Animals Act, 1960. Its head quarter is in Chennai. The board gives advice to

Government on Animal Welfare Laws and promotes animal welfare in the country. The Board issues publications to raise awareness of various animal welfare issues. The Board's Education Team gives talks on animal welfare subjects, and trains members of the community to be Board Certified Animal Welfare Educators.

### **Forest Survey of India**

Forest survey of India is a government organization in India under the Union Ministry of Environment, Forest and Climate Change for conducting forest surveys and studies. The organization came into being in, 1981. Its headquarter is in Dehradun, Uttarakhand. The objective of FSI is the monitoring periodically the changing situation of land and forest resources and present the data for national planning; conservation and management of environmental preservation and implementation of social forestry projects. FSI prepares State of Forest Report biennially, providing an assessment of the latest forest cover in the country and monitoring changes in these and conduct an inventory in forest and non-forest areas and develop a database on forest tree resources. Forest Survey of India assesses forest cover of the country every 2 years by digital interpretation of remote sensing satellite data and publishes the results in a biennial report called 'State of Forest Report'(SFR).

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## **5.5.3 International Agencies**

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### **IUCN (The World Conservation Union)**

The world conservation union was founded in the year 1948. The union brings together states, government agencies and a diverse range of nongovernmental organization in a unique partnership covering some 81 countries. Its headquarter is in Gland, Switzerland. IUCN seeks to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and sustainable use of natural resources. The union has helped many countries to prepare National Conservation Strategies, and demonstrates the application of knowledge through the field projects it supervises. The world conservation union builds on the strengths of its members, networks and partners to enhance their capacity and to support global alliances to safeguard natural resources at local, regional and global levels. The IUCN Species Survival Commission (SSC) represents the world's most complete source of scientific and management expertise on species and their conservation.

### **Convention on Biodiversity**

The Earth summit held in 1992 at Rio de Janeiro resulted into a Convention on Biodiversity, which came into force on 29 December 1993 and has been ratified by 183 countries. The Convention on Biodiversity has three key objectives- (i) conservation of biological diversity, (ii) sustainable use of biodiversity (iii) fair and equitable sharing of benefits arising out of the utilization of genetic resources. This convention has stimulated many countries to develop National Biodiversity Strategy and Action plan.

### **United Nations Environment Programme (UNEP):**

The UNEP, stands for United Nations Environment Programme was established in the year 1972. It is a global authority that set up the global environment agenda for protecting the different natural resources. The UNEP advocates environmental protection along with sustainable development without compromising the life quality of future generations. Headquartered in Nairobi, Kenya, UNEP works through its divisions as well as regional, liaison and out-posted offices and a growing network of collaborating centres of excellence. UNEP works closely with its 193 Member States and representatives from civil society, businesses, and other major groups and stakeholders to address environmental challenges through the UN Environment Assembly, the world's highest-level decision-making body on the environment.

The organization hosts the secretariats of many critical multilateral environmental agreements and research bodies.

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## **5.6. International Programmes on Conservation**

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### **World Conservation Strategy**

In 1980, the International union for conservation of natural resources (IUCN), the United Nations Environmental Programme (UNEP) and World Wide Fund for Nature (WWF) developed the world conservation strategy, a long term plan for conserving the world's biological resources (IUCN/UNEP/WWF, 1980). This plan was expanded and followed by "Caring for the earth: a strategy for sustainable living" ((IUCN/UNEP/WWF, 1991). This report enlisted a set of principles and strategies of a sustainable society based on practical integration of environment, social and economic, concerns. Its primary goal was to maintain essential ecological processes and life support systems to preserve species and genetic diversity to ensure the use of species and ecosystems in a sustainable manner to improve the quality of human life.

### **World Commission on the environment and development:**

In 1983 the United Nations established a commission called the World Commission on the Environment and Development. The commission is often called Brundtland Commission after the name of head of the commission. The commission proposed a global agenda to address the world's environmental problems and people's concerns relating to living conditions, resources, population pressures, international trade, education and health. This commission favours sustainable development as sustainable development meets the needs of the present without compromising the ability of future generations to meet their own needs (WCED, 1987).

### **United Nations Conference on Environment and Development (UNCED):**

At the time of the United Nations Conference on Environment and development (the Earth Summit) held in Rio de Janeiro most of the leaders of the world signed the frame work convention on climate change and the convention on biological diversity. The Rio summit adopted Rio declaration and Agenda 21 for achieving sustainable development in the 21 century (UNCED, 1992). This declaration includes equal consideration of environment, society and economy.

Besides these the Agenda 21-UNCED, The Rio Summit Follow-up, Commission on Sustainable Development (CSD), Global Environmental Monitoring and Assessment are some other international programmes on environmental conservation.

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## **5.7 Importance of Information and Technology for Conservation of Environment**

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Information generally has an advantage over those to whom such access is denied. The evolution of information technology, has generally led to dispersal of information to increasing broader audiences. Advances in telecommunications and other forms of information technology have contributed to the creation of new patterns of work and human association. Information technology has also increased the pace of discovery. The capacity of establishing and maintaining worldwide databases has linked environmental, researches around the globe. These information is utilized for developing and early warning system and to forecast any eventuality much earlier. A large amount of information is easily available through Remote Sensing technology, Geographical Information System (GIS) and Global Positioning System (GPS) that is being used for various environmental studies.

Realizing the importance of Environmental Information, the Government of India, in December, 1982, established an Environmental Information System (ENVIS) as a plan programme. The focus of ENVIS, is been on providing environmental information to decision makers, policy planners, scientists and engineers, research workers, etc. Total 25 ENVIS Centers have been functional in our country to cover the broad subject areas of environment. ENVIS is a decentralised system with a network of distributed subject oriented Centers ensuring integration of national efforts in environmental information collection, collation, storage, retrieval and dissemination to all concerned. Presently the ENVIS network consists of Focal Point at the Ministry of Environment and Forests and ENVIS Centers set up in different organizations/establishments in the country in selected areas of environment. These Centers have been set up in the areas of pollution control, toxic chemicals, central and offshore ecology, environmentally sound and appropriate technology, bio-degradation of wastes and environment management, etc. ENVIS focal point ensures integration of national efforts in environmental information collection, storage, retrieval and dissemination to all concerned.

### **Global Environment Database:**

The United Nations Environment Programme (UNEP) has set up the global environmental database (GRID) within the frame work of the Global Environmental Monitoring system (GEMS). The main function of GRID are environmental data management and to establish a global network on environment using GIS and image processing technology. GRID is useful to examine interactions between different environmental databases and to provide models and scenarios. The international Geosphere and Biosphere programme uses GRID as a useful data management system for studying global change. The activities of GRID also focus on problems of land degradation, forest depletion and loss of biological diversity.

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## **5.8 Summary**

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There is a serious concern about the growing fragility of the Earth's life support system. Ever growing human population and its activities are adversely affecting the various resources of the earth. Human population and economic wealth of people have significantly increased the degradation of natural resources which need to be controlled immediately. Resource protection and conservation is the need of the hours. One should protect the available resource by focusing on changing the consumption patterns, recycling, and prevention of degradation of the landscape and ecosystems. Environmental conservation and protection are two terms that are often used interchangeably, although they are quite different. Conservation refers to the responsible management of the environment and its resources for present and future use and protection, on the other hand, is a much stricter approach where the environment, lands and natural resources are put away, not to be consumed by humans, but are instead maintained in their pristine form. If the land is to be used by humans, it should only be utilized for its natural beauty and inspiration. The matter on environmental protection often focuses on the role of government, legislation, and law enforcement. However, in its broadest sense, environmental protection may be seen to be the responsibility of all the people and not simply that of government. There are many agencies which are working on local, national and international levels. There are many Non-Governmental Organizations (NGOs) which are actively involved in the area of resource conservation at local level. Sustainable development emphasizes that the rate of consumption and use of natural resources must approximate the rate at which these resources can be substituted or replaced. At the same time it requires that society is able to satisfy social, economic and other needs without affecting the interest of future generation.

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### **Terminal Questions**

- Q.1. What is environment protection and explain various approaches of environment protection.
- Q.2. Write a note on role of Government in environment Protection.
- Q.3. Differentiate between Protection and conservation.
- Q.4. Discuss in detail the various local agencies involved in environment Protection.
- Q.5. Discuss in detail the various national agencies involved in environment Protection.
- Q.6. Explain different International Programmes on Conservation

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**Unit 6: Environment in Indian Constitution**

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**6.0 Objectives****6.1 Introduction****6.2 Indian Constitution and Environmental Protection****6.3 Preamble to the Indian Constitution****6.4 Directive Principles of State Policy****6.5 Fundamental Duties****6.6 Fundamental Rights****6.7 Distribution of Legislative Powers between Union and States****6.8 Judicial Approach****6.9 Summary****6.10 References**

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**6.0 Objectives**

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After going through this unit you will be able -

- To apprise about the constitutional provisions concerning the protection of environment and promotion of clean and healthy environment
- To understand about the fundamental right and duty
- To understand about the directive principles of state policy
- To understand about the legal regime established under the Constitution.

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**6.1 Introduction**

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Traditionally, environmental ethics have formed an inherent part of Indian religious precepts and philosophy. Protection of forests and environment has always been part of Dharma (PC Joshi, 2007). Worship of nature – Sun, Moon, Earth, Air and Water – was not merely a primitive man's response to the fear of the unknown, but it arose from the deep reverence

shown to the forces of nature which sustained and preserved human life on earth. The basic tenet that underlies this deep reverence for nature is the belief that life is a singular, continuous and uniform phenomenon and even a small change in one part of the eco-system is likely to reverberate throughout. Guru Nanak (Founder of the Sikh Religion, 1469-1539), said 'Pawan Guru, Pani Pita Mata Dhart Mahat, Divis Raat Doi Daia, Khele Sagal Jagat' (Air is like God, Water is father and Earth is the mother. It is through the harmonious interaction of all these three vital ingredients that the whole universe is being sustained) [Jaspal Singh, 2009]. However, rapid industrialization and urbanization coupled with declining social values have contributed towards degradation of environment throughout the globe and India has also witnessed and contributed towards the same. (Manoj Kumar, 2011).

Constitution of India is a dynamic instrument which echoes the values, aspirations and the ideals of our freedom movement. Constitutional provisions strive for having clean environment and it is reflected in Constitutional provisions as interpreted by the higher judiciary.

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## **6.2 Indian Constitution and Environmental Protection**

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Constitution of India lays down unique federal structure for India. It is a bulky piece of legislation which not only gives shape to the aspirations of freedom fighters by laying emphasis on fundamental rights but also lays down the Directive Principles of State Policy which the legislature should keep in mind while legislating. Part XI of the Constitution dealing with legislative relations lays down detailed division of subjects on which Union and State governments can legislate. This part deals with the constitutional provisions pertaining to environment contained in different parts of the constitution.

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## **6.3 Preamble to the Indian Constitution**

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The Preamble to the Indian Constitution which starts with "We the People" sets out the goals and objectives of the Constitution. It declares India to be a Sovereign Socialist Secular Democratic Republic. It has been declared to be a key to open the mind of constitution makers. Though Words "Secular and Socialist" were added later on to the Constitution by 42nd Amendment yet the Constitution had secular as well as socialist fabric right from its inception. Various provisions in the Constitution deal with the socialist and secular fabric of the nation in particular Part IV lays down emphasis on Socialistic pattern of governance and Part III spells out the secular fabric of the country.

Word Socialist in the Indian Constitution read in conjunction with Part IV of the Indian Constitution points out that the Constitution adopted welfare government on socialistic pattern whose prime aim was welfare of people. Social welfare is not possible if the people are forced to live in unclean environment which jeopardise their health and lives. The use of words "Democratic Republic" further brings the point home that the government is to work for the welfare of the masses and that the people have right in participate in government process. This

implies that government shall seek to provide, apart from other things, a clean environment suitable for human abode.

The Preamble also aims to achieve Justice - Social, Economic and Political. A nation where rich and influential pollute the environment by uncontrolled and rampant industrialization and unregulated, unhindered and illegal mining without caring for the environment causing irreparable loss to the ecology and people cannot be said to be a nation having welfare state and providing social and economic justice. Hence, the Preamble not only talks about socialistic pattern but also that there shall be economic, political and social justice. Thus, though the Preamble does not expressly deal with environment yet the language of Preamble is wide enough to cover environment protection and clean environment as implicit therein.

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## **6.4 Directive Principles of State Policy**

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Part IV of the Constitution of India lays down Directive Principles of State Policy. They lay down the socio-economic goals of the nation. Though Directive Principles are non-justifiable yet they have been declared to be fundamental in the governance of the country (Article 37). Before 42nd Amendment, there was no specific provision in Part IV dealing exclusively with environment. However, goal of environment protection in the Indian Constitution can be inferred from the provisions enshrined in Articles 38, 47 and 50 read with Article 37.

Article 37 casts a duty on the State (i.e. all the organs of the State – legislature, executive and judiciary) to apply directive principles in making laws.

Article 38 seeks to achieve welfare of the people by casting obligation on the State to target social, economic and political justice. As explained earlier, social, economic and political justice along with welfare of people enjoins a duty upon State to protect and preserve the environment which is essential for the well-being of the country and of future generation.

Article 47 spells out the primary duty of the State to improve public health (Article 47). Improvement of Public Health takes within itself that the environment is free from pollution and conducive for human dwelling and public health. The surrounding environment filled with smoke, pollutants and smog caused by rampant, uncontrolled and unregulated industrialization, construction activities and stubble burning causing irreparable damage to the lungs of people living in vicinity and causing other health hazards is surely anti-thesis to the goal enshrined in Article 47 i.e. improvement of public health. Thus, though article 47 does not spell out in express terms the duty of the government to protect environment and promote clean environment yet it is implicit in it because improvement of public health is not possible in an unclean environment.

Article 51 provide for promotion of internal peace and security and for fostering respect for international law and treaty obligations. Henceforth, State shall endeavour to implement international law and treaties and foster respect for them including but not limited to

international obligations pertaining to protection of environment. Thus Article 51 seeks to promote protection of environment in consonance with international obligations.

Thus, though there were no express provisions pertaining to protection of environment in the Constitution yet promotion of environmental protection was implicit in Part IV of the Constitution of India even prior to its amendment by Constitution (Forty-second Amendment) Act, 1976.

Constitution (Forty-second Amendment) Act, 1976 inserted an express provision pertaining to environmental protection in Part IV in the form of Article 48A. It reads as under:

“The State shall endeavour to protect and improve the environment and to safeguard the forests and wild life of the country.”

After insertion of an express provision in Part IV along with other provision in other parts of the Constitution, it became incumbent on the part of the State to protect the environment and to promote clean environment. As stated earlier directive principles are fundamental in the governance of the country and all the organs of the State while making laws are to apply directive principles. ii

It must be remembered that though directive principles of state policy are non-justifiable yet it does not preclude the courts to declare any law as unconstitutional which is in violation of Part IV (Paramjit Jaswal, 2015). Similarly, courts are to ensure that the other organs of the State act as per the law of the land. Moreover, as observed by the Supreme Court in *Mumbai Kamgar Sabha v. Abdul Bhai* where two choices are available in the interpretation of the laws, the judiciary should lean in favour of the construction which is in conformity with the socio-economic philosophy enshrined in Part IV of the Constitution. Further, as will be evident from the discussion in the next section, many of the directive principles of state policy when interpreted in conjunction with Part III and Part IV-A have been elevated to the status of fundamental right including the right to live in pollution free environment.

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## **6.5 Fundamental Duties**

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Part IV A of the Constitution of India inserted by Constitution (Forty-second Amendment) Act, 1976 imposes duties upon every citizen of India. Article 51A casts eleven duties upon the citizens of India. iv Article 51A(g) casts the following duty upon the citizens of India

“To protect and improve the natural environment including forests, lakes, rivers and wild life, and to have compassion for living creatures”

Mode of enforcement of fundamental duties was not expressly provided by the Constitution. However, the powerful pronouncement of the Rajasthan High Court in *L.K. Koolwal v. State of Rajasthan* v clarified the co-relation between rights and duties when the court observed that rights and duties co- exist and there cannot be any right without any duty

and there cannot be duty without any right. Hence, the duty of one is the right of another and rights are justifiable.

While considering the enforcement of fundamental duty enshrined in Article 51A (g) and the directive principle contained in Article 48A, the Supreme Court in *Shri Sachidanand Pandey v. State of West Bengal* vi observed that Court cannot shrug its shoulders on the ground that priorities are matter of policy and therefore, the court should leave the matter. The court concluded that court can always give necessary directions in the matter.

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## **6.6 Fundamental Rights**

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Part III of the Constitution of India enumerates fundamental rights. One of the most important fundamental rights is the right to life and personal liberty enshrined in Article

21. Article 21 provides as under

“No person shall be deprived of his life or liberty except according to procedure established by law.”

Taking leaf from the observation of Field, J. in *Munn v. Illinois* vii wherein it was held that life does not mean mere animal existence it is much more than that, the Supreme Court of India has held in *Francis Coralie v. Union Territory of Delhi* viii that right to life includes right to live with human dignity and what Article 21 prohibits is not only the deprivation of life but deprivation of all those limbs and faculties by which life is enjoyed including the basic necessities of life such as food, shelter, clothing etc.

The Supreme Court in *Maneka Gandhi v. Union of India* ix interpreted the expression ‘procedure established by law’ to mean that the procedure must be just, fair and reasonable. After this interpretation coupled with judicial activism, many rights have come to be included within the ambit Article 21. Of late, Article 21 whose potential was never discovered in the past was ultimately pulled out of its deep slumbers and harnessed to engineer social justice which is one of the goals to be attained by the Constitution (Shailja Chander, 1992). Liberal court decisions in the field of life and personal liberty have opened new vistas in the Indian Constitutional Law whereby Article 21 read with Articles 14 and 19 may become a substitute for all other fundamental rights. It has come to be regarded as bundle of rights.

With the expansive interpretation of terms ‘life’ and ‘personal liberty’ x, right to live in clean and unpolluted environment has been held to be part of fundamental right guaranteed under Article 21.xi The pragmatic approach of the Supreme Court including right to clean environment in Article 21 has been discussed in the next sections.

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## **6.7 Distribution of Legislative Powers between Union and States**

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Constitution of India provides a federal structure of governance. Part XI and XII of the Constitution of India deals relations with Union and States. Part XI deal with the legislative relations between Union and States. Whereas Article 246 confer legislative competence on Union and States, Schedule VII distribute the subjects of legislation between the Union and States. Schedule VII contains three lists viz., List-I (Union List), List-II (State List) and List-III (Concurrent List). Union has exclusive competence to legislate with reference to subjects enumerated in list I, States have exclusive competence to legislate on subjects listed in List-II and Union and States have concurrent jurisdiction to make laws on subjects mentioned in List III subject to Union supremacy in case of repugnancy. xii There is no explicit entry pertaining to environment in any of the lists under the Seventh Schedule. Though List I contains subjects like UNO, entering into treaties and agreements with foreign countries and implementing Conventions, treaties and agreements. It also contains subjects relating to regulations of industry, mines and minerals, ports etc. i.e. which have inter-state and pan-India impact. List II contains subjects like Public Health and Sanitation apart from other subjects regarding agriculture and industry. Under Article 248 read with entry 97 List I, Union has exclusive competence to make laws on subjects not enumerated in any of the lists. Constitution (Forty-second Amendment) Act, 1976 inserted entries 17A and 17B in the Concurrent List relating to Forests and Protection of Wild Animals and birds respectively.

This apart, Part XI of the Constitution of India contains Article 253 which empowers the Parliament to legislate for the purpose of giving effect to any treaty, agreement or convention with any country or countries and for the purpose of implementing decisions made at any international conferences. Accordingly, Parliament has enacted laws under Article 253 read with entries 13 and 14 of Union List to meet its international obligations under the International Conventions and agreements like Stockholm Declaration of 1972.xiii

Thus, there are adequate provisions in the Constitution of India concerning the protection of environment in various parts of the Constitution. Though the subject of environment was not explicitly mentioned in the Constitution prior to Constitution (Forty-second Amendment) Act, 1976 yet the goals enshrined in the Preamble and the directive principles together with provisions incorporated in Part III, in particular Article 21 and its interpretation by the judiciary to include right to clean environment in it coupled with provisions incorporated in Part XI were sufficient to deal with the subject and issues relating to environment. Constitution (Forty-second Amendment) Act, inserted specific provisions pertaining to environment in the Indian Constitution.

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## **6.8 Judicial Approach**

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The Indian judiciary has been alive to environmental concerns and has adopted pragmatic and activist approach in interpreting constitutional provisions concerning environment protection. The pragmatic and realistic approach of the judiciary has enabled it to read right to live in clean environment as included in right to life and personal liberty enshrined in article 21. The most remarkable feature of this expansion of Article 21 is that many of non-justifiable Directive Principles embodied in Part-IV of the constitution have now been

resurrected as enforceable fundamental rights by the magic wand of judicial activism, playing on Article 21, which was almost a surplus age in the days of Gopalan.

Pollution is the result of modern industrialization and urbanization. Rich and literate raise cry against pollution though sometimes they are themselves responsible for it. The poor and slum dwellers remain dumb about it (V.K. Bansal, 1987). Discharge of industrial effluents in water, ponds of dirty water in streets, lack of sewage facilities etc. add to grim water pollution scenario. Air suffocating with smoke and smog created by polluting vehicles, industry and stubble burning have created lots of air pollution thereby adversely affecting health of millions of people. The legislature had enacted various laws to curb and control environmental pollution but they failed to have cut much ice. This being the plight of Indian masses the Supreme Court had to come forward and read right against environment pollution as part of right to life enshrined in Article 21, to relieve the ignorant masses from the trauma and tyranny caused by increasing environmental pollution.

In *B.L. Wadehra v. Union of India* xiv, the petition was filed for directions to Municipal Corporation, Delhi and the New Delhi Municipal Corporation to perform their duties, in particular the collection, removal and disposal of garbage and other waste. Apex court speaking through Kuldeep Singh J expressed grave dissatisfaction over the pollution in the Capital of India and observed, Historic City of Delhi – the Capital of India – is one of the most polluted cities of the world. The authorities responsible for pollution control and environment protection have not been able to provide clean and healthy environment to the residents of Delhi. The ambient air is so much polluted that it is difficult to breathe. More and more Delhi-it's are suffering from respiratory diseases and throat infections. The River Yamuna – the main source of drinking water – is the free dumping place for untreated sewage and industrial waste. Apart from Air and water pollution, the city is virtually an open dust- bin. Garbage thrown all over Delhi is a common sight..... It is no doubt correct that rapid industrial development, urbanization and regular flow of persons from rural to urban areas have made major contribution towards environmental degradation but at the same time the Authorities – entrusted with the work of pollution control – cannot be permitted to sit back with folded hands on the pretext that they have no financial or other means to control pollution and protect the environment...xv

The court held that right against environmental pollution and to have clean environment is a fundamental right to be found in Article 21 read with article 48A and thus issued directions to Municipal Corporation, Delhi and New Delhi Municipal Corporation regarding collection and disposal of garbage to keep the city clean.

In *Ratlam Municipality v. Vardhi Chand* xvi Supreme Court ordered the closure of limestone quarries in Dehra Dun-Mussoorie Area. It realized that the closure of limestone quarries would cause financial hardships but the court observed that it is the price that has to be paid for protecting and safeguarding the right of the people to live in a healthy environment with minimal disturbance of ecological balance, and without avoidable hazard to them and to their cattle, homes and agricultural land and undue affection of air, water and environment.

In *Subash Kumar v. State of Bihar* xvii it was held that right to live is a fundamental right under Article 21 of the constitution and it includes the right to enjoyment of pollution free water and air for full enjoyment of life. If anything endangers or impairs that quality of life in derogation of laws, a citizen has a right to have recourse to Article 32 of the constitution for removing the pollution of water or air which may be detrimental to the quality of life.

In *Vellore Citizens Welfare Forum v. Union of India* xviii the petition was directed against the pollution caused by enormous discharge of untreated effluent by the tanneries and other industries in the State of Tamil Nadu. It was argued that untreated effluents discharged by tanneries in the State of Tamil Nadu have polluted the main water supply source and the ground water. The petitioner argued that the ground water near these tanneries have been so polluted that it has become unsuitable for drinking, large pieces of agricultural land had been turned into barren land and the productivity of large area of land has been reduced considerably. The court discussed Precautionary Principle and concluded that right against environmental pollution is implicit in right to life enshrined in Article 21 of the constitution. After having so concluded, the court proceeded to direct the closure of industries which are not complying with the directions of the Pollution Control Board and NEERI.

Similarly in *M.C. Mehta v. Union of India* xix where a petition was filed for preventing the degradation of the Taj Mahal due to pollution caused by coal using industries via Trapezium, the Apex Court issued directions to 292 industries located in Agra to change over within a time schedule to Natural Gas as industrial fuel or stop functioning with coal/coke and to apply for relocation or otherwise stop functioning w.e.f. 30-04- 1997 on account of violation of Articles 21, 48A, 51A and 47 of the Constitution.

In *M.C. Mehta v. Kamal Nath* xx it was contended by the petitioner that if a person disturbs the ecological balance and tinkers with the natural conditions of rivers, forests, air and water, which are the gifts of nature, he will be violating the fundamental right guaranteed under Article 21 of the Constitution. Supreme Court accepted the contention of the petitioner and held that any disturbance of basic environment elements namely air, water, soil which is necessary for “life” would be hazardous to “life” within the meaning of Article 21 of the constitution. The court after holding it to be a violation of article 21 proceeded to observe that in these cases polluter pays principle and principle of Public Trust Doctrine applied. In *M.C. Mehta v. Union of India* xxi with a view to safeguard the countrymen from the vices of air pollution, the Supreme Court refused to grant blanket extension of dead line for conversion of vehicles to CNG. It is pertinent to mention here that the Supreme Court vide its order dated 28th July 1998xxii issued guidelines to convert vehicles to CNG in a reasonable time schedule.

In *N.D. Jayal v. Union of India* xxiii, the Supreme Court again reiterated that right to clean environment is implicit in right to life and personal liberty guaranteed under Article 21. Again, in *Municipal Corporation of Greater Mumbai v. Kohinoor CTNL Infrastructure Co. (P) Ltd.* xxiv, the Apex court laid down that right to live in clean and healthy environment is part of right to life and personal liberty guaranteed under Article 21. The court went on to hold that this right is also part of common law jurisprudence.

Thus the courts have clearly held that right to live in unpolluted environment is a fundamental right implicit in right to life and personal liberty enshrined in Article 21. Not only this, judiciary has also issued guidelines in certain cases to prevent and remedy ecological balance including the directions to close certain industrial establishments.

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## **6.9 Summary**

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From the foregoing analysis, it can be safely concluded that the constitution of India is a dynamic document and Indian judiciary has, by using interpretative tools, declared various unremunerated rights as fundamental rights. Judiciary has not only declared right to clean environment as a fundamental right but has also developed environmental jurisprudence underlying various important principles like Polluter Pays Principle, Precautionary Principle, Public Trust Doctrine etc. However, despite active role played by the judiciary, the environmental pollution is on the rise. Moreover, no right can be fully protected and guaranteed unless the entire community recognize their moral, ethical, social and constitutional duties and rise up to abide by them.

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**Unit 7: Judicial Remedies and Procedures**

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**7.0 Objectives**

**7.1 Introduction**

**7.2 The Constitution and Protection of the Environment**

**7.3 The National Green Tribunal**

**7.4 Jurisdiction**

**7.4.1 Original jurisdiction (section 14)**

**7.4.2 Appellate jurisdiction (section 16)**

**7.4.3 Exclusive jurisdiction of the Tribunal**

**7.4.4 Who can approach the Tribunal?**

**7.4.5 The Tribunal's decision**

**7.5 Criminal Courts**

**7.6 Supreme Court of India and High Courts**

**7.6.1 Writ petitions**

**7.6.2 Public Interest Litigation**

**7.6.3 'Alternative and efficacious remedy' exception**

**7.7 Environmental Legislation**

**7.7.1 Wildlife Protection Act, 1972**

**7.7.2 Water (Prevention and Control of Pollution) Act, 1974**

**7.7.3 Air (Prevention and Control of Pollution) Act, 1981**

**7.7.4 Environment (Protection) Act, 1986**

### **7.7.5 Public Liability Insurance Act, 1991**

### **7.7.6 Biological Diversity Act, 2002**

### **7.7.7 National Green Tribunal Act, 2010**

## **7.8 Judicial Decisions**

## **7.9 Summary**

## **7.10 References**

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## **7.0 Objectives**

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This unit aims at the following outcomes:

- Understand the legal scenario in India on environment and its protection;
- Develop an understanding about the institutions for protecting the environment and their role; and
- Provide an insight into the role of judiciary in developing environmental jurisprudence in India
- Understand the mandate of the National Green Tribunal, a special tribunal constituted to hear environmental cases.
- A basic understanding of the role of criminal courts, the Supreme Court of India, and the High Courts in environmental cases.

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## **7.1 Introduction**

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Protection of environment in India has its foundations in the obligations undertaken by India in international instruments, the Constitutional framework of the country, the legislation enacted, and the judicial decisions. Sources of environmental law, for that reason, can be located in these instruments. Apart from these formal sources, a number of informal mechanisms supplement the efforts to protect the environment in terms of conservation, management and regulation. Informal mechanisms may be traced to the efforts of communities, NGOs or the efforts of public-spirited individuals.

Environmental governance has direct (and indirect) implications on the rights and interests of persons, and the environment. Whether it is poor quality of air or water, a decision to clear forests, build an industry or a dam, mine land, dispose of waste in a particular manner, or inaction on the part of governmental agencies to stop environmental degradation – all these situations, among many others, have repercussions. These repercussions can take various forms such as: increased health impacts or increased mortality rates; reduced access to certain natural resources (e.g. clean ground water or forest produce); or economic loss (e.g. crop yields

reduction, or an industry is not permitted to commence operation). Persons affected or aggrieved in these situations turn to law for appropriate remedies. While certain types of remedies may be sought directly from the concerned government agency (the executive) or special grievance redressal mechanism under specific environmental laws, often people turn to the judiciary for grievance redressal. Depending on the nature of the grievance, there are different types of judicial remedies available. The main forum for environmental cases that are civil in nature is the National Green Tribunal. Criminal environment cases, such as cases filed against persons causing air or water pollution, have to be filed before criminal courts (Magistrate's court). Cases may also be filed before the High Courts of different states and the Supreme Court of India, particularly if fundamental rights guaranteed under filed before the High Courts of different states and the Supreme Court of India, particularly if fundamental rights guaranteed under the Constitution have been violated, or to ensure the protection of such rights if they are likely to be under threat.

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## **7.2 The Constitution and Protection of the Environment**

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The Constitution of India is the supreme law of the land. It is worth examining the scope of environmental protection envisaged under the Constitution.

To begin with, one may refer to the Constituent Assembly debates (see Divan & Rosencranz, 2001: 43- 44). There was no specific discussion about regulation of the environment by Parliament or the state legislatures. The discussion centered on the division of legislative powers on the environment under the Government of India Act, 1935 and the differences expressed by those who wanted a strong Centre and those who preferred more powers to the states. Items of economic importance like fisheries and forests over which control was asserted both by the Centre and the states became strongly contested. In the meeting of the Drafting Committee of the Constituent Assembly in July 1949, the Ministry of Agriculture wanted these items to be placed in the Concurrent List. It was argued by the Ministry that the country's agricultural prosperity was dependent on forests and therefore activities by the states shall not be prejudicial to that common interest. However, this proposal faced stiff resistance from the provinces and heads of states. Therefore, forests were classified as a state subject. Fisheries find mention in the State List (item no.21). However, legislative competence on fisheries and fishing beyond territorial waters find mention in the Union List (item no.57).

Post-independence, any discussion on constitutional protection for the environment becomes incomplete without a reference to the distribution of legislative and executive powers envisaged in the Constitution. Parliament and state legislatures, the nodal agencies for law-making, are vested with legislative powers on the basis of items distributed in the three lists, namely, Union List (List I), State List (List II) and the Concurrent List (List III) in the Seventh Schedule. There are articles (for example, Article 252) in the Constitution, which in exceptional situations vest the Union/Central Government with powers to legislate on an item described in the State List. This is apart from the principles of interpretation followed in the Constitution regarding conflict between central and state laws.

A perusal of the items in the Seventh Schedule shows how different subject matters in relation to the environment are distributed across the three lists. Residuary powers of law making in the Indian context are vested with the Union under Article 248. It may be true that the Constitution makers did not give priority to environmental protection in the sense in which it is understood today. However, the constitutional scheme includes many subject heads in the Lists, which are of crucial concern to protection of the environment today. Hurdles are posed due to the tension between the Centre and the states over who exactly could exercise the legislative power. For instance there is tension about water regulation, which is an item in the State List. Except for inter-state river water disputes, regulation of water sector is within the state jurisdiction. It is suggested to bring the water related items in the Concurrent List.

The Stockholm Conference on Human Environment, 1972 is a landmark achievement in environmental protection internationally. After participation in the Conference, India made serious inroads into environmental protection by introducing the 42nd amendment to the Constitution. Article 48-A was added to Part IV of the Constitution, which covers Directive Principles of State Policy. It reads as follows:

The State shall endeavor to protect and improve the environment and to safeguard the forests and wild life of the country.

During the Lok-Sabha debates there were suggestions to vest the state with the duty to conserve and develop water, soil and other natural resources. Some others suggested that state should assure that protection of the environment would not harm tribal forest dwellers. In the Rajya-Sabha while welcoming the new Article, some members suggested mineral wealth to be included and governments to undertake adequate and effective measures to check environment pollution (Divan & Rosencranz, 2001: 45).

In the newly added chapter on Fundamental Duties, Article 51A (g) imposed a responsibility on every citizen to protect and improve the natural environment including forests, lakes, rivers and wild life and to have compassion for living creatures.

Often constitutional provisions, particularly Article 21 (right to life) is referred to for adjudication of environmental disputes. Part 4 of this unit analyses some of the landmark decisions of the Supreme Court wherein the Court has referred to Article 21 as the basis for its decision.

Article 253 vests the power in Parliament to enact legislation to implement India's international obligations. Based on this legislative power, the Central Government has enacted a number of legislation to protect the environment. The next section will discuss the legislation.

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## **7.3 The National Green Tribunal**

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The National Green Tribunal (Tribunal) has been set up under the National Green Tribunal Act, 2010 (NGT Act). The objective of the NGT Act is to provide effective and expeditious disposal of cases relating to the protection of the environment including the

enforcement of any legal right relating to the environment. The Tribunal is a multi-disciplinary body, with judicial and non-judicial/expert members, which hears and decides cases before it.

The need to set up special environmental courts, such as the National Green Tribunal, was highlighted by the Supreme Court of India in a series of cases, and by the Law Commission of India in its 186th report in 2003. The Court was of the opinion that environmental cases raised issues which required technical knowledge and expertise, speedy disposal, and continuous monitoring, and therefore they should be adjudicated upon by dedicated courts with adequate expertise and technical assistance. The National Environmental Tribunal Act 1995 was passed by the Parliament but never implemented. Subsequently, the National Environment Appellate Authority Act 1997 was enacted under which the National Environment Appellate Authority was set up in 1997. There were several problems in the functioning of this Authority, including its limited mandate (only persons wishing to challenge environmental clearances could approach the Authority). When the National Green Tribunal was set up in 2010, it replaced the Authority. The Tribunal can be approached with cases pertaining to any of the following seven environmental laws:

- The Water (Prevention and Control of Pollution) Act, 1974 [Water Act]
- The Water (Prevention and Control of Pollution) Cess Act, 1977
- The Forest (Conservation) Act, 1980
- The Air (Prevention and Control of Pollution) Act, 1981 [Air Act]
- The Environment (Protection) Act, 1986
- The Public Liability Insurance Act, 1991
- The Biological Diversity Act, 2002

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## **7.4 Jurisdiction**

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The Tribunal has two kinds of jurisdiction – original and appellate jurisdiction. Original jurisdiction refers to the powers of the Tribunal to decide an issue for the first time, before any other authority with judicial powers has made any decision on it. Appellate jurisdiction refers to the power to sit in appeal – i.e. when an authority has issued an order or decision, and against such an order or decision a case has been filed.

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### **7.4.1 Original jurisdiction (section 14)**

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The Tribunal has original jurisdiction over all civil cases raising a substantial question relating to environment and which arise out of the implementation of any of the aforementioned seven laws. This includes the enforcement of any legal right arising from these laws, or if there is a direct violation of a specific statutory environmental obligation by a person which affects the community at large (not just an individual); or causes substantial damage to the

environment or property; or causes damage to public health that is broadly measurable. The environmental consequences could relate to a specific activity or a point source of pollution.

Examples of cases that the Tribunal can decide while exercising original jurisdiction are: cases of industrial pollution where the applicants are not challenging a specific approval or consent granted to the industry but are aggrieved by the impacts of the industry on, say, groundwater, or ambient air quality or noise levels; cases like the one challenging rampant illegal construction and development which contributed to the Uttarakhand floods and massive destruction in 2013; cases highlighting illegal activities with adverse impacts on the environment like unregulated sand mining, etc.

Such cases have to be brought before the Tribunal within a period of six months from the date on which the cause of action of the dispute first arose. After six months, a case may still be brought but within 60 days, and the case will only be heard if the Tribunal is convinced that the applicant was prevented by reasonable cause to file the case within stipulated time. However, if it is an ongoing activity or continuing adverse impact on the environment, the six months period is not applied very strictly, as any point of time could be selected as the point when the cause of action first arose.

Victims of environmental damage, including accidents occurring while handling hazardous wastes, can approach the Tribunal to seek relief and compensation (section 15). The Tribunal can order for restoration of damaged property and the environment. Any case for relief and compensation has to be brought to the Tribunal within five years from the date on which the cause for such relief and compensation first arose. After that a grace period of sixty days (as above) is given. A five year time period has been allowed, because it is possible that the impact of environmental degradation (like industrial pollution) may not be apparent for a long time, but manifests itself only much later.

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### **7.4.2 Appellate jurisdiction (section 16)**

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While exercising its appellate jurisdiction, the Tribunal hears and decides cases in which a regulatory approval or consent granted or rejected by the relevant government agency is being challenged. These approvals or consents relate to the seven aforementioned laws. The Tribunal has the power to cancel an approval or consent granted – if it is found to be illegally obtained. It can also issue a stop work notice or a stay order; or direct the constitution of committees of experts to carry out fact finding or monitor the implementation of its orders.

For example, persons who are aggrieved by the grant of an environmental clearance (which is granted in accordance with the EIA Notification 2006, issued under the Environment (Protection) Act, 1986) or a forest clearance (under the Forest (Conservation) Act, 1980) by the government to a thermal power plant near their village can approach the Tribunal in an appeal against such clearances. Similarly, if a company is denied an environmental clearance or a forest clearance, it can approach the Tribunal to challenge the decision of the government.

Another important set of cases which can be brought under the appellate jurisdiction of the Tribunal relate to the consents to establish and operate granted by the State Pollution Control Boards (SPCBs) under the Water Act and the Air Act to industrial plants. If a consent is granted or denied, the aggrieved party (could be person/s living near the industrial plant, or the industry) has to first approach the appellate authority set up under the Water Act and the Air Act. If either party before the appellate authority is dissatisfied with the decision of the appellate authority, it can approach the Tribunal.

An appeal has to be filed within 30 days from the date on which the order or decision that is being challenged was communicated. Beyond that, another 60 days may be granted by the Tribunal, if it is convinced that there was a sufficient cause for the delay in filing.

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### **7.4.3 Exclusive jurisdiction of the Tribunal**

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Cases relating to compensation and relief for environmental damage, and those in which appeals are being filed against regulatory approvals, as discussed above, can only be brought before the Tribunal. No other court is supposed to entertain such a case, and if such a case is filed, then the court is expected to ask the parties to approach the Tribunal for proper adjudication.

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### **7.4.4 Who can approach the Tribunal?**

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According to the NGT Act, an aggrieved person can file a case before the Tribunal – could be an individual, a company, a firm, an association of person (like a NGO) - even if not registered or incorporated, a trustee, a local authority (like a municipal corporation), a government body (like the SPCB) etc. The person need not be directly affected by the project or development in question, but could be any person who is interested in protecting and preserving the environment.

The Principal Bench of the Tribunal is situated in New Delhi, with four Zonal Benches in Bhopal, Kolkata, Pune and Chennai. Cases arising in the states mentioned in Column 2 of the following table have to be filed in the Bench mentioned in Column 1:

<b>Column 1</b>	<b>Column 2</b>
Principal bench	Uttar Pradesh, Uttarakhand, Haryana, Himachal Pradesh, Jammu & Kashmir, Delhi and Chandigarh
Central (Bhopal) bench	Madhya Pradesh , Rajasthan and Chhattisgarh
Eastern (Kolkata bench	West Bengal, Odisha, Bihar, Jharkhand, Assam, Nagaland, Mizoram, Arunachal Pradesh, Manipur, Tripura, Meghalaya, Sikkim, and Andaman & Nicobar Islands
Western (Pune) bench	Maharashtra, Gujarat, Goa, Daman & Diu, Dadra & Nagar Haveli

Southern (Chennai) bench	Kerala, Tamil Nadu, Karnataka, Andhra Pradesh, Pondicherry, and Lakshadweep
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### **7.4.5 The Tribunal’s decision**

The NGT Act requires the Tribunal to hear cases as expeditiously as possible and endeavour to decide the case within six months from the date on which the case is filed. Although an indicative time limit of six months has been set, often it takes longer as all parties have to be given a complete hearing, including presenting necessary evidence, and sometimes, the Tribunal initiates special investigations into facts, which may take up some time.

The Tribunal has the powers of a civil court, including the powers to summon any person, examine witnesses, receive evidence on affidavits, review its decisions, etc. It can regulate its own procedure, and is guided by the principles of natural justice. The NGT Act requires the Tribunal to consider the principle of sustainable development, the precautionary principle, and the polluter pays principle while deciding cases, and in a case involving an accident, the principle of no fault has to be applied while determining liability. Failure to comply with the orders of the Tribunal could lead to a fine or imprisonment of the person responsible, or both – depending on the fact situation.

If any of the parties before the Tribunal is not happy with the decision of the Tribunal, it can file an appeal before the Supreme Court of India within 90 days from the date of the Tribunal’s order, or later if sufficient cause for the delay is shown to the Supreme Court.

## **7.5 Criminal Courts**

While the National Green Tribunal hears only civil cases, certain violations of environmental laws constitute criminal offences, and cases have to be filed in criminal courts by appropriate government authorities.

Under the Water Act and the Air Act, several illegal acts have been identified as criminal offences. For example, as has been mentioned earlier, industrial units are required to obtain prior consents to establish and operate from the SPCBs. If units commence operation without proper consents, it is a criminal offence. If an industry is issued consent, it has to ensure that it complies with all the standards and specifications for equipment and processes mentioned in the consent. If the emissions or sewage discharge from the plant exceed the standards laid down by the SPCB, it is a criminal offence. Complaints against offences under the Water Act and Air Act have to be filed in the Court of the Metropolitan Magistrate or a Judicial Magistrate First Class (and not any court inferior to that). The complaint has to be filed by the SPCB of the state in which the act has been committed. If any other person intends to file a complaint, he or she has to first give notice of at least sixty days to the concerned SPCB of the alleged offence, and his or her intention to file a case. The courts can order imprisonment of the person responsible for committing the offence, and direct the payment of a fine. In case a company

commits an offence, the person or persons directly in-charge of conducting the business of the company can be held responsible.

Similarly, under the Wildlife (Protection) Act, 1972, several acts are considered to be criminal offences. Examples of criminal offences under this Act would include hunting or injuring protected animals, smuggling of animal skins, meat or body parts, and illegal trade in protected animal or plant species. These offences may be prosecuted in courts once a complaint is filed by one of the designated officials under the Act (e.g. the Chief Wildlife Warden, the officer-in-charge of a zoo, the Director of the concerned Tiger Reserve, etc.). Any other person can also file a complaint, but only after a notice of at least sixty days is given to the Central Government about the alleged offence, and the person's intention of filing a complaint in court. The punishment of offences under this Act could include imprisonment and/or fine. In some cases the period imprisonment could be anything between three to seven years with fine of not less than ten thousand rupees.

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## **7.6 Supreme Court of India and High Courts**

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### **7.6.1 Writ petitions**

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As has been discussed in other units, the Supreme Court of India and High Courts of various states have held that the fundamental right under Article 21 of the Constitution of India – the right to life – includes the right to clean and healthy environment; pollution free environment; clean and hygienic environment, etc.<sup>2</sup> Over the last three decades, persons affected by environmental degradation have approached the Supreme Court and the High Court's on numerous occasions, requesting the courts to protect their fundamental right to life which was being violated due to environmental degradation.

Every person has a fundamental right under Article 32 of the Constitution to approach the Supreme Court in case his/her fundamental right has been violated. Therefore, any person who believes that his/her right to life under Article 21 is being violated by certain actions or inactions of the government or even a private party, can file a writ petition before the Supreme Court.

For example, in 1989 a writ petition was filed by Indian Council for Environmental legal Action, an environmental organization, in the Supreme Court under Article 32 highlighting the plight of villagers in Rajasthan affected by chemical pollution due to certain industries. The pollution had poisoned the ground water, and the soil had become unfit for cultivation. The government agencies – the Central Government, the Rajasthan government and the Rajasthan State Pollution Control Board – had not been able to take adequate action against the industries. The Supreme Court held that the inability of the government agencies to perform their statutory duties and control pollution from industries was violating the fundamental right to life of the villagers under Article 21.

Persons can also file a writ petition in the High Court of their state under Article 226 of the Constitution in environmental matters. Unlike the jurisdiction of the Supreme Court under Article 32 of the Constitution, the High Courts may be approached not only for a violation of a fundamental right, but also for a violation of a statutory right. An appeal from a judgment of the High Court can be filed in the Supreme Court.

The Supreme Court and the High Courts have very wide powers under Articles 32 and 226. The courts can direct the concerned government agencies to comply with their legal duties and protect the rights of people and communities. They can also direct the suspension (temporary or permanent) of activities causing environmental problems, or cancel permits granted to future activities that could potentially cause environmental damage. Courts can award compensation for loss suffered due to environmental degradation, direct the restoration of the environment (for example a polluted pond) to a condition before the pollution, order assessment studies, inspection of sites by experts, installation of pollution control devices, etc.

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### **7.6.2 Public Interest Litigation**

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Sometimes cases filed before the Supreme Court or the High Courts are in the form of Public Interest Litigations or PILs. In these cases, typically, the issues before the court relate to sustained inaction or illegal action by government agencies which violate fundamental or statutory rights of a section of the society. PILs do not deal with a dispute between two private parties, nor do they raise issues that affect the rights and interests of a few individuals. While in traditional litigation, only the person whose rights and interests have been affected can bring a case to court, in case of PILs this rule of standing or locus standi is relaxed. PILs can be filed by public spirited individuals or organizations on behalf of affected communities, or to bring to light rampant illegalities, and the petitioner need not be directly affected. PILs have been encouraged by courts to ensure that even sections of the society that are disadvantaged economically, socially or politically, and are not in a position to access the courts and claim the protection of their rights, can still receive justice. PILs allow citizens to highlight instances of poor and inefficient governance in the country.

Another characteristic of PILs is that the courts do not apply rigid procedural rules to the case, but adopt innovative methods that can address the issues raised in the case more effectively. Unlike traditional litigation, wherein a case is not admitted if a lot of time has elapsed since the issue first arose, in PILs the courts generally overlook any delay in filing the case. The courts have also not insisted on a strict format for filing PILs, and even letters written to the Supreme Court, or articles in newspapers have triggered adjudication in the courts on the issues raised.

PILs very often involve a large number of parties including various government agencies, and the courts do away with the conventional adversarial or confrontational approach to adjudication. Instead they adopt a more collaborative approach in which all parties make efforts to achieve common goals. Another distinguishing aspect of PILs is that courts' orders

in PILs are binding even on third parties – i.e. those who are not even party to the petition before the courts.

One of the most well-known PILs before the Supreme Court in the environmental context involved illegal limestone quarrying in the Doon Valley. 4 Rural Litigation and Entitlement Kendra, an organization based in Dehradun, sent a letter to the Supreme Court alleging unauthorized and illegal limestone quarrying in the Doon Valley that was leading to major environmental damage. The Court treated this letter and the accompanying affidavits as a PIL and in the following years issued several orders to regulate the quarrying activities in the area. The Court relied on various expert committee reports and inspection reports, and several parties were allowed to make representations before the Court.

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### **7.6.3 ‘Alternative and efficacious remedy’ exception**

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Although any person can approach the Supreme Court under Article 32 of the Constitution in environmental matters, the Supreme Court has often held that if there is an alternative and efficacious remedy, then the person must approach that forum first. So for instance, if a petition is filed before the Court on the issue of air pollution caused due to emissions from an industrial estate, the Court is likely to direct the petitioners to approach the National Green Tribunal, which is a specialized body constituted to deal with environmental matters, and which has jurisdiction over air pollution related cases. It is also expected to decide cases within a shorter time frame. However, if the case is of grave national importance or the issue involves activities in several states, the Supreme Court may take up the matter.

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## **7.7 Environmental Legislation**

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Protection of the environment till the 1970s was piecemeal wherein provisions incidentally touched upon the environment (for example, the provisions of the Indian Penal Code and the Code of Criminal Procedure). This trend changed in the 1970s wherein laws were made to prevent water pollution and to protect wildlife. In the 1980s, forest conservation and air pollution laws were passed. The Bhopal gas leak in 1984 paved the way for umbrella legislation, namely, the Environment (Protection) Act in 1986 and amendments in the pollution laws and the laws dealing with hazardous activities.

Exercising the legislative power, the Centre and the states have adopted laws, rules and regulations in fields like the environment in general, and forests, pollution, wildlife, biodiversity, mines and minerals, coastal zones and public liability in particular. Institutions like the National Green Tribunal and state Pollution Control Boards have been set up through laws. Many a times the discussions focus on central laws. However, it may be pertinent to note that states too have initiated legislative efforts depending on their legislative power and local needs. Apart from the exercise of their legislative powers, the legislatures are influenced by judicial decisions. The subsequent section will show how the initiatives of the Supreme Court were instrumental in influencing executive and legislative actions. The key features of some of the legislation are mentioned below.

**7.7.1 Wildlife Protection Act, 1972**

The colonial rulers were drawn to wildlife for vested reasons. Some wild birds therefore enjoyed protection under the Wild Birds Protection Act, 1887. During the breeding season their possession or sale was prohibited. Later on, the Wild Birds and Animals (Protection) Act was passed in 1912 to prevent the excessive killing of birds and animals. After independence, Parliament enacted the Wildlife (Protection) Act in 1972 on the request of states under Article 252 of the Constitution. This Act allows the central and state governments to establish national parks and sanctuaries for the protection and propagation of wildlife. In the subsequent years the Act also expanded its focus to prohibition and regulation of internal and international trade. The Ministry of Environment and Forests prepared a Manual on Wildlife in 2007 in order to assist the enforcement personnel in the implementation of the Act stringently. The Act was amended in 1993, 2002 and 2006. A Bill for further amendment, namely, the Wildlife (Protection) Amendment Bill, 2013 has been introduced in the Rajya Sabha. Due to increase in wildlife crime, the Tiger Task Force recommended stringent provisions for tackling the crime. The Committee constituted for examining the recommendations of the Tiger Task Force favoured the recommendation and also suggested amendments in the Act to make it consistent with the provisions of the Convention on International Trade in Endangered Species of Wild Fauna and Flora, 1973 (CITES). A separate chapter namely, Chapter VB is proposed for incorporating the CITES obligations under the proposed Amendment Bill.

**7.7.2 Water (Prevention and Control of Pollution) Act, 1974**

The Water Act was enacted with the objective of prevention and control of water pollution in India. It aims at the maintaining or restoring of the wholesome nature of water.

The Act provides for constitution of State Pollution Control Boards (SPCB or the Board) with powers and functions, which include developing comprehensive plan for the prevention, control, or abatement of pollution, inspecting plants for the treatment of effluents and evolve economical and reliable methods for their treatment. The Board has the power to take samples of effluents, entry and inspection and the power to refuse or withdraw consent if the industry does not install treatment and disposal system. The Board is vested with powers to take emergency measures in the case of pollution of a stream or well and make application to the court for restraining apprehended pollution thereby. The Act envisages the Board to be bound by the directions given by the State Government or the Central Pollution Control Board (CPCB).

**POLLUTION**

- contamination of water or such alteration of the physical, chemical or biological properties of water or such discharge of any sewage or trade effluent or of any other liquid, gaseous or solid substance into water which may or is likely to create a nuisance or render such water harmful or injurious to public health or safety or to domestic, commercial, industrial, agricultural or other legitimate uses or to the life and health of animals or plants or of aquatic organisms

The Central Government shall be the final authority in decision making in cases where the direction given by the State Government is inconsistent with that of the CPCB. The State Government may supersede the SPCB in cases where the latter is in default in terms of performance of its duties or in the interests of public. Activities like the use of stream or well for disposal of polluting matter are treated as offences and the Board may impose penalties accordingly. Similarly offences by companies and Government departments may also be subject to liability.

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### 7.7.3 Air (Prevention and Control of Pollution) Act, 1981

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The Air Act, 1981 is enacted as an outcome of the Stockholm Conference, 1972. It is implemented with the help of Rules.

**Air pollutant:** any solid, liquid or gaseous substance including noise present in the atmosphere in such concentrations as may be or tend to be injurious to human beings or other living creatures or plants or property or environment.

The SPCBs constituted under the Act are envisaged to plan a comprehensive programme for prevention, control or abatement of air pollution and to secure its execution. The Board exercises power to grant consent to establish or operate some industrial plants. It also holds the power to make application to the court for restraining anyone from causing air pollution. The Board holds an advisory role vis-a-vis the State Government.

Provisions in relation to offences by the companies and Government departments are the same as those mentioned in the Water Act.

Under the Act, the State Government has the power to declare air pollution control areas. For instance, the entire area under the State of West Bengal is declared as an air pollution control area.

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### 7.7.4 Environment (Protection) Act, 1986

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Parliament enacted the Environment (Protection) Act in 1986 to give effect to objectives of the Stockholm Conference, 1972. This legislation was enacted in the aftermath of the Bhopal disaster. It is an umbrella legislation followed by a set of rules, regulations and notifications, which include:

It is stipulated in the Act that rules or orders made therein shall have effect notwithstanding anything inconsistent therewith contained in any other enactment.

**Environment:** water, air, land and the inter-relationship, which exists among and between water, air and land, and human beings, other living creatures, plants, micro-organism and property

**Environmental pollutant:** any solid, liquid or gaseous substance present in such concentrations as may be or tend to be injurious to environment

**Hazardous substance:** any substance or preparation which by reason of its chemical or physical-chemical properties or handling is liable to cause harm to human beings, other living creatures, plant, micro-organism, property or the environment.

Under the Act, the Central Government has the power to take measures to protect and improve environment, to constitute authorities, to give directions, to enter and inspect, procure information from a State Government, etc. The scope for delegating powers and functions to any authority or State Government is envisaged. The Central Government has the power to make rules under the Act.

The Act characterizes certain activities like excess emission, handling hazardous substances in violation of procedural safeguards and obstruction of person empowered to enter and inspect as offences for which a penalty is imposed. The Act addresses offences committed by companies and Government departments separately. Cognizance of an offence can be taken on a complaint by the Central Government or any authority or person authorized in that behalf. The Act also provides that any person who has given notice of not less than sixty days of the alleged offence and his intention to make the complaint to the SPCB or any officer authorized in this behalf may also be considered. Section 22 of the Act bars the jurisdiction of civil courts with respect to any action taken by the duly competent authority under the Act.

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## 7.7.5 Public Liability Insurance Act, 1991

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The Public Liability Insurance Act, 1991 was enacted subsequent to the Bhopal tragedy. It provides for immediate relief to victims of an accident while handling any hazardous substance.

**Accident:** involves fortuitous, sudden or unintentional occurrence while handling any hazardous substance resulting in continuous, intermittent or repeated exposure to death or injury to any person or damage to any property. Excludes an accident by reason of war or radioactivity

The Act vests liability on the owner on a no-fault basis for compensation. The owner is liable to take insurance policies and renew the same on expiry before he starts handling the hazardous substances. He is also liable to contribute to a Relief Fund. State Governments are vested with the power to issue directions, which include the direction to prohibit or regulate the handling of any hazardous substance and the stoppage or regulation of the supply of electricity, water or any other service. SPCBs hold the power to make an application to the court to restrain an owner from handling hazardous wastes. Offences by companies and Government departments are the same as those mentioned in the Water Act, 1974.

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## 7.7.6 Biological Diversity Act, 2002

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In view of India's rich reserves of biological resources and the Convention on Biological Diversity (CBD)'s recognition of the sovereign rights of countries over their biological resources, India enacted the Biological Diversity Act in 2002 and the Rules in 2004.

The Act aims to undertake and implement India's obligations in accordance with the provisions of the CBD. The Act classifies users of biological diversity into two categories based on the involvement of foreign partners or institutions in the utilization of resources of India. For the first category, the Act provides for prior approval of the National Biodiversity Authority (NBA) if their uses are for research, commercial utilization or bio-survey and bio-utilization. Persons in the second classification (any citizen of India, body corporate, undertaking or organization registered in India) shall give prior intimation to the State Biodiversity Board. The following categories who are citizens of India are exempted from this requirement:

- Local communities or people of the area
- Growers and cultivators of biodiversity
- Vaidis and hakims practicing indigenous medicine

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### **7.7.7 National Green Tribunal Act, 2010**

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The National Green Tribunal, which is set up under the Act of 2010, is the nodal authority to receive complaints from any one on an environmental dispute or for seeking compensation. The Tribunal has its principal place of sitting in Delhi with Bhopal, Pune, Kolkata and Chennai as the zonal places of sitting. A time limit is prescribed for bringing disputes or compensation claims before the Tribunal. A decision from the Tribunal is appealable to the Supreme Court. The Tribunal consists of judicial members and experts from the field of the environment. The Tribunal is guided by the principles of natural justice.

Legislation like the Indian Forest Act, 1927, the Forest Conservation Act, 1980, the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 and mining laws are also significant in the discussion on environmental protection. The EIA and CRZ Notifications, Noise Pollution Regulations, Hazardous Substances (Handling) Rules and many other similar measures strengthen the legislative initiative.

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## **7.8 Judicial Decisions**

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The initial period of judicial remedies centered on tortuous and public nuisance claims (for instance, Municipal Council, Ratlam v. Sri Vardhichand, AIR 1980 SC 1622). Gradually writ petitions and Public Interest Litigations (PIL) were used to access the Supreme Court and High Courts to seek justice in environmental matters. This section analyses some of the decisions laid down by the Supreme Court of India.

In *M.C. Mehta v. Union of India*, (1987) 1 SCC 395, the Court was addressing the issue of closure and relocation of some units of Sriram Foods on the ground that such hazardous industries cannot be operating from populated areas. While this petition was pending, two instances of oleum gas leakage occurred from one of the units and the workmen and the public suffered. A PIL was filed for compensation to the victims. The Court for the first time laid down the rule of absolute liability by stating that an enterprise engaged in hazardous activity is a potential threat to the people working in the factory and those living in the nearby areas.

Therefore, the enterprise owes an absolute duty to the community. In the event of an accident, such enterprise is strictly and absolutely liable to compensate all the victims. This liability is not subject to any exception.

In *Rural Litigation and Entitlement Kendra v. State of UP*, (1986) Supp SCC 517, a PIL was filed under Article 32 for a direction banning all illegal mining operations in the Mussoorie Hills and surrounding areas due to adverse impact on the ecology of the area. In this case the Court held that it is for the government to decide in each case to what extent can the exploitation of mineral deposits be allowed at the cost of ecology based on appropriate advice. The Court reiterated that the task on environmental protection is not only the task of the government but also of every citizen under Article 51A (g) of the Constitution.

In a PIL under Article 32 of the Constitution concerning the discharge of effluents into the river Ganga by the tanneries of Kanpur, the Supreme Court observed that even though there are provisions under the Water Act, 1974 and the Environment (Protection) Act, 1986, no preventive measures have been taken and therefore the Court may issue appropriate directions for the removal of such public nuisance.

Therefore, in *M.C. Mehta v. Union of India*, (1987) 4 SCC 463, the Court held that tanneries cannot function without fulfilling the minimum requirement of a primary treatment plant. Just like an industry which cannot pay minimum wages cannot be permitted to continue functioning, a tannery which cannot set up a primary treatment plant cannot be allowed to function as the adverse effects on the public outweigh the loss to the management and labour on its closure. In a further case, namely, *M.C. Mehta v. Union of India*, (1987) 4 SCC 471, the Court while dealing with water pollution of the river Ganga issued directions to the Nagar Mahapalikas which have jurisdiction over the areas through which the Ganga flows to submit to the SPCBs the plan regarding the disposal of waste, sewerage and treatment of trade effluents discharged into the river. The Court also held that it is the duty of the Central Government under Article 48A of the Constitution to introduce compulsory lessons on environmental protection in schools. In *M.C. Mehta v. Union of India*, (1992) 1 SCC 358, the Court gave directions in order to spread awareness on environment protection through mass media, information films and educational courses.

In *Dahanu Taluk Environment Protection Group and Another v. BSES Co. Ltd*, (1991) 2 SCC 539, a Special Leave Petition under Article 136 of the Constitution was filed seeking directions for setting up of a thermal power plant in an ecologically sensitive area. The Court held that it is primarily for the government concerned to consider the importance of public projects for the betterment of the conditions of living of the people and the necessity for the preservation of ecological balance, avoidance of deforestation, etc. that may be brought to its notice by various bodies of laymen and experts and strike a just balance between these conflicting interests. The Court's role is limited to examine whether the government has taken all relevant aspects into account and not been influenced by extraneous or immaterial considerations while arriving at the final decision. In this case, the Court held that the government had taken the decision after due consideration of material considerations and

providing for sufficient safeguards under the Environment (Protection) Rules, 1986. However the Court noted that if there is a request for relaxation of any condition, the petitioners must be given an opportunity to be heard.

In *Tarun Bharat Sangh v. Union of India*, (1993) 3 SCR 21, Tarun Bharat Sangh, a voluntary organization, brought to the notice of the Court the widespread illegal mining carried on in the area declared as a Tiger Reserve in Alwar district of Rajasthan. The petitioner contended that this area is declared as a Tiger Reserve under the Rajasthan Wild Animals and Birds Protection Act, 1951 as a sanctuary and a National Park under the Wildlife (Protection) Act, 1972 and as a protected forest under the Rajasthan Forest Act, 1953. The petitioner contended that in spite of its protected status, the State Government granted licenses for mining in the area in violation of the law. The Court held that the case involves allegations about the failure of the executive to do its duty by law and by the people when faced with the might of money. The Court held that once an area is declared as a protected forest, it falls within the purview of the Forest (Conservation) Act, 1980. No non-forest activity can be carried out even by the State Government except with the prior approval of the Central Government. Mining is a non-forest activity and granting of mining leases/licences and renewal of the same by the State Government without prior approval by the Central Government in the protected forest area after 1 January 1975 is contrary to law.

In *Vellore Citizens' Welfare Forum v. Union of India*, (1996) 5 SCC 647, a PIL was filed under Article 32 of the Constitution about the discharge of untreated effluents by tanneries into agricultural lands and waterways in Tamil Nadu. The Court held that the state must adopt the principle of sustainable development keeping in view the Constitutional obligations under Articles 21, 47, 48-A and 51A (g). In addition, the Court considered the precautionary principle and the polluter pays principle as the essential components of the principle of sustainable development and as part of the environmental law of the country. The Court held that these principles are part of customary international law and since not inconsistent with the municipal law shall be deemed to have been incorporated into national law.

In *S. Jagannath v. Union of India*, (1997) 2 SCC 87, a writ petition was filed under Article 32 of the Constitution with respect to the enforcement of the CRZ Notification, 1991. The petition was about intensive and semi-intensive type of prawn farming in the ecologically fragile coastal areas. The Court observed that traditional and improved traditional shrimp farming technologies are benign and pollution-free. However, the Court referred to the constitutional provisions and laws like the Environment (Protection) Act, 1986 and its Rules, the Water Act, 1974, the Fisheries Act, 1897, the Wildlife Protection Act, 1972 and the Forest (Conservation) Act, 1980 to suggest that intensive and semi-intensive technologies cannot be permitted in prawn farming. The CRZ Notification was held to have overriding effect over other legislation since it is issued under the Environment (Protection) Act, 1986. The Court directed commercial shrimp industry in an ecologically fragile area to be scrutinized by a High Powered Authority under the Act and the need to conduct an environmental and social impact assessment. The Court held that this industry is neither directly related to waterfront nor

directly needing foreshore facility. As far as the workmen were concerned, the Court directed the matter to be considered under the Industrial Disputes Act, 1947.

In *M.C. Mehta v. Union of India (Taj Tapezium case)*, (1997) 2 SCC 353, the Court held that industries in the Taj Trapezium Zone using coke or coal are polluting industries therefore these industries have to convert to natural gas or must stop functioning and relocate themselves. In *M.C. Mehta v. Union of India*, (1997) 11 SCC 312, taking note of the falling groundwater level, the Court directed the Central Government to appoint the Central Groundwater Board as an authority under the Environment (Protection) Act, 1986. This Board would be empowered to regulate groundwater management and address the issue of indiscriminate boring and withdrawal of groundwater.

In *M.C. Mehta v. Kamal Nath*, (1997) 1 SCC 388, the petitioner contested the grant of a lease of riparian land to a private company for commercial purposes on the banks of the river Beas. The Court held that the lease amounted to a violation of the public trust doctrine, which means that State is the trustee of all natural resources to be used for the enjoyment of the general public. In this case the Court found that the construction was interfering with the natural flow of the river.

In *A.P. Pollution Control Board v. Prof. M.V. Naydu*, (2001) 2 SCC 62, the Court held that the establishment of industries within the 10 kilometre radius of two major reservoirs of Andhra Pradesh, namely Osman Sagar and Himayat Sagar, falls within clear prohibition and the State Government cannot grant exemption.

In *M.C. Mehta v. Union of India*, (2001) 3 SCC 756, the Court directed the phasing out of non-CNG buses and fixed the time limit for the switch over to CNG. In *M.C. Mehta v. Union of India*, (2004) 12 SCC 118, the question which came up for consideration was whether mining activity up to 5 kilometres from the Delhi-Haryana Border on the Haryana side of the ridge and in the Aravalli Hills causes environmental degradation and if so what directions need to be issued. After a perusal of the background of the case and its previous orders, the Court held that the Aravalli Hill range needs to be protected at any cost. Therefore mining activity can be permitted only on the basis of sustainable development and on compliance of stringent conditions.

In *re Noise Pollution case*, AIR 2005 SC 3136, the Supreme Court examined the implications of noise pollution vis-à-vis Article 21 of the Constitution. The Court dealt with the noise pollution caused by firecrackers, loud speakers and vehicles in the light of the Noise Pollution (Regulation and Control) Rules, 2000 and its own previous decisions. Accordingly, the Court issued direction to the states to make provisions for seizure and confiscation of loud speakers, amplifiers and other devices causing noise pollution beyond the permissible levels. As per Rule 3, ambient air quality standards are to be prescribed for different areas and a categorization of the areas accordingly for implementation. The Court directed the Central and State Governments to implement these rules wherever it is not done. The Court stated the need to create public awareness about the hazardous effects of noise pollution.

In *G. Sundarrajan v. Union of India*, (2013) 6 SCC 620, the appeals from the Madras High Court were concerned with setting up of a nuclear power plant in Kudankulam in the State of Tamil Nadu. The Court noted that the Government of India set up a 15 member expert group to study the matter and allay the fears of the general public. The State Government also appointed an Expert Committee. Both Committees were satisfied with the safety and security of the plant and environmental safeguards. Accordingly, the Court held that KKNPP has been set up and made functional based on the principle of sustainable development and its impact on ecology has been taken care of keeping in view national and international environmental principles.

The close relationship between protection of the environment and management of natural resources is well explained by the Court in *Reliance Natural Resources Ltd v. Reliance Industries Ltd*, (2010) 7 SCC

1. The Court stated that inter-generational equity is part of the constitutional jurisprudence on equality and sustainable development and protection of the environment are pre-conditions for the use of nature. The Court reminded the

Government of India to frame a comprehensive legislation on energy security and supply of natural gas under production sharing contracts.

A PIL was filed under Article 32 of the Constitution on behalf of the people living in and around the Nilgiri forests on the Western Ghats. The petitioner challenged the validity of the actions by the state authorities which amount to destruction of the tropical rain forests of the region which he alleged were a clear violation of the Indian Forest Act, 1927, the Forest (Conservation) Act, 1980, the Tamil Nadu Hill Stations Preservation of Trees Act, 1955 and the Environment (Protection) Act, 1986. Reiterating the public trust doctrine, the Court held that common properties like rivers, seashore, forest and the air are held by the Government in trust for the free and unimpeded use of the general public. It criticized the way afforestation fund is utilized by the state governments (*In T.N. Godavarman Thirumulpad v. Union of India* (2014), <http://judis.nic.in/supremecourt/imgs1/aspx?filename=41309>)

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## **7.9 Summary**

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In this unit, we discussed various judicial remedies available in response to environmental problems. We studied the National Green Tribunal constituted under the National Green Tribunal Act, 2010, its powers and functions, and the types of cases it can hear and decide. The National Green Tribunal can only hear civil cases. Criminal cases such as those concerning air and water pollution, or cases relating to wildlife protection can be filed in the lower courts (Court of the Metropolitan Magistrate or Judicial Magistrate First Class). The Supreme Court of India and the High Courts also play a very crucial role in environmental conservation, and they can issue a variety of orders and directions to ensure that the rights and interests of persons and the environment are protected effectively.

The national environmental law of India has its formal sources in the Constitution, legislation, rules, regulations and judicial decisions. The right to life guaranteed under Article 21, the duty of the State under Article 48-A and the fundamental duty under Article 51A(g) of the Constitution of India are important in the discussion on environment protection. Constitutional provisions on legislative powers empower the Central and State Legislatures to enact laws aimed at environment protection. Article 253 of the Constitution vests power in the Centre to make laws to implement India's international obligations.

India has enacted a number of legislation since 1970. The colonial legislation on protection of birds, wildlife and forests are either amended or supplemented with legislation in post-independent India. Now there are laws in general on environmental protection, wildlife, forest conservation, biodiversity, water and air pollution, mining, liability and hazardous substances. The Central Government has also made Environment Impact Assessment (EIA) mandatory for developmental activities. The CRZ Notification addresses the issue of usage of coastal areas, which in turn would highlight the importance of eco-tourism apart from pollution. The National Green Tribunal Act, 2010 has brought in a new adjudicatory mechanism to resolve disputes and determine compensation issues. The Tribunal's decisions are subject to appeal to the Supreme Court.

The Supreme Court of India many a times has shown an active interest in environmental protection and adjudicated inter alia on the legitimacy of developmental activities having an impact on environment. The Court has extensively used Article 21 of the Constitution to provide relief to the parties and thereby link environment with human rights. The Court at times criticized the lack of execution of laws by the concerned authorities. The Court introduced doctrines like the public trust doctrine to highlight the significance of common properties. Principles of international environmental law like sustainable development, the precautionary principle, the polluter pays principle and intergenerational equity was applied to adjudicate the matter. However, the Court restrained itself in some of the cases where it took the position that if the government has duly followed the procedures and laws, the Court shall not perform the role assigned to the executive.

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## 7.10 References

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**Unit 8: The Environmental Authorities**

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**Unit Structure****8.0 Objectives****8.1 Introduction****8.2 The Ganga Action Plan Authority****8.3 National Biodiversity Authority (Section 8)****8.4 The Protection of Plant Variety and Farmers Right Authority of India****8.5 The National Green Tribunal****8.6 References**

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**8.0 Objectives**

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After studying this unit you will be able to understand:

- Depth understanding of The Ganga Action Plan Authority
- Depth understanding of National Biodiversity Authority (Section 8)
- Depth understanding of The Protection of Plant Variety and Farmers Right Authority of India
- Depth understanding of The National Green Tribunal

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**8.1 Introduction**

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The environmental authorities are established through environmental governance (EG). Which consist of a system of laws, norms, rules, policies and practices that dictate how the board members of an environment related regulatory body should manage and oversee the affairs of any environment related regulatory body. These are responsible for ensuring sustainability (sustainable development) and manage all human activities—political, social and economic. Environmental governance includes government, business and civil society, and emphasizes whole system management.

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## 8.2 The Ganga Action Plan Authority

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The Ganga Action Plan (GAP) was launched by Rajiv Gandhi, the then Prime Minister of India, in June 1986. Its main objective was to improve the water quality by the interception, diversion, and treatment of domestic sewage and to prevent toxic and industrial chemical wastes from identified polluting units from entering the river. The other objectives of the GAP are as follows:

- Control of non-point from human defecation, cattle wallowing, and the disposal of human remains in the river.
- Research and development to conserve the biotic diversity of the river to augment its productivity.
- Development of sewage treatment technology such as Up-flow Anaerobic Sludge Blanket (UASB) and sewage treatment through afforestation.
- Rehabilitation of soft-shelled turtles for pollution abatement.
- Resource recovery options such as methane production for energy generation and use of aquaculture for revenue generation.
- To act as a trendsetter for taking up similar action plans in other grossly polluted stretches in other rivers.
- The ultimate objective of the GAP is to have an approach of integrated river basin management considering the various dynamic interactions between abiotic and biotic ecosystem.

Notwithstanding some delay in the completion of the first phase of the GAP, it has generated considerable interest and set the scene for evolving a national approach towards replicating this program for the other polluted rivers of the country. The Government of India proposed to extend this model with suitable modifications to the national level through a National River Action Plan (NRAP). The NRAP mainly draws upon the lessons learned and the experience gained from the GAP besides seeking the views of the State Governments and the other concerned Departments/Agencies.

National Ganga River Basin Authority (NGRBA) is a financing, planning, implementing, monitoring and coordinating authority for the Ganges River, functioning under the Jal Shakti ministry of India. The mission of the organization is to safeguard the drainage basin which feeds water into the Ganges by protecting it from pollution or overuse. In July 2014, the NGRBA has been transferred from the Ministry of Environment and Forests to the Ministry of Water Resources, River Development & Ganga Rejuvenation, formerly Ministry of Water Resources (India).

Union government in a notification issued on 20 September 2016 has taken decision under River Ganga (Rejuvenation, Protection and Management) Authorities Order 2016 for a new body named "National Council for River Ganga (Rejuvenation, Protection and Management)" NCRG to replace existing NGRBA. The new body will act as an authority

replacing the existing National Ganga River Basin Authority for overall responsibility for superintendence of pollution prevention and rejuvenation of river Ganga Basin.

It was established by the Central Government of India, on 20 February 2009 under Section 3(3) of the Environment Protection Act, 1986, which also declared Ganges as the "National River" of India.

The Prime Minister is the chair of the Authority. Other members include the cabinet ministers of ministries that include the Ganges among their direct concerns and the chief ministers of states through which the Ganges River flows. The Chief Ministers as members are from the states through which Ganges flow viz. Uttarakhand, UP, Bihar, Jharkhand, West Bengal, among others.

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### **8.3 National Biodiversity Authority (Section 8)**

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The NBA shall be established by the central government Biodiversity Act 2002 (Section 8). The National Biodiversity Authority shall be a body corporate by the name aforesaid, having perpetual succession and a common seal, with power to acquire, hold and dispose of property, both movable and immovable, and to contract, and shall by the said name sue and be sued.

The National Biodiversity Authority shall consist of the following members:

- (a) A Chairperson, who shall be an eminent person having adequate knowledge and experience in the conservation and sustainable use of biological diversity and in matters relating to equitable sharing of benefits, to be appointed by the Central Government;
- (b) Three ex officio members to be appointed by the Central Government, one representing the Ministry dealing with Tribal Affairs and two representing the Ministry dealing with Environment and Forests of whom one shall be the Additional Director General of Forests or the Director General of Forests;
- (c) Seven ex officio members to be appointed by the Central Government to represent respectively the Ministries of the Central Government dealing with –
  - i. Agricultural Research and Education;
  - ii. Biotechnology;
  - iii. Ocean Development;
  - iv. Agriculture and Cooperation;
  - v. Indian Systems of Medicine and Homoeopathy;
  - vi. Science and Technology;
  - vii. Scientific and Industrial Research;
- (d) five non-official members to be appointed from amongst specialists and scientists having special knowledge of, or experience in, matters relating to conservation of biological diversity,

sustainable use of biological resources and equitable sharing of benefits arising out of the use of biological resources, representatives of industry, conservers, creators and know ledge-holders of biological resources.

- The functions of the National Biodiversity Authority (Section 18)

The Board shall advise the Central Government on matters relating to the conservation of biodiversity, sustainable use of its components and equitable sharing of benefits arising out of the utilization of biological resources. It shall also advise the State Governments in the selection of areas of biodiversity importance .It is also authorized to take any measures necessary to oppose the grant of intellectual property rights in any country outside India. Prior Approval of the NBA is necessary to obtain any biological resource occurring in India and to apply for intellectual property protection whether in India or outside India.

- State Biodiversity Board (Section 22)

The State Government may, by notification in the Official Gazette, appoint for the purposes of this Act, a Board for the State to be known as the (name of the State) Biodiversity Board. The Board shall be a body corporate by the name aforesaid, having perpetual succession and a common seal, with power to acquire, hold and dispose of property, both movable and immovable, and to contract, and shall by the said name sue and he sued.

The Board shall consist of the following members, namely:

- (a) a Chairperson who shall be an eminent person having adequate knowledge and experience in the conservation and sustainable use of biological diversity and in matters relating to equitable sharing of benefits, to he appointed by the State Government;
- (b) not more than five ex officio members to be appointed by the State Government to represent the concerned Departments of the State Government;
- (c) not more than five members to be appointed from amongst experts in matters relating to conservation of biological diversity, sustainable use of biological resources and equitable sharing of benefits arising out of the use of biological resources.

- The Functions of State Biodiversity Boards (Section 23)

- a) advise the State Government, subject to any guidelines issued by the Central Government, on matters relating to the conservation of biodiversity, sustainable use of its components and equitable sharing of the benefits arising out of the utilization of biological resources
- b) regulate by granting of approvals or otherwise requests for commercial utilization or bio-survey and bio-utilization of any biological resource by Indians
- c) perform such other functions as may be necessary to carry out the provisions of this Act.

Further one has to seek prior approval of the State Board to obtain Biological Resources for commercial utilization after giving prior intimation.

- Biodiversity Management Committees (Section 41)

Every local body shall constitute a Biodiversity Management Committee within its area for the purpose of promoting conservation, sustainable use and documentation of biological diversity including preservation of habitats, conservation of land races, folk varieties and cultivars, domesticated stocks and breeds of animals and microorganisms and chronicling of knowledge relating to biological diversity.

The National Biodiversity Authority and the State Biodiversity Boards shall consult the Biodiversity Management Committees while taking any decision relating to the use of biological resources and knowledge associated with such resources occurring within the territorial jurisdiction of the Biodiversity Management Committee. The Biodiversity Management Committees may levy charges by way of collection fees from any person for accessing or collecting any biological resource for commercial purposes from areas falling within its territorial jurisdiction.

- Penalties (Section 55)

1. Whoever contravenes or attempts to or abets the contravention of the provisions of Section 3(to obtain Biological Resources with the permission of the National Board) or Section 4(results of research not to transferred to a foreigner or NRI without the permission of the National Board) or Section 6(application of Intellectual property right not to be made without the approval of National Board) shall be punishable with imprisonment for a term which may extend to five years, or with fine which may extend to ten lakh rupees and where the damage caused exceeds ten lakh rupees such fine may commensurate with the damage caused, or with both.

2. Whoever contravenes or attempts to contravene or abets the contravention of the provisions of section 7 (Prior intimation to State Biodiversity Board for obtaining biological resource for certain purposes)or any order made under sub-section (2) of Section 24(order, prohibiting or restricting any such activity which is detrimental or contrary to the objectives of conservation and sustainable use of biodiversity or equitable sharing of benefits) shall be punishable with imprisonment for a term which may extend to three years, or with fine which may extend to five lakh rupees, or with both.

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## **8.4 The Protection of Plant Variety and Farmers Right Authority of India**

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The Protection of Plant Varieties and Farmers' Rights Authority confers Plant Genome Savior "Farmer Reward" and "Farmer Recognition" to the farmers engaged in the conservation of genetic resources of landraces and wild relatives of economic plants and their improvement through selection and preservation and the material so selected and preserved has been used as donors of gene in varieties registerable under the PPV&FR Act, 2001 (53 of 2001) upto 10 rewards and 20 recognitions (consisting of a citation, memento and cash prize) are conferred in a year.

The Protection of Plant Variety and Farmers Right Act, 2001 (PPVFR Act) is an Act of the Parliament of India that was enacted to provide for the establishment of an effective system for protection of plant varieties, the rights of farmers and plant breeders, and to encourage the development and cultivation of new varieties of plants. This act received the assent of the President of India on the 30 October 2001.

The PPV&FR Act, 2001 was enacted to grant intellectual property rights to plant breeders, researchers and farmers who have developed any new or extant plant varieties. The Intellectual Property Right granted under PPV & FR Act, 2001 is a dual right – one is for the variety and the other is for the denomination assigned to it by the breeder. The rights granted under this Act are heritable and assignable and only registration of a plant variety confers the right. Essentially Derived Varieties (EDV) can also be registered under this Act and it may be new or extant. Farmers are entitled to save, use, sow, re-sow, exchange or sell their farm produce including seed of a registered variety in an unbranded manner. Farmers' varieties are eligible for registration and farmers are totally exempted from payment of any fee in any proceedings under this Act. The period of protection for field crops is 15 years and for trees and vines is 18 years and for notified varieties it is 15 years from the date of notification under section 5 of Seeds Act, 1966. Annual fee has to be paid every year for maintaining the registration and renewal fee has to be paid for the extended period of registration. Farmers can claim for compensation if the registered variety fails to provide expected performance under given conditions. The rights granted under this Act are exclusive right to produce, sell, market, distribute, import and export the variety. Civil and criminal remedies are provided for enforcement of breeders' rights and provisions relating to benefit sharing and compulsory license in case registered variety is not made available to the public at reasonable price are provided. Compensation is also provided for village or rural communities if any registered variety has been developed using any variety in whose evolution such village or local community has contributed significantly. The procedural details and modes of implementing this Act are provided in PPV&FR Rules, 2003.

According to sec 2(c), "breeder" means a person or group of persons or a farmer or group of farmers or any institution which has "bred, evolved or developed any variety." [1]

According to sec 2(k), "farmers" means any person who – "Cultivates crops by cultivating the land himself; or" "Cultivates crops by directly supervising the cultivation or land through any other person; or conserves and preserves, severally or jointly, with any other person any wild species or traditional varieties"; or "Adds value to such wild species or traditional varieties through selection and identification of their useful properties."

Genetic resources of economic plants and their wild relatives particularly in areas identified as agro-biodiversity hotspots are awarded annually from Gene Fund. The name of the award is Plant Genome Saviour Community Award and the amount is INR 10, 00,000 for each community. A maximum of five awards are conferred in a year.

The Protection of Plant Varieties and Farmers' Rights Authority also confers Plant Genome Savior "Farmer Reward" and "Farmer Recognition" to the farmers engaged in the

conservation of genetic resources of landraces and wild relatives of economic plants and their improvement through selection and preservation and the material so selected and preserved has been used as donors of gene in varieties registerable under the PPV&FR Act, 2001 (53 of 2001).[2] Up )to 10 rewards and 20 recognitions (consisting of a citation, memento and cash prize) are conferred in a year.

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## **8.5 The National Green Tribunal**

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The National Green Tribunal (Tribunal) has been set up under the National Green Tribunal Act, 2010 (NGT Act). The objective of the NGT Act is to provide effective and expeditious disposal of cases relating to the protection of the environment including the enforcement of any legal right relating to the environment. The Tribunal is a multi- disciplinary body, with judicial and non-judicial/expert members, which hears and decides cases before it.

The need to set up special environmental courts, such as the National Green Tribunal, was highlighted by the Supreme Court of India in a series of cases, 1 and by the Law Commission of India in its 186th report in 2003. The Court was of the opinion that environmental cases raised issues which required technical knowledge and expertise, speedy disposal, and continuous monitoring, and therefore they should be adjudicated upon by dedicated courts with adequate expertise and technical assistance. The National Environmental Tribunal Act 1995 was passed by the Parliament but never implemented. Subsequently, the National Environment Appellate Authority Act 1997 was enacted under which the National Environment Appellate Authority was set up in 1997. There were several problems in the functioning of this Authority, including its limited mandate (only persons wishing to challenge environmental clearances could approach the Authority). When the National Green Tribunal was set up in 2010, it replaced the Authority. The Tribunal can be approached with cases pertaining to any of the following seven environmental laws:

- The Water (Prevention and Control of Pollution) Act, 1974 [Water Act]
- The Water (Prevention and Control of Pollution) Cess Act, 1977
- The Forest (Conservation) Act, 1980
- The Air (Prevention and Control of Pollution) Act, 1981 [Air Act]
- The Environment (Protection) Act, 1986
- The Public Liability Insurance Act, 1991
- The Biological Diversity Act, 2002

### **Jurisdiction:**

The Tribunal has two kinds of jurisdiction – original and appellate jurisdiction. Original jurisdiction refers to the powers of the Tribunal to decide an issue for the first time, before any other authority with judicial powers has made any decision on it. Appellate jurisdiction refers

to the power to sit in appeal – i.e. when an authority has issued an order or decision, and against such an order or decision a case has been filed.

## **Original jurisdiction (section 14)**

The Tribunal has original jurisdiction over all civil cases raising a substantial question relating to environment and which arise out of the implementation of any of the aforementioned seven laws. This includes the enforcement of any legal right arising from these laws, or if there is a direct violation of a specific statutory environmental obligation by a person which affects the community at large (not just an individual); or causes substantial damage to the environment or property; or causes damage to public health that is broadly measurable. The environmental consequences could relate to a specific activity or a point source of pollution.

Examples of cases that the Tribunal can decide while exercising original jurisdiction are: cases of industrial pollution where the applicants are not challenging a specific approval or consent granted to the industry but are aggrieved by the impacts of the industry on, say, groundwater, or ambient air quality or noise levels; cases like the one challenging rampant illegal construction and development which contributed to the Uttarakhand floods and massive destruction in 2013; cases highlighting illegal activities with adverse impacts on the environment like unregulated sand mining, etc.

Such cases have to be brought before the Tribunal within a period of six months from the date on which the cause of action of the dispute first arose. After six months, a case may still be brought but within 60 days, and the case will only be heard if the Tribunal is convinced that the applicant was prevented by reasonable cause to file the case within stipulated time. However, if it is an ongoing activity or continuing adverse impact on the environment, the six months period is not applied very strictly, as any point of time could be selected as the point when the cause of action first arose.

Victims of environmental damage, including accidents occurring while handling hazardous wastes, can approach the Tribunal to seek relief and compensation (section 15). The Tribunal can order for restoration of damaged property and the environment. Any case for relief and compensation has to be brought to the Tribunal within five years from the date on which the cause for such relief and compensation first arose. After that a grace period of sixty days (as above) is given. A five year time period has been allowed, because it is possible that the impact of environmental degradation (like industrial pollution) may not be apparent for a long time, but manifests itself only much later.

## **Appellate jurisdiction (section 16)**

While exercising its appellate jurisdiction, the Tribunal hears and decides cases in which a regulatory approval or consent granted or rejected by the relevant government agency is being challenged. These approvals or consents relate to the seven aforementioned laws. The Tribunal has the power to cancel an approval or consent granted – if it is found to be illegally obtained. It can also issue a stop work notice or a stay order; or direct the constitution of committees of experts to carry out fact finding or monitor the implementation of its orders. For example,

persons who are aggrieved by the grant of an environmental clearance (which is granted in accordance with the EIA Notification 2006, issued under the Environment (Protection) Act, 1986) or a forest clearance (under the Forest (Conservation) Act, 1980) by the government to a thermal power plant near their village can approach the Tribunal in an appeal against such clearances. Similarly, if a company is denied an environmental clearance or a forest clearance, it can approach the Tribunal to challenge the decision of the government.

Another important set of cases which can be brought under the appellate jurisdiction of the Tribunal relate to the consents to establish and operate granted by the State Pollution Control Boards (SPCBs) under the Water Act and the Air Act to industrial plants. If a consent is granted or denied, the aggrieved party (could be person/s living near the industrial plant, or the industry) has to first approach the appellate authority set up under the Water Act and the Air Act. If either party before the appellate authority is dissatisfied with the decision of the appellate authority, it can approach the Tribunal. An appeal has to be filed within 30 days from the date on which the order or decision that is being challenged was communicated. Beyond that, another 60 days may be granted by the Tribunal, if it is convinced that there was a sufficient cause for the delay in filing.

### **Exclusive jurisdiction of the Tribunal**

Cases relating to compensation and relief for environmental damage, and those in which appeals are being filed against regulatory approvals, as discussed above, can only be brought before the Tribunal. No other court is supposed to entertain such a case, and if such a case is filed, then the court is expected to ask the parties to approach the Tribunal for proper adjudication.

### **Who can approach the Tribunal?**

According to the NGT Act, an aggrieved person can file a case before the Tribunal – could be an individual, a company, a firm, an association of person (like a NGO) – even if not registered or incorporated, a trustee, a local authority (like a municipal corporation), a government body (like the SPCB) etc. The person need not be directly affected by the project or development in question, but could be any person who is interested in protecting and preserving the environment.

The Principal Bench of the Tribunal is situated in New Delhi, with four Zonal Benches in Bhopal, Kolkata, Pune and Chennai. Cases arising in the states mentioned in Column 2 of the following table have to be filed in the Bench mentioned in Column 1:

<b>Column 1</b>	<b>Column 2</b>
Principal bench	Uttar Pradesh, Uttarakhand, Haryana, Himachal Pradesh, Jammu & Kashmir, Delhi and Chandigarh
Central (Bhopal) bench	Madhya Pradesh , Rajasthan and Chhattisgarh

Eastern (Kolkata bench)	West Bengal, Odisha, Bihar, Jharkhand, Assam, Nagaland, Mizoram, Arunachal Pradesh, Manipur, Tripura, Meghalaya, Sikkim, and Andaman & Nicobar Islands
Western (Pune) bench	Maharashtra, Gujarat, Goa, Daman & Diu, Dadra & Nagar Haveli
Southern (Chennai) bench	Kerala, Tamil Nadu, Karnataka, Andhra Pradesh, Lakshadweep and Pondicherry

**The Tribunal’s decision**

The NGT Act requires the Tribunal to hear cases as expeditiously as possible and endeavor to decide the case within six months from the date on which the case is filed. Although an indicative time limit of six months has been set, often it takes longer as all parties have to be given a complete hearing, including presenting necessary evidence, and sometimes, the Tribunal initiates special investigations into facts, which may take up some time.

The Tribunal has the powers of a civil court, including the powers to summon any person, examine witnesses, receive evidence on affidavits, review its decisions, etc. It can regulate its own procedure, and is guided by the principles of natural justice. The NGT Act requires the Tribunal to consider the principle of sustainable development, the precautionary principle, and the polluter pays principle while deciding cases, and in a case involving an accident, the principle of no fault has to be applied while determining liability. Failure to comply with the orders of the Tribunal could lead to a fine or imprisonment of the person responsible, or both – depending on the fact situation.

If any of the parties before the Tribunal is not happy with the decision of the Tribunal, it can file an appeal before the Supreme Court of India within 90 days from the date of the Tribunal’s order, or later if sufficient cause for the delay is shown to the Supreme Court.

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**8.6 References**

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## **Unit-9 Sustainable Development**

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### **9.0 Learning objectives**

#### **9.1 Introduction**

#### **9.2 Sustainable Development Strategies (World)**

#### **9.4 Sustainable Development: Roots in Indian Philosophy**

#### **9.5 Millennium Development Goals (MDGs) in India**

#### **9.7 The GAIA Hypothesis**

#### **9.8 Summary**

#### **9.9 Glossary**

#### **9.10 References**

#### **9.11 Suggested Readings**

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### **9.0 Learning objectives**

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This unit will help you to learn about the following-

- Traditional concepts and the environment.
- Role of science streams for the environment.
- Root causes of environmental issues.
- Difference between environment and sustainability.
- Policies for sustainable future.
- Strategies followed by India for a sustainable future.

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### **9.1 Introduction**

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As civilisation grew with time, the environment unintentionally and increasingly came to be treated as a field of unlimited space with ample resources for those with the power and mental skills to manipulate these natural resources. Without the knowledge of the natural resources' distribution, the exploitation of resources was intensified in a manner which further unbalanced the ecosystem system and the time to recover natural resources itself was enough.

The course of human history has been one of increasing capacities to modify and manipulate the environment. To manipulate its resources and to move into new farming lands at the expense of weaker sections when resources became insufficient to satisfy appetites, personal and social competence emerged as main objectives of education in for this progress.

The explosive growth of human populations and the impacts of modern technology have been such that limits to growth and the penalties of wasteful- management have become familiar issues at a global level. Science availed the photographs of our planet captured from space and gave the public in the 1960s and 1970s a powerful visual image of finite resources. From here, the environmental education emerged as an essential part of the response to these dangerous perceptions.

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## **9.2 Sustainable Development Strategies (World)**

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There are numerous pieces of evidence across the world that our ancestors or primitive peoples have exceeded the carrying capacity of the lands like- slash and burn agriculture pattern sounds less harmful for the ecology but proved penetrated highly the atmosphere if analysed in terms of shifting cultivation pattern of certain regions.

Sustainable development strategies are a continuing process that combines aspects of formal planning and incremental learning with emphasise on institutional policymaking. Sustainable decision-making involves political decisions at the national, regional and local levels, which aim at a balanced development of socio-environmental systems in their particular jurisdiction. A tough question in sustainable decision-making is that of defining and measuring sustainable development.

After the publication of the Brundtland report (1987), the concept of sustainability has gained rapid attention among researchers, policy-makers and scientists. The Brundtland report described that 'Sustainable development meets the needs of the present without compromising the ability of future generations to meet their own needs'.

Among the results of the Earth Summit (held in Rio de Janeiro, Brazil in 1992), Agenda-21 is a comprehensive list of progressive actions needed to achieve sustainable development at the global level.

150 states committed themselves to start the actions which will render future development sustainably but without the scientific tools to guide policy- making towards sustainable directions.

Decisions leading to sustainable development expected to be based on scientific data and adequate information which were later addressed as the indicators of sustainability. Many researchers recognize that sustainable development is a function of two major components-

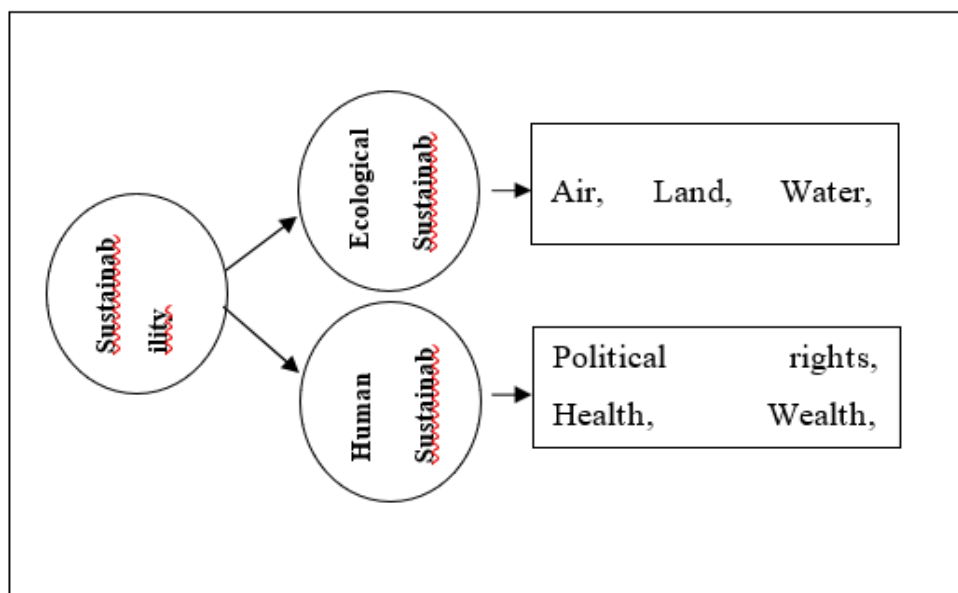
- Ecological and
- Human.

Above components derives that sustainable decision-making should have two simultaneous goals-

- protection and improvement of the environment as a dynamic practice
- human development index to secure high standards of living

Now it is clear that sustainable development ought to have environmental, economic, political, social, and cultural dimensions simultaneously. Ecological sustainability with water, land, air and biodiversity, and human sustainability with political-rights, health, wealth and education, is referred to as the primary components of sustainability.

The following graph illustrates this relationship-



**Graph: 9.1:**

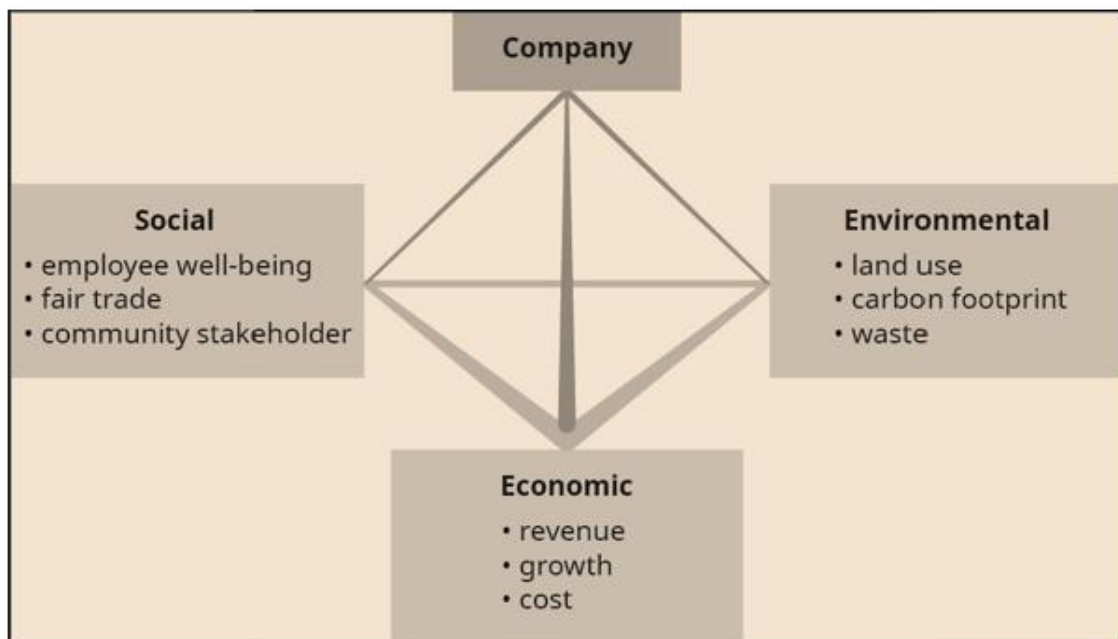
Components of Sustainability/ Source: Self elaboration

There are many evidences that the development process is currently unsustainable. Ozone depletion, global warming, climate change, species extinction, the collapse of water bodies, soil erosion and air pollution are among the obvious signs of ecological distress. Climate change has now become a hot topic of conversation all over the world.

Indigenous peoples were and are inevitably closer to the land and its ecology for their survival. They are more likely to learn from their ecological misbehaves than modern people as there are many modes of transportations are now available across the world.

Environmental issues such as climate change and global warming have come to the foremost attention of the public as well as of business. Throughout the world, everyone is noticing these climatic changes and accepting that global warming is causing such change.

The argument that the corporate excesses have gone beyond the limits are starting to become disclosed and due to effects on large numbers of people, and awareness raised on the social behaviours of corporations. This is one reason why the issue of Corporate Social Responsibility (CSR) has become a much more prominent feature of the corporate landscape.



Graph: 9.2: Corporate Social Responsibility/ Source: BC Open Textbooks

There are many contemporary works of literature available that deal with sustainability focuses on human population and the effects of the growth rate on the environment and global sustainability.

The decreased attention of the scientific debate on the possible consequences of population growth on the Earth's ecological equilibrium has led to progressive indifference. There is an attitude of extreme caution by political authorities and institutions in dealing with the issue of demography and its consequences for global dynamics. Hence, more and more attention is paid by governments and institutions to the partnerships and international agreements to reduce greenhouse gas emissions and to combat climate change to achieve the goals toward sustainability and development.

Many demographic studies suggest that the growth forecasts for 2100 and beyond will be well within the capacity of our production system.

The World Conservation Strategy was based on the following three requirements-

- The maintenance of life-support systems,
- The preservation of genetic diversity (extending to species and habitat diversity) and
- The sustainable use of natural resources.

In a contribution to The Observer Magazine (1975), Higgins encompassed seven enemies of the mankind- among six were the- population explosion, food shortages, other resource scarcities, environmental degradation, misuse of nuclear capacities and uncontrolled technology. The seventh and more hazardous enemy was the nature of humankind itself. There were various instances in the world that proved this right.

If we try to treat the environment holistically, then we must go along with education. The holistic approach will not be complete until education has its place in the whole system of environmental protection. It is necessary to remind people constantly that our environment is the totality of what we live in, visible or invisible.

Study Questions: 1

Answer the following questions as True/ False –

1. Our ancestors never damaged ecology.
2. Slash and bum is a cultivation method.
3. The ‘Brundtland report’ was published in the year 1987.
4. Sustainable development considers the need for the present generation only.
5. Agenda-21 paves the way for economic development.
6. The health sector is a part of ecological sustainability.
7. Corporate Social Responsibility (CSR) is a set of strategy for sustainability.
8. According to Higgins, the most dangerous enemies of mankind is human itself.

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## 9.4 Sustainable Development: Roots in Indian Philosophy

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Respect to everyone is the core part of the Indian philosophy, be it for nature or for knowledge. This respect, is in fact, the incense of the modern-day sustainability and eco-conservation debate. The Indian culture incorporates respects, rituals and celebrations each day around cycles and forces of nature.

Now, the world strongly believes that unless people’s moral and spiritual qualities are nurtured and developed in a harmonious way, the best of sustainability efforts will not become fruitful.

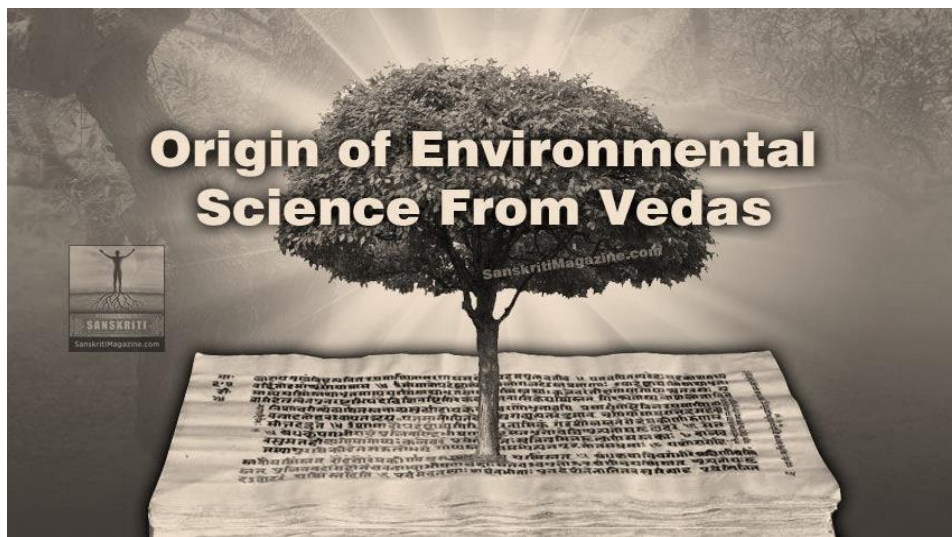
Most of the people in India, live in the way to achieve sustainable and harmonious living in all spheres of life through living with morality and spirituality at the individual level. The journey for world transformation starts indeed at the individual level and targets the world community in wide.

Sages in ancient India have even composed prayers and songs in praise of almighty human-life force and said that it is the essence of all creatures and creations. Undoubtedly, all of us acknowledge and recognise the uniqueness of ourselves and the cohabitants of our world. Despite this fact, we seem to be strangely neglectful of the natural resources that nurture us.

The Vedic philosophy of India has always emphasized for a harmonious and corresponding human connection with nature. Vedas have originated from ‘Aranyakas’ (forest-books) which were written by sages who lived in the forest and survived on natural produces. Even the ancient works of literature like- Mahabharata, Ramayana, Vedas, Upanishads, Bhagavad-Gita, Puranas and Smriti, contain some of the earliest and important ethical messages on ecological balance and the need for people’s ethical approach for nature.

In a short period of our human history as a species people have transformed their habitats and surroundings in many irreversible ways.

Modern-day unformed sustainability agendas revolve around environmental, social and economic prosperity which is well reflected in Indian type of livings and can be traced well across our beliefs, rituals and practices.



Graph: 9.3: Origin of environment from Vedas/ Source: Pinterest

The concept of nature has become the foundation of a relatively new discipline of philosophy called environmental philosophy. The scope of environmental philosophy is to gather knowledge of the relationship between living beings and their environment from different perspectives. This discipline also tries to find out the answer about the belief and knowledge that communities hold about nature and their moral interest towards nature.

**Study Questions: 2**

Fill in the blanks to complete the following sentences –

1. Respect is the core part of the     philosophy.
2. Sustainability efforts will result only when .... qualities are nurtured.
3. Vedas have originated from .....
4. ‘Aranyakas’ was written by .....
5. Modern-day sustainability agendas are well reflected in the Indian type of livings, beliefs, rituals and.....
6. Environmental philosophy focuses on the concept of.....

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## **9.5 Millennium Development Goals (MDGs) in India**

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The words nature and environment are used interchangeably by scholars in common parlance. The term environment is associated with the functional definition according to which our surrounding provides us with conditions for growth and development and is also a source of danger and destruction. In ecological sciences environment is described by scholars ‘consistency of both biotic and abiotic components available on our planet’.

As a discipline environmental ethics is relatively new but human concern for the environment and nature in the form of worships and practices has always existed from the past.

The idea that nature has its intrinsic value apart from the utilitarian values it has for human beings is a significant idea that forms the basis for what is called “bio-centric” vision of nature. These philosophers believe that human beings thought that they are separate from nature and use nature for our own survival is nothing but camouflage. So one must care for the environment because ultimately the human welfare depends on the environment in all aspects.

**Millennium Development Goals (MDGs):** An extreme measure to eradicate poverty and other evils from all over the world, the Millennium Development Goals (MDGs) were adopted by world leaders to combat eight social and economic concerns within their political boundaries. These goals were decided with a global vision and individual responsibility.

MDGs evaluation mandated a positive response among all stakeholder countries and their internal contributors too. Most of the indicators grabbed positive values, as a result, newer and comprehensive goals were adopted to meet holistic socio-economic reforms.

United Nations Development Programme (UNDP) supports a range of capacity building initiatives that address implementation challenges. UNDP works directly with central ministries and several states by strengthening capacities of representatives and officials at each level of governance. UNDP also participates in strategic programmes and schemes which are geared towards the achievement of MDGs and other National Development Goals.

India is a signatory to the Millennium Declaration adopted in September 2000. The targets of the MDGs eight development goals converge with India’s own commitment towards the development goals to reduce poverty and other areas of deprivation.

India has witnessed significant progress towards the MDGs, as some targets achieved before the 2015 deadline.

For example- India has achieved the target for reducing poverty by half, but falling short of achieving the target for reducing hunger. Again, the country has achieved gender parity in primary school enrolment but was lagged behind on targets for primary school enrolment and completion. Overall, India has made progress in providing clean drinking water however; access to sanitation facilities remains inadequate.

Graph: 9.4: Eight MDGs/ Source: MoSPI



MDGs brought critical development challenges to the forefront and also embraced countries with a strong target-oriented agenda. India steps towards the right direction in some areas but the progress yet looking for some major reforms.

Goal 1: Eradicate Extreme Hunger and Poverty

In order to meet the MDGs, the Poverty Head Count Ratio (PHCR) level has to be 23.9%. In 2011-12, the PHCR was 21.9 per cent. Indicating that India has achieved the poverty reduction target but the progress is uneven. The credit for this achievement is on both-economic growth (including the agriculture sector) as well as increased social spending on interventions such as MGNREGA and the National Rural Health Mission (NRHM).

India represents one-quarter of the world's undernourished population. It comprises over a third of the world's underweight children and nearly a third of the world's food-insecure people. Till 2015, malnourishment in all ages declined to 40 per cent but it is still below the target of reduction up to 26 per cent.

### **Section 1.01 Goal 2: Achieve Universal Primary Education**

Universalizing primary education in India was a herculean task, but due to moderate efforts, India is on-track to achieve this Millennium Development Goal. Enrolment and completion rates of girls in primary school have increased drastically and are catching up with those of boys. This effort also lowered the gender biases. At the national level, the male and female youth literacy rate is likely to be at 94.81 per cent and 92.47 per cent.

In 2009, India introduced the Right of Children to Free and Compulsory Education Act (RTE) to improve the quality of education, especially at primary level.

### **Section 1.02 Goal 3: Promote Gender Equality and Empower Women**

As of August 2015, the Indian parliament has only 65 women representatives out of 542 members in Lok Sabha, while there are 31 female representatives in the 242 member Rajya Sabha. These data present that the proportion of seats in the National Parliament held by women is only 12.24 per cent against the target of 50 per cent.

### **Section 1.03 Goal 4: Reduce Child Mortality**

This MDG aims to reduce mortality among children under five years. India's Under Five Mortality Rate (U5MR) declined from 125 per 1,000 live births in 1990 to 49 per 1,000 live births in 2013. Considering the MDG target is of 42 per 1000, these data suggest that India is on the right track, largely due to the sharp decline in recent years.

The large scale of the under-nutritional condition in mothers and children poses a critical development challenge for India. To overcome this situation many programmes such as- National Policy on Children (2013), National Policy on Early Childhood Care and Education (ECCE) and Integrated Child Development Services (ICDS) are designed for focusing on real-time monitoring of child development.

### **Section 1.04 Goal 5: Improve Maternal Health**

India is required to reduce Maternal Mortality Rate (MMR) to 139 per 100,000 live births by 2015 to meet the MDG. There has been some improvement in the Maternal Mortality Rate (MMR) between 1990 to 2006 (declined to 167 per 100,000 live births in 2009). However, despite these signs of progress, India's progress on this goal has been found slower.

Delivery in institutional facilities has risen from 26 per cent (1992-93) to 72 per cent (2008-09). Consequently, deliveries by trained personnel have also increased at the same pace. Main reason contributing to this factor has been the introduction of a conditional-cash-transfer scheme 'Janani Suraksha Yojana' which improved the deliveries in hospitals and nursing homes up to 72 per cent in 2009.

**Section 1.05 Goal 6: Combat HIV/AIDS, Malaria and Other Diseases**

India is on track to achieving this goal, since HIV, malaria and tuberculosis prevalence has been declining continuously.

India has made significant strides in reducing the prevalence of HIV/AIDS and transmissions of HIV/AIDS in India has brought down from 0.45 per cent (2002) to 0.36 per cent (2009). Malaria has consistently come down from 2.12 per thousand (2001) to 0.72 per thousand (2013).

India alone accounts for one-fifth of the global share of tuberculosis (TB), tuberculosis prevalence per lakh population has reduced from 465 (1990) to 211 (2013).

**Section 1.06 Goal 7: Ensure Environmental Sustainability**

India has made some progress and is on track towards achieving this MDG. The forest cover or green assets has increased to 21.23 per cent, an increase of 5871 square km and protected areas cover to about 4.83 per cent of the country's total land area, this has reduced the energy intensity of GDP growth through higher energy efficiency.

**Section 1.07 Goal 8: Develop a Global Partnership for Development**

The Indian telecom network is the second-largest network (according to 2014 data) in the world after China. The total number of Internet users has increased from 198.39 million (2013) to 259.14 million (2014), which reflects an annual growth of 60%.

Due to the globalization's effect, India has emerged as one of the key development partners for fostering economic and intellectual assistance to various developed and developing countries through the world. India's development assistance in terms of funds is significantly complementing to the conventional assistances inflows from developed countries.

**Study Questions: 3**

Answer the following questions as True/ False –

1. Nature has its intrinsic value apart from the utilitarian.
2. MDGs has eight development goals.
3. India has achieved the MDGs target for reducing hunger.
4. Right of Children to Free and Compulsory Education Act (RTE) was introduced in 2012.
5. 'Janani Suraksha Yojana' is a Direct Benefit Transfer (DBT) scheme.

6. The forest cover of a country is also referred to as green assets.

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## **9.6 Efforts for Sustainability in India**

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Cooperation and coordination both are inherent to India's ancient civilisation, aligning this philosophy Prime Minister of India pressed for the International Solar Alliance at the UN Climate Change Conference in Paris in 2015. This alliance has played an important role in shaping the Sustainable Development Goals (SDGs), further mirrored in the country's national development goals also.

India is fully dedicated to achieving the SDGs even before they were fully crystallized. The National Institution for Transforming India (NITI) has carried out a detailed mapping of the 17 Goals and 169 targets and other supporting major government initiatives.

This report about the focuses on the progress made towards achieving SDGs- 1, 2, 3, 5, 9, 14 and 17. These Goals have been considered as focus areas for evaluation. As NITI Aayog parts the oversight responsibility. It has led the process of Voluntary National Reviews (VNR) preparation. A multi- disciplinary VNR Task Force was constituted to coordinate the reviews for the fulfilment of the exercise.

While targeting economic, infrastructure and industrialisation developments, the nation's war against poverty elimination, social inclusion and empowerment of the marginalised sections have never compromised.

### **Goal 1: End Poverty in All its Forms Everywhere**

There are many enthusiastic evidences that the rapid economic growth of India which was achieved following the economic reforms initiated in 1991, has led to a reduction in poverty. Numbers of people below the poverty line has fallen across all economic, social and religious groups nationally and in all states.

The Mahatma Gandhi National Rural Employment Guarantee Act alone has generated over 2 billion employment days during 2016-17, largely for the deprived sections of society. In an effort to achieve the goal of 'housing for all' by 2022, direct-transfer financial assistance is being extended to poor homeless people. Pradhan Mantri Jan-Dhan Yojana (PMJDY), launched in 2014 for ensuring access to the entire gamut of financial services like- banking, credit, insurance, pension and other conditional transfers.

### **Goal 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture**

Significant progress has been made in improving food and nutrition security through various plans. As a result, stunting among children under 5 years age has declined from 48% to 38.4% in the decade of 2005-15. The absolute numbers of stunted and underweight children, still remain high. To address this concern, more than 800 million people are covered by

providing the food grains at affordable prices through the Public Distribution System (PDS). The Mid-Day-Meal (MDM) Programme is providing nutritious cooked meals to 100 million children in primary schools across the entire country.

India is one of the largest producers of milk, pulses and other grains in the world. The National Mission on Sustainable Agriculture (NMSA) is functioning under the National Action Plan on Climate Change (NAPCC). This plan is working towards mitigating the impact of climate change on agricultural productivity. Due to Soil Health Card scheme, land under organic farming has increased by over 17- fold over the last 10 years.

Crop insurance support schemes also helped in minimizing the losses incurred to farmers and provide single-window comprehensive risk coverage for various crops and horticulture produces.

### **Goal 3: Ensure healthy lives and promote wellbeing for all at all ages**

India made significant gains in various health indicators by improvement in vaccination coverage for children between 12-23 months of age. The country's strategy in health is focused on providing essential medical services to the entire population with a special emphasis on the poor and marginalised.

The National Health Policy (2017) is targeted for- universal primary health care, to achieve further reductions in infant and U-5 mortality, to reduce premature deaths due to non-communicable diseases as well as to increase governmental expenditure on health. Nowadays, a composite index is being used to monitor and evaluate the improvements in health services delivery in the country. ANMOL (Auxiliary Nurse Midwives Online) is an application launched by the Ministry of Health & Family Welfare for enabling Auxiliary Nurse Midwives (ANMs) to electronically enter and update data for beneficiaries.

National Vector Borne Disease Control Programme focuses on prevention and control of six diseases including- Malaria, Japanese Encephalitis, Dengue, Chikungunya, Kala-Azar and Lymphatic Filariasis.

### **Goal 5: Achieve gender equality and empower all women and girls**

While much more progress still remains, a number of indicators showing the status of women in India have moved to the right direction over these years. For instance- around 68.4 per cent of women were literate in 2015-16 compared to 55.1% in 2005-06. Around 53 per cent of women were using bank services in 2015-16 compared to 15.1 per cent in 2005-06.

The 'Beti Bachao Beti Pado' (BBBP) initiative focuses on a comprehensive package of interventions for the girl child including education, health-care and protection.

'One Stop Crisis Centres' are being established across the country for providing integrated and instant support to women affected by violence, whether in private or public spaces. Further, the Women Helpline initiative has also strengthened these Centres.

## **Goal 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation**

All types of connectivity including road connectivity and electricity are being brought to all villages across India. The Bharat Broadband Network Limited (BBNL) initiative is aiming to provide high-speed broadband connectivity to all villages in the country. Over the last decade, there has been a consistent growth in installed electricity generation capacity and also the proportion of non-fossil-fuel sectors has grown by 51.3 per cent. 8,000 km of pavements and cycle tracks are proposed for 106 cities over the course of the next 5 years to promote non-motorized transport and reduce the carbon footprint.

## **Goal 14: Conserve and sustainably use the oceans, seas and marine resources**

A clear agenda has been formulated for promoting ocean ecology with the name 'Blue Revolution'. For tracking the marine pollution along the coastline and Exclusive Economic Zones (EEZs), the country has developed the Coastal Ocean Monitoring and Prediction System. An oil spill management system is also placed for responding to emergencies arising out of oil spills by crude oil movements.

A new era of port-led development was accepted and as a result, the 'Sagarmala' project was commissioned for improving- port connectivity, port- linked industrialization, coastal community development and reducing waiting time for cargos.

## **Goal 17: Revitalize the global partnership for sustainable development**

While working with the global partnership for the achievement of the SDGs, India expressed its solidarity for the principle of 'common but differentiated responsibilities'. India is trying to gather sufficient revenues from domestic resource mobilisation and from foreign aids, for achieving the SDGs, especially for global public goods such as climate change mitigation and control of pandemics.

A next-generation tax reforms agenda is implied in the country to optimise domestic resource mobilization, including direct tax reforms as well as the indirect tax reforms (such as- Goods and Services Tax also known as a uniform and simplified form of indirect taxation). For certain purposes, another form of a monetary instrument like- Swachh Bharat Cess (Clean India Cess) has also been introduced for the hassle-free funding of Clean India Mission.

The Ministry of Statistics & Programme Implementation (MoSPI) is on fast- track to evolve national indicators in light of the global SDG indicators with respect to regional characteristics. The NITI Aayog recently released a Three- Year Action Agenda covering the years 2017-18 to 2019-20. This Agenda addresses the specific challenges facing the country in real-time and the details of measures to fast track the national development agenda.

Most of the states have matched strategic insights from the national development and 2030 agendas, keeping in mind their own specific contexts and priorities.

## **Study Questions: 4**

Match the following sentences –

Institute/ Organization                      Year

1. Total numbers of SDGs are                      A- 2022
2. SDG: 1                      B- End poverty in all forms
3. ‘Housing for all’ is proposed for                      C- 17
4. ‘ANMOL’ provides support for                      D- Internet connectivity to all villages
5. ‘One Stop Crisis centre’                      E- To achieve gender equality (SDG: 5)
6. ‘Bharat Broadband Network Limited’                      F- SDG: 3
7. ‘Blue Revolution’ is for                      G- Indirect tax
8. SDGs indicators in India                      H- MoSPI
9. GST is an                      I- Ocean ecology
10. ‘Sagarmala’ project aims for                      J- Port-led development

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## **9.7 The GAIA Hypothesis**

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This hypothesis is named after the Greek earth goddess and the was coined by James Lovelock in 1979. In this hypothesis proposed a different model of the Mother Earth. It establishes that the ecosphere and all creatures surviving on it were inter-dependent and thus form a complete system.

According to this, the complete system and all components of the system were interdependent and weighing equally for maintaining the Earth as a planet and make itself capable of providing sustaining life.

It is necessary to recognise and allocate the actions in which one organism affects other organisms and also inevitably affects itself. There could be many possibilities which did not necessarily have direct reflections into its actions. In other words, all actions may well have many unintended consequences.

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## **9.8 Summary**

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Now it is very well established that there is no unique sustainable path and accordingly, policymakers should choose different criteria and strategies to make efficient sustainable decisions for each region (likewise- country or state).

Economic progress is visible in most of the places. For instances- cities are growing, transport systems are booming, and so on, as a result, the middle class is growing rapidly in all aspects of life.

India step-in to pursue the implementation of the SDG agenda through close collaboration between the national and sub-national governments. For this, India is following a holistic approach towards SDGs (targeted to achieve until 2030) by starting various initiatives. As a result of these efforts, India's SDG Index Score ranges between 42 and 69 for States and between 57 and 68 for UTs.

Implementations of India's Nationally Determined Contributions (INDCs) seeks investments of scale and size which is unprecedented for a developing nation. This essentially indicates that along with domestic finances, international public and private sector finances would Influence to others in a skilful manner Intensified: Boosted

Ancestors: An early version of humankind

Indigenous: Local people

Irreversible: Unable to undone

Embraced: Ready to accept enthusiastically

Intrinsic: Essential

Eradicate: Fully erased

Pavement: Smooth way for people have to be mobilized for filling the gaps.

There are quite a few challenges for the achievements of SDGs, a very visible one is air pollution, mainly due to high dependency on coal and therefore emits a lot of CO<sub>2</sub>. So India needs to increase energy coal-based efficiency and move to harness more renewable energy sources. Many parts of India face drastic resource scarcities especially natural resources such as- water pollution (sometimes toxic) and shortages.

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## 9.9 Glossary

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Cess: Tax for certain objective

Answers of study questions: 1

1- False      2- True      3- True      4- False

5- False      6- False      7- True      8- True Answers of study questions: 2

1- Indian      2- moral and spiritual      3- Aranyakas

4- sages      5- natural      6- practices

Answers of study questions: 3

1- True      2- True      3-False

4- False      5- False      6-True

Answers of study questions: 4

1- C    2- B              3- A              4- F

5- E    6- D              7- I              8- H

9- G    10- J

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## 9.11 Suggestive Readings

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**Unit 10: Environmental Ethics**

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**10.0 Learning objectives**

**10.1 Introduction**

**10.2 Meaning and definitions of environmental ethics**

**10.3 Environmental ethics in society**

**10.3.1 Classification of society and environmental ethics in different societies**

**10.3.2 Classification of society on the basis of religion:**

**10.4 Responsibility for environmental degradation**

**10.4.1 Air Pollution**

**10.4.2 Water Pollution**

**10.4.3 Soil Pollution**

**10.4.4 Noise Pollution**

**10.4.5 Solid waste Generation**

**10.4.6 Biodiversity Degradation**

**10.5 Remedial measures and recommendations to save nature**

**10.6 Summary**

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**10.0 Learning objectives**

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After studying this unit you will be able to explain:

- What is Environmental ethics
- How environmental ethics is defined

- Why environmental ethics is important
- What are characteristics and environmental advantages of Rural society
- What are characteristics and environmental disadvantages of urban society
- How different religious societies interpret nature and its components.
- How environmental components are degrading
- How Air, Water and Soil being polluted due to unethical activities
- How biodiversity is depleting due to unethical activities
- How Society or individuals can play role in Environmental conservation.

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## 10.1 Introduction

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As you know that meaning of Environment, is “total surrounding”. The word Environment has been taken from French word “Environ” which means “surroundings”. Environment may be defined as “the sum total of all surroundings of a living organism, including natural forces and other living things, which provide conditions for development and growth. The term “ethics” has been taken from the ancient Greek word “ethos” which means habit or custom. Ethics in the broadest sense alludes to the worry that people have dependably had for making sense of how best to live. The logician Socrates (399 B.C.) is cited "the most essential thing is not life, but rather the great life”.

Environmental ethics consists of the study of normative issues and principles relating to human interactions with the environment and their consequences. As you know that every component of earth is being deteriorated, degraded and losing its quality due to manmade activities. Many environmentalists are searching some remedial measures to conserve the environment. The motivation for environmental ethics was the first Earth Day in 1970 when environmentalists started urging philosophers who were involved with environmental groups to do something about environmental ethics. Every year Earth Day is being celebrated on 22nd April. A growing trend has been to combine the study of both ecology and economics to help provide a basis for sustainable decisions on use of natural resources. Environmental issues require a consideration of ethics and morals because it is observed that developmental activities certainly lead in to different types of pollution, diseases, economic loss and biodiversity degradation.

Environmental ethics try to define the moral basis of environmental responsibility. There are so many examples related to environmental ethics and we can understand environmental ethics through following examples.

For example: There is currently enough food in the world to feed everyone sufficiently, it is unethical to allow some people to starve while others have more than enough. When you look the tree of Peepal (*Ficus religiosa*) what do you think? Is it related to our cultural, religious ethical values? Off course answer is yes. Our ethical values tell us we shouldn't destroy the trees like Peepal, Tulsi, Bargad, Neem and other trees of religious importance. We can observe that ethics and morals are not always the same for different communities, societies and

countries, thus it is often difficult to clearly define what is right and what is wrong. For example some individuals think that situation of energy at global level as serious and they have to reduce their consumption at the same time other people do not believe there is a problem and so do not modify their energy use and think they will use energy for long time. You can easily understand environmental ethics in another example: Some people think that a fire cracker during different celebrations is not good for nature but views of other people are just opposite.

The earth is valuable for both the nature and society that occur on it. Evolutionary history has been going on for billions of years, while cultural history is only about a hundred thousand years old. It is believed that culture, tradition, religions, society, economy are determined by nature and environmental components. On the other hand activities performed as culturally, religiously, socially, economically and traditionally influence natural environment.

Morality refers to the human ethics which pertains to matters of good and bad, often referred to as “right or wrong”, used in three contexts viz. individual conscience, systems of principles, and judgments; these three commonly called moral values. Morality is a collection of beliefs as to what constitutes a good life. Morals reflect a cultural predominant feeling on ethical issues. Most cultures have reverence for life and hold that all individuals have a right to live. Moral codes are often complex definitions of right and wrong that are based upon well-defined value systems and dictate proper personal conduct. The scope of Environmental ethics is broad covering area; the realm of actions, policies and lifestyles which impact on natural environment. The spatial or local extent of its scope is also extensive as the biosphere of earth, for space probes and their related debris result from human interaction with nature. This has extended the realm of environmental ethics to distinct zone of solar system. The temporal scope of environmental ethics extends for as long as human action can exercise any kind of impact as long as something of value remains on which significant impacts can be made. While this may sound like a purely theoretical point, nuclear energy generation and experimentation is already bringing in to being radioactive substances with half-lives of millions of years, with predictable harmful effects on human being. Environmental ethics also studies the past in order to discover the traditions which often underlie current values and which often turnout to supply limits to possible change in ethical attitudes or resources for such change. In this unit we will discuss about environmental ethics in different societies, environmental degradation due to unethical activities and remedial measures for environmental conservation.

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## **10.2 Meaning and definitions of environmental ethics**

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Meaning of Environmental ethics is simply ethical relationship of human being with the natural environment. Environmental ethics came in to existence as subject in early 1960s when anthropogenic activities such as poor agricultural practices, industrialization, urbanization, excessive use of pesticides and insecticides was impacting environment badly. Rachel Carson published a book namely “Silent Spring” in the year 1962 to aware the people about the impacts of chemical pesticides on public health and leading to the destruction of wildlife. Paul Ehrlich

published book entitled “The Population Bomb” in the year 1968 which warned of the devastating effects the increase human population on natural resources of the earth.

Definitions of Environmental Ethics: In very simple words Environmental ethics may define as “to set the moral values toward environment”.

“Environmental ethics is a branch of applied philosophy that deals with the conceptual foundations of environmental values as well as more concrete issues surrounding societal attitudes, actions, and policies to protect and sustain biodiversity and ecological systems”.

“Environmental ethics is the part of environmental philosophy which considers extending the traditional boundaries of ethics from solely including humans to including the non-human world. It exerts influence on a large range of disciplines including environmental law, environmental sociology, eco-theology, ecological economics, ecology and environmental geography”.

“Environmental Ethics is the field of applied ethics that discusses, reflects and reasons on values, rules, norms, criteria for dealing with animate and inanimate entities in a responsible way”.

“Environmental Ethics is the base of reasoning for, e.g., the following fields of action within society: environmental protection, animal protection, nature protection, animal rights, and sustainability issues”.

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## **10.3 Environmental ethics in society**

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As you know that ethical values correlates with successful life. In every part of society, ethics play very important role in development of personality, time spent by individuals on ethics, is the key in having a successful life and career. But when we talk about Environmental ethics in society meaning is totally different. It deals with the thoughts, moral responsibilities and holistic approach towards nature and environmental components viz. air, water, soil, earth, sun, plants, animals, microbes etc. Many societal views correlate environmental ethics with integrity. Integrity is the single most important value a person can have, it is your most powerful weapon. In this chapter we will discuss the Environmental ethics in different societies.

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### **10.3.1 Classification of society and environmental ethics in different societies**

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Classification of society on the basis of area: On the basis of area, facilities, population and infrastructure societies may be of following two types:

(A) Environmental ethics in Rural Society:

Man (*Homo sapiens*) started their life as other wild animals; they initially resided in forest and natural habitats. Rural societies are earliest human groups; gradually man acquired the skill and knowledge in agriculture. Agricultural development people began to lead a settled life and human communities became more stationary especially near the rivers and other water resources. India is a land of villages and majority of villages are small with around five hundred persons per village. The social life of rural society has its own special characteristics. Sociologists think that for defining an Indian village, its population, physical structure, and modes of production for livelihood are definitely important.

Generally, a village has less than five thousand individuals. It is rightly said 'India is a country of villages' because agriculture is the main occupation of the people of India and majority of people in India live in the villages. Rural societies help in strengthening our social bonds and bringing stability to our society in many ways. Rural societies also help our society by preserving our environment and culture. The rural society has undergone considerable change in the recent past, particularly since the Independence as a result of a series of the land reform legislations that have accelerated the pace of this change. India has a rich cultural heritage and is a land of diversity. The diversity in social life is reflected in multi-social, multi-lingual, multi-religious and multi-caste nature of the society. Presently, approximately 70-80% of Indian population belongs to rural society. The important features of the Indian social structure are predominant rural habitation in small villages, multi-religious and multi-caste social identities and important role of family in the social life.

**The major characteristics of rural society are given below:**

- (i) **Small size of village community:** Rural society has small villages and small population size. They entirely depend on their domestic animals and natural resources for their survival. Small size villages help to increase social bond, helping nature which lead in providing basic needs to the villagers.
- (ii) **Faith in culture and religion:** Rural societies generally believe on different types of cultures and religions. This type of approach helps conservation of nature and its components because it is true that all the cultures and religions directly associated with nature. Rural society also believes in traditional methods of food preparation and medicines, these types of methods are helpful in conservation of nature.
- (iii) **Simplicity:** In the present time people realized that simple living standards are directly correlated with nature conservation. As you know that using of bicycle is far better than using of fuel cars/vehicles. Fuel cars/vehicle not only contribute to air and noise pollution but also responsible for extra pressure on energy resources. All the luxurious things such as Air conditioning homes, washing machine, mobile phone etc. put extra pressure on natural resources which are responsible for different types of pollution. It is well known that harmful CFCs gases are emitted from air conditioning equipments and refrigerators. These harmful gases are responsible for ozone layer depletion. Rural societies generally rely on natural based products and avoid such luxurious items.

## **Advantages of rural society with respect to environment:**

(i) Unpolluted Air, Water and Soil: Due to less industrial activities and less number of vehicles in rural society, you will find pure water, air and soil in rural society as compared to urban society. Rural society use organic farming, green manuring, vermi- compost, cow manure instead of harmful chemical fertilizers and pesticides.

Now scientists of world also recommend these types of agricultural practices to minimize the health problem and pollution level.

(ii) Rich Biological Diversity: As you know that main occupation of rural society is agriculture. They cultivate different types of crops, fruits, medicinal plants in their territory therefore; you will find more natural resources and bio-diversity in rural society. Rural societies also preserve and conserve sacred groves which are great repositories of bio-diversity.

(iii) No or minimum use of Chemical fertilizers: People of rural society cultivate crops with the help of cow manure, biofertilizers and green manures. These types of agricultural practices are certainly helpful to conserve biodiversity of terrestrial and aquatic ecosystem.

(iv) Rich number of sacred grooves: Rural society has rich number of sacred groves. Sacred groves are religiously important groves. In India about 13000 sacred groves are present in different states and most of the sacred groves are located in the rural areas.

(v) Minimum generation of non-biodegradable waste: People of rural society generally depend on their natural products and believe in traditional method of life style therefore they generate less non-biodegradable as compared to urban society. Due to minimum influence of urbanization and industrialization in rural society certainly lead to minimum generation of solid waste and non-biodegradable waste.

(vi) High respect of local flora and fauna: As earlier mentioned that rural society mostly depends on natural products such as fruits, foods, medicines, agricultural equipments etc. therefore, they respect nature with high zeal. People of rural society respect medicinal plants, local crops, cow, buffalo, snakes, crow, pigeon and almost all the creatures surrounding them. They know they cannot survive without natural resources.

## **Disadvantages:**

(i) Lack of scientific knowledge about environment and local flora and fauna

(ii) No advanced remedial measures for natural disasters such as flood, earthquake etc.

## **(B) Environmental Ethics in Urban Society**

As you know that urban area is where all the facilities such as schools, hospitals, malls, well developed roads are easily accessible. Urban area has its typical characteristic determined by variables as mix of power, space, market as a result of development in science and technology, and industrial development. Due to industrial development there is urbanization as a result of which urban societies are created. Urban areas are derived from rural areas. It is also noted that

every village possesses some elements of the cities while every city possesses some feature of the villages. Different criteria are used to decide a society as urban, some of them are: population, legal limits, types of occupations, social organizations. The city in the words of Louis Wirth refers to “a relatively large, dense and permanent settlement of socially heterogeneous individuals.”

## **Meaning of Urban Society:**

An urban society is characterized by higher population density and vast human feature in comparison to rural society. Urban societies are created from rural societies and again developed by the process of urbanization.

## **Urban societies should fulfill the following criteria:**

- (i) A minimum population of five thousands persons/people.
- (ii) Minimum 75% of working people should have non-agricultural occupation.
- (iii) A density of population of a least 400 persons/sq.km.

Urbanization (Formation of Urban area from rural area) refers to a process which envisages land settlement and complete transformation of economy from agricultural to industrial, commercial sectors dependent on institutions of modern living. The urban society is heterogeneous and known for its diversity and complexity. Urban society is far away from the biodiversity, natural resources and nature.

## **Advantages of Urban Society with respect to Environment:**

- (i) Sanitation and hygienic environment
- (ii) Good literacy and well aware people
- (iii) Remedial measures for epidemic diseases
- (iv) Well developed infrastructure and accessibility

## **Disadvantages of Urban Society with respect to Environment:**

(i) Pollution: The situation of urban society is going worse day by day. Excessive use of vehicles, industrial revolution, and lack of moral responsibilities certainly leads in to air, water and soil pollution in urban societies. Presently, city like Delhi facing lot of problems due to photochemical smog. Various rivers of India such as Ganga, Yamuna, Narmada, Hoogly etc. losing their water quality and biodiversity at tremendous rate due to urban domestic waste, industrial waste and dumping of solid waste. River Ganga flows in major cities like Haridwar, Kanpur, Allahabad, Varanasi, Patna, Sahibganj and receiving millions of liters untreated sewage from these cities. As you know that situation of Yamuna river in Delhi which is literally dead river due to urban waste and sewage.

(ii) Low biological diversity: Developmental activities such as road construction, industries development, urbanization, etc. are responsible for low biological diversity in urban society. Many species of plants, amphibians birds and mammals have been extinct due to habitat destruction, pollution and other manmade activities. You must know that population of sparrow declining very fast specially in urban area due to urbanization.

(iii) Maximum use of chemical fertilizers: Due to high population demand of food and basic needs are also high in urban area therefore, farmers are using excessive amount of chemical fertilizers to enhance the crop production. As you know that these chemical fertilizers are harmful for human being and cause different types of diseases such as cardiovascular disorders, cancer and neurological disease.

(iv) Very low traditional knowledge: Traditional knowledge of environmental components can play very important role in conservation of environment. As you know that urban society lack the concept of joint families which consequently lack the traditional knowledge of environmental management. People of urban societies are far away from environmental ethics as compared to people of rural society.

(v) High generation of solid waste: Due to very dynamic and busy life style urban people generally relies on packaged and processed food; therefore they generate high solid waste compared to rural society. If you visit cities like Delhi, Kanpur you will find the mountains of solid waste near the road. After incineration (burning of solid waste) these wastes release very toxic gases in the atmosphere.

(vi) High vehicular and industrial emission: Rapid increase in population in urban society and use of personal vehicles ultimately lead in to high gaseous emission from vehicles. As you know that situation of Delhi the Capital of India where odd even formula of Government for vehicle is still not working perfectly. Demand of basic needs also raise with population explosion as a result industrialization also increases at the same rate. Toxic chemical from industries eventually mix with atmospheric air which is responsible for respiratory diseases, lung cancer, cardiovascular disorders, and neurological disease.

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### **10.3.2 Classification of society on the basis of religion:**

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The causes of diversity in India may be traced through a variety of methods, the most obvious being the ethnic origins, religions, castes, tribes, languages, social customs, cultural and sub cultural beliefs, political philosophies and ideologies, geographical variations etc.

India is a land of diverse religious faiths. But the influence of Hinduism easily transcends that of any other religion like Christianity in Europe. Religious concepts like monotheism, immortality of the soul, re-incarnation, karma, nirvana, moksha etc. inspire people all over the country. Religious rites and rituals have uniformity throughout the country. All religions have a common ideal worship of the Lord, and all of them proclaim that there is only one God. Almost all the religions described or cited some nature based beliefs and

theories. Some important religions of world and their interpretations about nature are described below:

(i) Environmental ethics in Hinduism: Hindu religion is one of the oldest religions and believes in Environmental ethics. We need to understand how attitude of Hindu to nature has been shaped by religious view of cosmos, creation the animate world, the plant kingdom and his relation to external world. The earliest Sanskrit text, Vedas and Upanisads have almost exclusively accepted and preached about the non-dualism of the supreme power that existed before the creation of earth. According to Mahabharata (Moksha 182.14-19) “God as the efficient cause the nature (Prakriti) as the material cause of the universe is unconditionally accepted, as is their harmonious relationship. Hindu believes that God is father of all creatures, he made sky, from sky he made water and from water he made fire (Agni) and air (Vayu) then earth came in to existence. Hindu also believes mountains are his (God) bones, earth is the flesh, sea is the blood, sky is his abdomen, air is his breath and agni and rivers are teja and nerves, respectively”. Hundreds of references related to environmental ethics have been cited in Hindu religion. Hindu respects five components of environment such components are Air, (vayu), Water (Jal), Soil (Earth), sky (akash) and fire (agni) . We will discuss details about views of Hinduism on nature in unit-2 i.e. Cross cultural views on nature.

(ii) Environmental ethics in Islam: Islam is regarded as monotheistic religion, which is clear from the very first sentence of Holy Quran. Quran literally means Word of God. Holy Quran says that God reveals himself in cosmos. Muslim believes that the laws of nature, the work of God are the divine words recorded in the book of Nature. The law of God for man is divine words embodied in the Quran. Work and word of God correspond with each other. They believe that God (Allah) is the absolute creator, sustainer, ruler, destroyer, restorer and recorder; there is no power or strength except him. He (God) is Exalter (al-rafi) and the honourer (al- muizz) and abaser (al-muhill). He is withholder (al-mani) and He is advantager (al- nafi). He is Compassionater (al-rahman, al-rahim). Further Quran says “man is born with nature made by Allah and he indeed prospers who purifies it and he is ruined who corrupt it. Muslims also believe that agriculture is best occupation and they tried to protect flora and fauna of globe. According to Hazrat Bin Malik, Holy Prophet “If Muslim plants a tree and cultivate a field of crop and men or animal eat of it is a charitable act for them”. Many references have been cited in Muslim literatures about nature we will discuss in Unit-2 i.e. cross culture views on nature.

(iii) Sikhism: Environment is actually a bridge between man and super power. Gurunanak Founder of Sikh religion has assigned divine attributes to nature. Sikh religion and philosophy are deeply related to environment. Sikhism deals with natural phenomenon, animal and birds, seasons and flora and fauna and above all the creation of the world. According to Sikhism, man should have respect for all God is creation and man must know the internal truth of his place. If we take the sense of Sikhism then we can conclude man must maintain such a balance between both physical and spiritual relationship not only for his own well-being but for his environment also.

(iv) Environmental ethics in Christianity: Christian people believe that the Lord took the man and put him in the Garden of Eden to work it and take care of it. The concept of strict and generally valid laws of nature could hardly have arisen without the Christian concept of creation. According to Genesis 1:26-28 the God Said “let us make man in our image, in our likeness, and let them rule over the fish of the sea and bird of the air, over the livestock, over all the earth, and over all creatures, that move along the ground. Therefore, God created man in his own image. God blessed them and said to them “be fruitful and increase in number, fill the earth and take care of earth. Many references have been cited in Christianity we will discuss some of them in Unite-2 i.e. cross culture views on nature.

(v) Environmental ethics in Buddhism: We are giving amidst ecological calamities and environmental crisis because we have agonized our mother earth, trodden dense forest, the realm of tranquillity, forbidden water the first and life giver to all living beings. We have become disinclined to pursue our peace-seeker’s saying and the shown path. Buddh religion says that soma, varma, prajapati, moon and sun may bestow bliss on you, and religion also believes that every component of environment is important and created by God. Pollution is prohibited in Buddhism. If we study the environmental ethics of Buddhism we will find Buddhist philosophy helps us to have a clearer understanding of present environmental issues. Metta Suttara says that Buddhist prayers that “As the mother protects her child even at the risk of her own life” on the same way earth protects us”. The lesson learned is an environmental ethic is a crucial part of society and we have to be aware how our actions affect people directly or indirectly. We should try to follow the rules and regulations (moral values) set by the different societies for conservation of nature and environmental.

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## **10.4 Responsibility for environmental degradation**

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We must know that moral irresponsibility of people is responsible for Environmental degradation. Environmental pollution may define as “Any undesirable change in physical, chemical and biological properties of environmental components is called environmental pollution”. In ancient time people were aware about the importance of every component of environment. But in last few decades almost every component of environment such as air, water, soil, flora and fauna being polluted and degrading due to unethical activities. For example millions of devotees take bath in Ganga River during special occasion such as: Makar Sankranti, Kanwar Mela, Vasant Panchmi, Maha Shivaratri etc. and generate some solid waste in Ganga River which pollutes the water quality of Ganga River. Over population, unethical activities, deforestation, mismanagement of natural components are responsible for environmental degradation. Unethical activities and total ignorance of environmental components certainly leads to different types of pollutions some of them are described below:

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### **10.4.1 Air Pollution**

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As you know that, air is one of the most important commodities to sustain life on this earth. Clean air is the primary requirement to sustain healthy lives of humankind and those of the supporting ecosystems. Without air we cannot imagine life on this earth. As you know that

main source of air pollution is vehicular emission. If we think about the conditions of metropolitan cities of world we will find that level of RSPM, SPM, oxides of sulfur, and oxides of nitrates increasing day by day. We should think ethically about the use of public transportation instead of personal vehicle. As you know about the condition of Delhi where even odd even formula of Government did not work. The problem of air pollution has assumed serious proportions in Delhi, which is also reflected by an increase in the respiratory and cardiovascular mortality. According to World Health Organization (WHO) urban air pollution is responsible for approximately 8,00,000 deaths and 4.6 million lost life annually around the globe. Forest fire also contributes in air pollution and it is totally due to irresponsibility. Religious spots such as Badrinath, Kedarnath, Haridwar, Varanasi and Ayodhya, etc. receive number of vehicles and contribute in air pollution. It is totally due to pilgrimage concept has been changed in to tourism. People should know difference between pilgrimage and tourism. Pilgrimage as just a journey towards religious spots and tourism is temporary movement of people for different purposes such as adventure, sports, education, business etc. Shifting of spiritual pilgrimage in tourism industry certainly alarming us that our ethical values are degrading day by day.

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### **10.4.2 Water Pollution**

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After air water is one of the precious gifts of nature to human being and other species of planet earth. The importance of water in our diet is apparent as it helps the body to perform specific metabolic tasks and regulates our body temperature, moreover water is unique solvent. There is no doubt that water is everywhere and it is very important to all the life inhabiting in this. Fortunately, India is blessed with full of natural resources viz. forest, water and land. India is home to various aquatic bodies such as Ganga, Yamuna, Rapti, Brahmaputra, Narmada, Krishna, Kaveri, Jhelum, Dal lake, Naini Lake, Bhimtal Lake etc. In Indian culture and tradition all the rivers regarded as mother. Unfortunately, in last few decades these rivers being polluted due to different types of manmade activities such as urbanization, industrialization, dumping of solid waste, poor agricultural practices etc. River encroachment is also sign of unethical vales of human beings. You must know that the Kedarnath tragedy which happened on 16th June, 2013 in which 4200 villages and 1 lakh pilgrims were affected which is certainly due to the misbalance in nature.

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### **10.4.3 Soil Pollution**

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Soil is upper part of earth and considered as a non-renewable resource because its formation from the parent rock material to soil takes more time. Indian Vedic scripture Atharveda says that “Matah bhumih putroham prithivyah” means this earth is my mother and I am the dutiful son of Her. But due to unethical activities such as dumping of solid waste soil quality going degrade. Excessive use of pesticides and insecticides, deforestation are sign of human’s greed which over exploited the earth components at tremendous rate. Toxicants of soil may reach up to high trophic levels through bioaccumulation and bio-magnification and cause different types of diseases not only in human being but also other organisms of ecosystem. For

the conservation of earth we should respect the earth. Swacch Bharat Abhiyan started by Honorable Prime Minister of India, Shri Narendra Modi on 2 October, 2014 that aims to clean up the streets, roads and infrastructure of the cities, smaller towns, and rural areas of India. You must know that if you want to clean whole country you should move towards moral values and moral responsibilities.

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#### **10.4.4 Noise Pollution**

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Noise word has been taken from Latin word “Nausea” which means unwanted sound. Noise pollution also leads in to different psychological effects, gastro-intestinal diseases, nausea, vomiting etc. Pressure horns of vehicles, sound of disc jockey and industrial noise are main sources of noise pollution. Noise level also find at higher level during different festivals such as Deepawali, Kanwar Mela, Mahashivratri, Ganesh Chatutrhi etc. If you observe the causes of noise pollution sources you will find that all the sources are due to moral irresponsibility. Fire crackers in marriage function and during festivals are totally needless. Researchers also observed that populations of many valuable birds declining due to fire crackers. Certain animals such as monkeys, wild pigs, baboon, fox etc change their behavior in noise affected areas.

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#### **10.4.5 Solid waste Generation**

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In the present time about 960 million tonnes of solid waste is being generated annually in India as industrial, mining, municipal, agricultural, biomedical wastes. This solid waste being dumped either in to dumping sites or in the periphery of aquatic ecosystems which is not only hazardous to aquatic life but also to the whole ecosystem. Domestic waste, industrial waste, medical waste and agricultural waste are the forms of solid waste. Unawareness and unscientific methods of its management are main problems of solid waste management.

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#### **10.4.6 Biodiversity Degradation**

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India is in 12th position in the list of mega biodiversity nations of world. Unfortunately, due to deforestation, habitat destruction, environmental pollution, and irrespective of plants and animals several species are facing the threat of extinction. If we think about ethical aspects of biodiversity we will find we generally respect biodiversity of earth. Srimad Bhagvatam 7.14.9 says that human should look upon deer, camel, monkeys, donkeys, rats, reptiles, birds and flies as though they were their own children what is that which distinguishes these from those (children). Yajurveda Bhasya 13.49 says that “O king! You should never kill animals like bullock useful for agriculture or like cows which give us milk and all other helpful animals and must punish those who kill or do harm for such animals”. Poaching of animals is quite common in some places. Animals have been poached in certain places of India in which poaching of dolphin (National aquatic animal of India) Rhino, elephant (National Heritage of India), musk deer, and tiger are common.

Biodiversity used as food and medicines since prehistoric time. Ancient medical science such as Ayurveda and Unani medical system entirely depend on these rare medicinal plants. But due to commercialization and over exploitation many medicinal plants already extinct from the earth. In this context National father Mahatma Gandhi Said “Nature provides us enough to satisfy every man’s need but not every man’s greed.

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## **10.5 Remedial measures and recommendations to save nature**

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- We should respect and honour the earth and its components.
- We should try to understand and cooperate with nature and with its every component.
- We should not hold themselves above other living creatures, and have no right to drive them to extinction.
- Hunting and poaching of animals should be banned.
- Human should be grateful to the plants and animals which provide food, medicines, employment to human being.
- We should keep each day sacred to earth and celebrate the turning of season
- Human should not run after gain at the cost of nature, rather should strive to restore its damaged majesty.
- We must aware future generations about the environmental ethics and moral responsibilities towards nature and environment.
- We must respect air, river, water bodies, trees, forests, all plants and animals.
- We have the right to defend ourselves against individuals of species that do harm and to use individuals of species to meet our vital needs but we should strive not to cause premature extinction of any wild species.
- We must protect the habitat of wild species.
- We must encourage religions and cultures to protect nature.
- We should use no more of the earth’s resources than we need and should not waste such resources.
- We must increase the number of sacred groves in country.
- We must promote culture and traditions to conserve nature.

Thus, only by the change in attitude of man and by inculcating environmental ethics among one and all, we can protect, conserve and preserve natural resources and continue to live on the beautiful earth for generations to come.

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## **10.6 Summary**

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In this unit we have discussed various aspects of environmental ethics. So far you have learnt that:

- Environmental ethics deals with the moral responsibilities of men towards nature and environmental components.

- Environmental ethics may be defined as “Environmental ethics is a branch of applied philosophy that studies the conceptual foundations of environmental values as well as more concrete issues surrounding societal attitudes, actions, and policies to protect and sustain biodiversity and ecological systems.
- Environmental ethics varies according to various societies.
- Society can be classified on the basis of area, infrastructure, facilities and religions. They may be Rural, Urban, Hindu, Islamic, Buddhist, Christianity, Sikh.
- Social homogeneity, simplicity, conservatism, faith in culture & religions are main characteristics features of rural society.
- Unpolluted air, water and soil, rich biodiversity, rich numbers of sacred grooves and traditional knowledge are main environmental advantages of rural society.
- Carelessness about traditional customs, dynamic life, social heterogeneity etc. are characteristics of urban society.
- Polluted air, water, soil, low biodiversity, use of chemical fertilizers, less knowledge about traditional knowledge of flora and fauna are the environmental disadvantages of urban society.
- Every religion follows the rules and regulations of nature and people of different religions have faith in nature and its components.
- Moral irresponsibility’s of people certainly leading in to air, water, soil/land, and noise pollution. Unethical activities are responsible for bio-diversity degradation and solid waste generation.
- We can save the earth through promote environmental ethics, promote culture and tradition, change mindset of people and minimize the burden on ecosystems. We must know that earth is mother of all living creatures and we should protect every component of earth in very respectable ways.

## Terminal Questions

1. (a) Fill in the blank spaces with appropriate words.

Meaning of environment is..... The word Environment has been taken from.....word from .....language. The term ethics derives from the Greek word.....means ..... ". Morality refers to the concept of human ethics which pertains to matters of good and bad, often referred to as used in three contexts viz. individual conscience, systems of principles, and judgments; these three communally called .....

(b) Discuss the concept of Environmental ethics. Are you aware about various examples of Environmental ethics in different religions?

(c) What are the main characteristics of rural society?

2. (a) What are the environmental advantages of rural society?

(b) What are the main characteristics of urban society?

3. (a) What do you understand by urban area? What are the disadvantages of urban society with respect to environment?
4. (a) Give the environmental ethics in Hindu religion.  
(b) Give the environmental ethics in Islam.  
(c) Give the environmental ethics in Sikhism and Buddhism.
5. (a) Fill the blank spaces with appropriate words.

Environmental pollution may define as “Any undesirable change in ,  
..... and ..... properties of environmental components is called environmental pollution”. In ancient time people were aware about the importance of every ..... But in last few decades almost every component of environment such as .....being polluted and degrading due to .....

- (b) Illiteracy is character of urban society (Yes/No)
- (c) You will find rich biodiversity in rural area (Yes/No)
- (d) Explain water pollution due to unethical activities.
- (e) What do you understand by environmental degradation?
6. (a) Define environmental ethics. How biodiversity depleting due to unethical ways.  
(b) How you can minimize the environmental impacts through environmental ethics?

**Answers**

1. (a) Total surroundings, Environ, French, Ethos, habit or custom, right or wrong, moral values.  
(b) Small size villages, Intimate relations, Faith in culture and religions, Dominance of Joint family, Social homogeneity, Conservatism, Poverty, and Illiteracy are characteristics of rural society.
2. (a) Unpolluted Air, water and soil, Rich Biological diversity, No or minimum use of chemical fertilizers, Rich number of sacred groves, Minimum generation of solid waste, High respect of flora and fauna are advantages of rural society with respect to environment.  
(b) Social heterogeneity, Division of labor, Individuation, Unstable family, Moral carelessness, High incident of crime, dynamic and artificial life are characteristics of urban society.
3. (a) Urban area is where all the facilities such as schools, hospitals, malls, well developed infrastructure easily accessible. Environmental disadvantages of urban society with respect to

environment are polluted air, water and soil, low biodiversity, maximum use of chemical fertilizers, very less traditional knowledge about local flora and fauna.

4. (a) See the classification of society on the basis of religions (1.3.1)
  - (b) See the classification of society on the basis of religions (1.3.1)
  - (c) See the classification of society on the basis of religions (1.3.1)
5. (a) Physical, Chemical, Biological, Component of Environment, Air, water and soil, manmade activities.
  - (b) No
  - (c) Yes
  - (d) See Responsibility of environmental degradation
  - (e) See Responsibility of environmental degradation
6. (a) Environmental ethics is a branch of applied philosophy that studies the conceptual foundations of environmental values as well as more concrete issues surrounding societal attitudes, actions, and policies to protect and sustain biodiversity and ecological systems.

“Environmental ethics is the part of environmental philosophy which considers extending the traditional boundaries of ethics from solely including humans to including the non-human world. It exerts influence on a large range of disciplines including environmental law, environmental sociology, eco-theology, ecological economics, ecology and environmental geography.

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**Unit 11: Environmental Racism and Environmental Rights**

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**11.0 Learning objectives**

**11.1 Introduction**

**11.2. Environmental Racism and Environmental Rights**

**11.3 Environmental Rights and Human Rights**

**11.3.1 Human Rights**

**11.3.2 Status of Human rights in India**

**11.4 Human Rights and Environment**

**11.5 Environmental Rights in India**

**11.6 Animal Rights**

**11.6.1 Animal rights should have following important points.**

**11.6.2 Animal right issues:**

**11.6.3 List of Animal Rights in India**

**11.7 Animal Welfare Organizations in India**

**11.8 Important National Parks and Wildlife Sanctuaries of India**

**11.9 Summary**

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## **11.0 Learning objectives**

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After studying this unit you will be able to understand:

- Concept of Environmental racism
- What are Environmental rights?
- Environmental Rights in India
- Human rights
- Human rights in India
- Animal Rights
- Animal rights in India
- Organizations working for animal welfare in India

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## **11.1 Introduction**

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As you know that, human beings get all the essential components such as air, water, food, material for infrastructure, fuel, energy from environment. It is well known that human being exploited these components at very fast rate which may lead to different types of problems such as pollution, loss of biological diversity, diseases etc. Many important rivers of globe such as Indus, Ganges, Yamuna, Buriganga, Marilao river, Sarno, Mississippi, Citarum river etc. loosing their water quality on the other hand many important animals such as Elephant, Tiger, Musk deer, Rhinoceros, Dolphins etc. have been poaching in different parts of the world. Therefore, it is now essential to implement Environmental laws and environmental rights at various levels for the protection of environmental components such as plants, animals and natural resources. An environmental law seeks to protect both the environment for itself, and for the benefit of humankind at a local and global level.

It is also noticed that some communities (specially poor communities or communities of developing countries) facing the environmental problems such as pollution, epidemic diseases, improper remedial measures, on the other hand some communities use excessive use of natural resources. This inequality of the natural resources and environmental components is called environmental racism. Environmental racism is phenomena in which environmental components are not equally distributed. In this unit you will learn about environmental rights, laws/acts, environmental racism, human, and animal rights and about many organizations which are presently working for the protection of animal at national level.

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## **11.2. Environmental Racism and Environmental Rights**

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As you know that meaning of “Environment” that is “surroundings” and racism is the “belief in the superiority of one race over another”. Today, the use of the term "racism" does

not easily fall under a single definition. In 1978 United Nations Educational, Scientific and Cultural Organization (UNESCO) declaration on Race and Racial Prejudice (Article 1), the UN states that "All human beings belong to a single species and are descended from a common stock". They are born equal in dignity and rights and all form an integral part of humanity. You can understand the meaning of environmental racism by the following example.

A lot of people are pretty lucky to get clean air or unpolluted water. But not everyone is so lucky in this world for that situation. It seems that a disproportionate number of people who live in environmentally hazardous areas are either minority groups or people of low socio-economic status. Environmental racism is defined as "It's the placement of people into environmentally hazardous areas or the placement of environmental hazards into areas with high numbers of minority individuals". Environmental racism refers to "intentional or unintentional targeting of minority communities or the exclusion of minority groups from public and private boards, commissions, and regulatory bodies and put them in to environmental hazardous area".

It is the racial discrimination in the enactment or enforcement of any policy, practice, or regulation that negatively affects the environment of low-income communities at a disparate rate than affluent communities.

Environmental racism is a very important concept that provided a label for some of the environmental activism occurring in minority and low-income groups. In particular, it associates racism with environmental actions, experiences, and outcomes. In the broadest sense, environmental racism is the process in which environmental decisions, actions, and policies result in racial discrimination or the creation of racial advantages.

According to Robert Kuehn in his article titled "A Taxonomy of Environmental Justice" "Environmental racism defined as "any environmental policy, practice, or directive that differentially affects or disadvantages individuals, groups, or communities based on race or colour". Most activists and many academics use the terms environmental racism and environmental injustice interchangeably.

The term environmental equity, a term coined by a U.S. Environmental Protection Agency (EPA) working group, because they believe it lends itself most readily to scientific risk analysis and avoids the more charged and controversial terms racism and justice.

### **Examples of Environmental racism:**

- (i) Native American land has been used as a place to dump radioactive nuclear waste. Latino individuals are more likely to live near large hazardous waste landfills.
- (ii) African Americans are more likely to live near uncontrolled toxic waste sites.
- (iii) Caucasians living in the mountains of Appalachia deal with contaminated drinking water from mountaintop mining.

(iv) Many people of Uttarakhand State of India also facing lot of problems due to heavy construction of hydropower projects specially in the hilly region of state.

(v) Some people of these communities have suffered from health problems such as cardiovascular diseases, neurological diseases, psychological disorders etc. and have shorter life spans. Due to the toxic air, water, soil, flood in these places, no one really wants to live or work in these areas. But because those who are living in these areas are typically of low socioeconomic status, they have neither the ability nor the resources to move to a better place. Since the people living in these areas have fewer economic resources, there is no need to build better buildings for them to live in or to maintain the old ones.

You can see example of environmental racism in the predominantly black city of Flint, Michigan where water was poisoned with dangerous levels of lead (Pb), a substance that can lead to serious health consequences, including brain damage. Instead of accepting the problem and coming up with solutions, local and federal government tried to cover it up at first. Compare this with a dangerous natural gas leakage found in the mainly white community of Porter Ranch, CA, where government officials have been far more responsive to the threat.

Environmental Rights are the protection of natural resources; the access to and use of natural resources; and how the access to and use of these resources affects surrounding populations, as well as the resources themselves. Environmental rights are an extension of the basic human rights that human beings require and deserve. In addition to having the right to food, clean water, suitable shelter, and education, having a safe and sustainable environment is paramount as all other rights are dependent upon it.

Beyond equal distribution and access to sustainable resources, environmental Rights also include an additional obligation from those in the industrialized nations. It requires us to act responsibly in our own use of natural resources, and to regulate our levels of consumption in a more equitable manner.

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## **11.3 Environmental Rights and Human Rights**

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### **11.3.1 Human Rights**

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It is important to know that environmental rights are just extension of human rights. As you know that The United Nations (UN) is an organization of 193 Nations of the world, having its headquarters at New York city. It was established on October, 24, 1945. The two main goals of the United Nations are: Peace and human dignity. Keeping in mind its main aim of human dignity, the United Nations set up the U.N. commission of human rights in 1946, as a part of the economic and social council. This commission wrote an important document, which came to be known as the Universal Declaration on Human Rights (UNDHR). This declaration was approved by all the member of the general Assembly of the U.N. on December 10, 1948. Therefore, 10 December celebrated as the World human Rights Day. The declaration expressed

the hope that people would learn to respect the rights and dignity of others. The declaration has a preamble and 30 articles, which set a common standard of achievement for all people and all nations.

The universal Declaration of human rights of 1948 gives various rights to human beings, living in countries who are member of the U.N.O. These rights include important rights like The right to equality, right to life, liberty and security; prohibition against slavery and cruelty; equality before law; no discrimination; no arbitrary arrest or detention; freedom of movement; right to asylum i.e. protection from danger, in foreign countries to political criminals; etc.

The universal declaration of Human Rights of 1948 was reconsidered and revived in the world conference on Human Rights held on 25 June, 1993 in Vienna. In this conference 171 member countries of the U.N. General Assembly adopted by agreement called The Vienna declaration on Human Rights. This declaration proved the commitment of the states (countries) to fulfill their obligation to promote universal respect for and observance and protection of human rights and fundamental freedom for all. In this conference it was resolved that the U.N. should strengthen its mechanisms to ensure compliance of human rights and for poorer countries were also resolved to given financial aids for strengthening their infrastructure to strengthen compliance of human rights.

Although the human rights are now bestowed universally, but their exists overwhelming violations of human rights, particularly in developing and under developed countries. Population and poverty often ignores human dignity and without dignity or self-respect there is no meaning of human rights. When millions of people of the third world countries are fighting for their bread and butter, how can one expect them to fight court cases for securing their human rights? How can beggars claim for human rights? How can poor starving people give good education to their children as provided in the human rights of universal education? How can such poor people prevent child labour, when their children can help them in earning some money for running the family's expenditure? Rich people always can buy and enjoy human rights, while poor illiterate people cannot avail even what lawfully belongs to them. Human rights violations are therefore, very common and do frequently occur.

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### **11.3.2 Status of Human rights in India**

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In order to keep watch on frequent violation of the human rights, and to enforce the United Nation's Universal declaration of Human Rights, the Government of India, Under the Protection of Human Right Act, has established a National Human Rights Commission (NHRC) at the national level while State Human Rights Commissions (SHRCs) have been established at state level. NHRC constituted on 12th October,1993 which is responsible for protection and promotion of human rights. The Protection of Human Rights Act, 1993 amended in 2006 which contains 7 chapters and 43 sections.

All the states of India have, however not set up such commissions so far as they usually entail a huge expenditure. Only 16 states have set up such commission so far. The NHRC

receives about 70,000 complaints of violations of human rights every year, but faster investigation become difficult, since all the states have not set up State Human Rights Commissions.

Government of India now going to table the “Protection of Human Rights (Amendment) 2006” in parliament, so as to allow single State Human Rights Commission to assume charge of more than one state. The NHRC would then be able to transfer cases to its state counterpart. This proposed Amendment bill also provides for compensation to be paid to a victim during the period of investigation, unlike the existing system. In addition the amendment bill will enable any retired justice of supreme court to become the chairperson of NHRC as against the present provision which allow only a retired Chief Justice of Supreme court to become such a chair person, Similarly for SHRCs, any retired Chief Justice of High Court can now become the chairperson, which will be changed as to enable appointment of any retired judge of the High court to this position.

In India the Human rights have generally centered around bonded labour, custodial deaths, fake police encounters, violence against women, dowry deaths, child abuse, mass killings of daliths etc. The constitution of India has also granted to its citizen seven Fundamental Human Rights (which can be legally enforced) such as:

### **The seven fundamental rights by the Indian constitution are:**

- (i) Right to equality: This right includes equality before law and is provided from Article 14 to Article 18 of Indian constitution.
- (ii) Right to freedom: This right includes freedom of speech and expression, assembly, right to life and liberty and provided from Article 19 ,20 ,21, 21, 22 of constitution.
- (iii) Right against exploitation: This right prohibits all forms of forced labour and child labour and is provided under Articles 23 and 24 of Indian constitution.
- (iv) Right to freedom of religion: This right includes freedom of conscience and free profession, practice, and spread of religion, freedom to manage religious affairs, freedom from certain taxes and provided under Article 25 to 28 of Indian constitution.
- (v) Cultural and Educational rights: Right of any section of citizens to conserve their culture, language or script. Article 29 and Article 30 of Indian constitution provides for cultural and educational rights.
- (vi) Right to constitutional remedies: Right to constitutional remedies present for enforcement of Fundamental Rights. It is provided under Article 32 to 35 of Indian constitution.
- (vii) Right to Privacy: It is an intrinsic part of Article 21 that protects life and liberty of the citizens

The Indian constitution also provides for a number of directive Principles of state policy, which though cannot be legally enforced, but shall remain the fundamental principles of the governance of country, and it shall be duty of state to apply these principles. The

fundamental rights, thus already provide a lot of guaranteed freedom and liberty to Indian People, while the directive principles intend to provide several other human rights for the social and economical upliftment of its people in the time to come.

In spite of grant of so many rights and in spite of existence of Human Rights Commissions, there frequently occur violations of Human Rights in India. Social discriminations, untouchability, male dominance and women violence, child abuse, slavery, exploitations of labour, favoritism in services, police atrocities (cruel act) etc. are the order of the day, since the guilty are either not at all punished quickly and there is too much of corruption all around the country.

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## **11.4 Human Rights and Environment**

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The first international efforts to seek the inclusion of the right to healthy environment under the human right was made in the 1972 U.N. conference on Human Environment held at Stockholm, Sweden. This conference concluded on 16 June, 1972 with adoption of declaration, consisting of a Preamble and 26 principles. These principles are given below:

- (i) Human Rights must be asserted (confidently state that something is true) and condemned.
- (ii) Natural Resources such as forests, mineral, water, energy, land etc. must be protected.
- (iii) The capacity of earth to produce renewable resources must be maintained.
- (iv) Wild life (flora and fauna both) must be safeguarded or protected.
- (v) Non-renewable resources such as coal, petroleum, natural gases etc. must be shared and not exhausted.
- (vi) Environmental Pollution must not exceed the limit of environment to clean itself.
- (vii) Oceanic/marine pollution must be prevented.
- (viii) Development is needed to improve the environmental conditions.
- (ix) Developing countries therefore need financial assistance.
- (x) Developing countries need reasonable prices.
- (xi) Environmental policies must not slow down the developmental process.
- (xii) Developing countries need money to develop environmental safeguards/environmental protection devices.
- (xiii) Integrated development planning is needed
- (xiv) Rational planning should resolve conflicts between environment and development with appropriate solution

- (xv) Human settlements must be well planned and managed to mitigate environmental problems.
- (xvi) Governments should plan their own population policies to control the population.
- (xvii) National institutions must plan development of natural resources of Nations.
- (xviii) Science and technology must be used to improve the environmental conditions.
- (xix) Environmental education is essential to all people of world.
- (xx) Environmental research must be promoted in general and in developing countries in particular.
- (xxi) States (countries or Nations of UN) may exploit their resources as they wish but must not endanger others
- (xxii) Compensation is due to states thus endangered
- (xxiii) Each Nation must establish its own environmental standards (such as for air, water, noise, soil quality)
- (xxiv) There must be cooperation on international environmental issues (such as global warming, green house emission, ozone layer depletion, acid rain etc.)
- (xxv) International organizations should help to improve the environment
- (xxvi) Weapon of mass destruction should be eliminated.

In the U.N. conference on Environment and Development (UNCED) held in Rio de Janeiro (Brazil) in 1992 popularly called Earth summit. This conference was an emphasis on sustainable development and environmental protection. Through principle 10 of this Rio-declaration, a link was formulated between human rights and environmental protection, largely on procedure terms.

### **Principle 10 of the Rio-Declaration proclaims as follows:**

“Environmental issues are best held with the contribution of all related citizens. Each individual shall have appropriate access to information concerning the environment that is held by public authorities, including information about hazardous material and activities in their communities and the opportunities to participate in the decision making policies at National level. States (countries/nations) shall make possible and encourage public alertness and responsiveness and participation by making information widely available”

Right to information, participation and remedies in respect to environmental conditions, thus, formed the focus of the Rio Declaration. In addition to Principle 10, the declaration included provisions on the participation of different components of the population such as by women (Principle 20), by youth (Principle 21) and by indigenous people and local communities (principle 22). Public participation was also emphasized in Agenda 21 drawn at the Earth Summit. The Agenda 21 also calls on governments and legislators to established judicial and

administrative procedures for legal redress and remedy for actions affecting environment that may be unlawful or infringe under the law, and to provide access to individuals, groups and organizations with a recognized legal interest.

Agenda-21 also calls for public participation in Environmental Impact Assessment procedures and in decisions. It also encourages governments to create policies that facilitate a direct exchange of information between the government and the public on environmental issues, suggesting the EIA process as a potential mechanism for participation.

In order to promote and protect human rights to safety and healthy environment, as laid down in UNCED, the WHO has carried out a wide range of actions: from establishing a special department to deal with environmental concerns, to setting specific policies and strategies, carrying out and disseminating research, or providing technical advice on issues such as sanitation. The WHO, in the last decade, has formulated a new WHO Global Strategy for Health and Environment, which was endorsed by the forty-sixth World Health Assembly in May 1993. This strategy provides a unifying frame work for WHO's activities and has following three objectives:

- (i) To achieve a sustainable basis for health for all people of world.
- (ii) To provide an environment that promotes health
- (iii) To make all individual and organizations aware of their responsibility for health and its environment.

Most international organizations and UN agencies with a mandate to address developmental related issues, and multilateral financial institutions in particular, have placed the issue of poverty high up on their agenda and programmes of action. Most of them establish an explicit link between poverty and the environment, explaining as how the poor suffer more harshly the consequences of environmental problems and frequently adopting approaches similar to those introduced in the 1987 report from the World Commission on Environment and Development (Brundtland Report Our Common Future).

It could be stated that the right to information on all environmental issues; the right to participate in EIA debates on developmental projects; the right to challenge environmental pollution activities in the court through individual writs or public interest litigations (PILs) etc. have in fact, vested powerful human rights in the hands of the people, though no direct right to healthy or adequate environment as such, has been included in the policies or activities of any organizations, departments and agencies so far.

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## **11.5 Environmental Rights in India**

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There are various environmental rights and acts related to environment in Indian constitution which are described below:

- The specific provisions on environment protection in the Indian constitution are in Article 51-A (g) which articulates that "It shall be duty of every citizen to protect and improve the

natural environment including forests, lakes, rivers and wild life and to have sympathy for living creatures.”

- Article 47 of Indian constitution provides that the State shall regard the raising of the level of nutrition and the standard of living of its people and the improvement of public health as among its primary duties. The improvement of public health also includes the protection and improvement of environment without which public health cannot be assured.
- Article 48 deals with organization of agriculture and animal husbandry. Article 48-A of the constitution states that “the state shall endeavor to protect, preserve and improve the environment and to safeguard the forests and wildlife of the country”.
- The right to life, a fundamental right, given in article 21 of the Indian Constitution states that “No person shall be deprived of his life or personal liberty except according to the procedures established by law”.
- The supreme court of India has expanded this right to life, as to include in it the right to clean environment, on the basis of the fact that environmental deterioration could eventually endanger the life of the present as well as of the future generations.
- The protection of environment has, thus, become a fundamental duty of every Indian constitution do provide strong environmental rights to its citizens.
- The growing education, environmental responsiveness, and development of societies and NGOs have further strengthened the environmental protection movement in India.
- The union Govt. has also strengthened the human rights by legislating and implementing the “Rights to information Act, 2005”, under which any person is entitled to collect information on any issue, including the state of environment or the actions taken by the Governments to prevent environmental pollution being caused by any specific activity of any specific person or industry, etc.
- To enhance environmental awareness among one and all, the Hon’ble. Supreme Court of India, has vide its judgment dated 18-12-2003, ( given in continuation of its initial order dated 22-11-1991, followed by several interim orders ) has directed the U.G.C. and various colleges to introduce a compulsory subject on “Environmental studies” in all the undergraduate courses, at least from the year 2004-05.

In India there are various environmental Acts and laws such as: Air (Prevention and Control of Pollution) Act, 1981, Biological Diversity Act, 2002, The Environmental (Protection) Act, 1986, The Hazardous Waste (Management & Handling) Act, 1989, Water (Prevention and Control of Pollution) Act, 1974, Wildlife Protection Act, 1972 etc. have implemented and some of them are given below:

Table-1: List of Environmental Acts/ Laws in India

S. no.	Name of Act/Law	Sections and Appendix
1.	Air (Prevention and Control of Pollution) Act, 1981	It contains 7 chapters and amended in 1987. It extends to the whole of India Exclusively for the protection of Atmosphere

2.	Biological Diversity Act, 2002	It contains 12 chapters. It extends to the whole of India Exclusively for the protection of biodiversity of nation.
3.	The Environmental (Protection) Act, 1986	It contains 4 chapters and 26 Sections It Extends to the whole of India Exclusively for the protection of environmental components.
4.	Forest Conservation Act, 1980	It contains 5 chapters. It Extends to the whole of India except Jammu and Kashmir. Exclusively for the protection of Forests of India
5.	The Hazardous Waste (Management & Handling) Act, 1989	It contains 21 chapters. It amended in January 6, 2000 and May 21, 2003. Exclusively for the protection of Environmental components.
6.	Indian Forest Act, 1927	It contains 13 chapters, 38 Sections and 03 schedules. Exclusively for the protection of Forests in India
7.	National Green Tribunal Act, 2010	It contains 05 chapters and 86 Sections. It provides for the establishment of a National Green
		Tribunal for the effective and expeditious disposal of cases relating to environmental protection and conservation of forests and other natural resources including enforcement of any legal right relating to environment and giving relief and compensation for damages to persons and property and for matters connected therewith or incidental thereto.
8.	Protection of Plant Varieties and Farmer's Right Act of 2001	It contains 11 chapters and 97 Sections It extends to the whole of India It is exclusively for the establishment of an effective system for protection of plant varieties, the rights of farmers and plant breeders and to encourage the development of new varieties of plants. It amended in the year 2003
9.	Public Liability Insurance Act, 1991	It contains 23 chapters. Exclusively for public liability insurance for the purpose of providing immediate relief to the persons

		affected by accident occurring while handling any hazardous substance and for matters connected therewith or incidental thereto.
<b>10.</b>	Water (Prevention and Control of Pollution) Act, 1974	It contains 08 chapters and 64 sections. Exclusively for the prevention and control of water pollution and the maintaining or restoring of wholesomeness of water, for the establishment, with a view to carrying out the purposes aforesaid, of Boards for the prevention and control of water pollution, for conferring on and assigning to such Boards powers and functions relating thereto and for matters connected therewith. The Act was amended in 1988
<b>11.</b>	Wildlife Protection Act, 1972	It contains 07 chapters and 66 sections. It extends to the whole of India except the State of Jammu and Kashmir Exclusively for the protection of wild flora and fauna

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## **11.6 Animal Rights**

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According to Australian philosopher Peter Singer (1975) in his famous book on Animal Liberation, “The basic principle of equality does not require identical treatment, it requires equal consideration” Animal rights are the belief that animal have right to be free of exploitation. Animal rights are not about put animals above human but put these animals free from human exploitation. You should know that animal rights are differ from animal welfare. Animal rights are belief that human do not have right to exploit animals on the other hand animal welfare means belief that human do have right to use animals are treated humanely.

Various renowned scientists quoted the animal rights. According to Thomas A. Edison, “Non-violence leads to peak of ethics, which is goal of all evolution. Until we stop harming all other living beings, we are still savages or goth”.

According to Elbert Einstein, “If man aims towards righteous path his first act of self-discipline is from injury to animals”.

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### **11.6.1 Animal rights should have following important points.**

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- (i) The right to live freely in natural habitats of their desire.
- (ii) The right to express their normal behaviors (Searching of food, grooming and building of nests).
- (iii) Right to life.

- (iv) Right to reproduce.
- (v) Right to choose their own life style.
- (vi) Right to live free from man induced destruction.

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### **11.6.2 Animal right issues:**

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There are various animal right issues and some of them are given below

- (i) Human over population: This is major issue of animal rights as well as environmental issue. As population rise man made or anthropogenic activities such as transportation, pollution, habitat loss of wild animals increasing at tremendous rate. This leads in to harmful effects on animals.
- (ii) Animal treated as property: Human believe that animals are like their property. Human beings nourish animals only for their use not as family members. This is also great animal right issue. Animal should consider as family member and human being should treat animal like guardian rather than owner.
- (iii) Non-vegetarian: Non-vegetarian is another animal right issue. According to the sample registration system baseline survey 71 % population of India over the age of 15 are non-vegetarian. We should follow the vegan food which is plant based food. Many animals such as fishes, birds and mammals have been kill for the human consumption.
- (iv) Factory Farming practices: Factory farming practices involve many harmful or cruel practices for maximize profit from the animals. Animal suffers from high doses of antibiotics, hormones, battery cages, tail docking (cutting tail of animals) and debarking (cutting beaks of birds without anesthesia). Animals spent their whole life under these uncomfortable conditions.
- (v) Animal Experimentations: Many species of animals have been used as subject for medication. It is estimated that annually, 10 million to 100 million animals used for different experiments. According to Baltimore survey every drug test requires at least 800 animals.
- (vi) Hunting and Poaching: Population of many animals has declining due poaching. Many species such as Dolphin (poaching for oil), elephants (poaching for tusk, ivory), rhinoceros (poaching for medicines for cancer), tiger (poaching for claws, bones), musk deer (poaching for musk gland) have been poaching in different parts of country. This is also considered as important animal's rights issue.

Therefore, various animal rights have been implemented at various levels. Some of the important animal rights are described below:

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### **11.6.3 List of Animal Rights in India**

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- (i) According to central Government Act Article 51-A (g) “It is the fundamental and basic duty of every citizen to have compassion for all living creatures”.
- (ii) According The Penal Code (IPC) Sections 428 and 429 “To kill or injure any animal, including stray animals, is a punishable offence. According to this right “mischievous mischief by killing poisoning maiming or rendering useless any elephant, camel, horse, etc., whatever may be its value or any other animal of the value of 50 rupees or upwards.
- (iii) According Section 11(1) (i) and Section 11(1) (j) of Prevention of Cruelty to Animals Act 1960 (PCA Act, 1960) “Abandoning any animal for any reason can land you in prison for up to three months”.
- (iv) As per Prevention of Cruelty to Animals, (Slaughterhouse) Rules, 2001 and Food Safety and Standards Regulations, 2011 “No animal can be slaughtered in any place other than a slaughterhouse and sick or pregnant animals shall not be slaughtered”.
- (v) According to Animal Birth Control Rules 2001 (ABC Rules, 2001) “Stray dogs that have been operated for birth control cannot be captured or relocated by anybody including any authority”.
- (vi) According to Section 11(1) (h) of Prevention of Cruelty to Animals Act 1960 (PCA Act, 1960) “Neglecting an animal by denying her sufficient food, water, shelter and exercise or by keeping him chained/confined for long hours is punishable by a fine or imprisonment of up to 3 months or both”.
- (vii) Under Wildlife (Protection) Act, 1972 “Monkeys are protected and cannot be displayed”.
- (viii) According to Section 22 (ii), PCA Act, 1960 Prevention of Cruelty to Animals Act 1960 “Bears, monkeys, tigers, panthers, lions and bulls are prohibited from being trained and used for entertainment purposes, either in circuses or streets”.
- (ix) As per Rule 3, Slaughterhouse Rules, 2001 “Animal sacrifice is illegal in every part of the country”.
- (x) As per Section 11(1) Prevention of Cruelty to Animals Act, 1960 “Organizing of or participating in or stirring any animal fight is a cognizable offence”.
- (xi) According to Rules 148-C and 135-B of Drugs & Cosmetics Rules, 1945 that “Cosmetics tested on animals and the import of cosmetics tested on animals is strictly prohibited”.
- (xii) According to Section 38-J of Wildlife (Protection) Act, 1972 “Teasing, feeding or disturbing the animals in a Zoological park and littering the Zoological park premises is an offence punishable by a fine of 25000 (In rupees) or imprisonment of three years or both”.
- (xiii) As per Section 9 of Wildlife (Protection) Act, 1972 “Capturing, trapping, poisoning or baiting of any wild animal or even attempting to do so is punishable by law, with a fine of up to 25000 (In rupees) or imprisonment of seven years or both”.

(xiv) According to Section 9 of Wildlife (Protection) Act, 1972 “Disturbing or destroying eggs or nests of birds and reptiles or even attempting to do so constitutes to hunting and attracts a punishment of a fine of up to 25000 (In rupees) or imprisonment of seven years or both”.

(xv) As per Section 11(1) (d) Prevention of Cruelty to Animals, (Transport of Animal) Rules, 2001 and Motor Vehicles Act 1978 “Conveying or carrying animals whether in or upon any vehicle, in any manner or position which causes discomfort, pain or suffering is a punishable offence under two Central Acts”.

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## **11.7 Animal Welfare Organizations in India**

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(i) Animal Welfare Board of India: It was established in the year 1960, under Section 4 of the Prevention of Cruelty to Animals Act-1960, is a legal advisory body, formed for advising the Government of India, on animal welfare laws. It was originally formed under the Ministry of Food & Agriculture was brought under the Ministry of Environment & Forests (Now Ministry of Environment, Forest and Climate Change) in the year 1990. It has also been providing to the animal welfare organizations in India, various types of grants to including: Regular, Cattle Rescue and Shelter House grants for looking after the Animals.

(ii) Blue Cross of India (BCI): It is one of the largest animal welfare organizations in India, was founded in the year 1959 and recognized by the Animal Welfare Board of India in the year 1966. For the purpose of controlling and eradicating human deaths, due to dog-bites and rabies, the ‘BCI’ has been implementing an alternate method namely Animal Birth Control and Anti Rabies Program instead of the method of ‘Catching and Killing’.

(iii) The Blue Cross of Hyderabad: It was founded in the year 1992 recognized by the Animal Welfare Board of India. It was founded by Telugu Actor Mr. Akkineni Nagarjuna and Tamil Actress Mrs. Amala Akkineni, focusing on ‘Animal veterinary treatment’, ‘re-homing and rehabilitation’ of animals in the State of Telengana. It has been running 9 projects the welfare of animals with a total of 650 animals of various species.

(iv) The Wildlife Rescue & Rehabilitation Centre: It was set up by the trustees of the Compassion Unlimited Plus Action to provide relief to wild animals, birds and reptiles, including medical treatment and housing and to handle cases of cruelty to wild animals, which are injured, abused and illegally traded.

(v) People for Ethical Treatment of Animals (PETA): PETA was founded in 1980 and is dedicated to establishing and defending the rights of all animals. PETA operates under the simple principle that animals are not ours to eat, wear, experiment on, or use for entertainment. PETA educates policymakers and the public about animal abuse and promotes kind treatment of animals.

PETA is an international nonprofit charitable organization based in Norfolk, Virginia, with affiliates worldwide. PETA believes that animals have rights and deserve to have their best interests taken into consideration, regardless of whether they are useful to humans.

PETA India was launched in January 2000. PETA India works under the simple principle that animals are not ours to consume, wear, research/experiments on or use for leisure, while educating policymakers and the public about animal abuse and promoting an understanding of the right of all animals to be treated with respect.

PETA India focuses primarily on the areas in which the greatest numbers of animals suffer the most: in the food and leather industries, in laboratories and in the entertainment industry. PETA India's investigative work, public education efforts, research, animal rescues, legislative work, special events, celebrity involvement and national media coverage have resulted in countless improvements to the quality of life for animals and have saved countless animals' lives.

(vi) Animal Aid Unlimited: It is a Rescue Centre established in the year 2002 with a aim to rescue and treat and keep in sanctuary, the ill or injured, un-owned street animals of Udaipur, Rajasthan. The ultimate goal of 'Animal Aid Unlimited' is equality, protection and life in freedom of all animals and a complete end to the use and abuse of animals, such as: dog, donkey, cow, pig, fish and mouse.

(vii) Buddha Society for Animal Welfare: It was established by 'Shiksha Rattan' Dr. S. P. Sharma to provide veterinary medical service for the less privileged animals which are deprived of minimum essential veterinary medical aid. 'It has been providing to animals all the essential veterinary medical care, including, medication, vaccinations, surgery, spaying or neutering and general treatment necessary to restore the animal to have a comfortable life.

(viii) Group of Animal Lovers: It was founded by a group of 4 young college friends (Mr. Bhavik Shah, Mr. Pulkit Panchal, Ms. Khyati Shah and Mr. Vishal Modi), with similar thoughts and feelings with desires to do something to make a difference in the society for the betterment of animals and birds. According to the founders of the 'GOAL', in Ahmedabad, Gujarat, during the 'Uttarayan' Festivals'-celebrations, with the 'International Kite Festival', thousands of birds such as pigeons, peacocks, vultures, kites, egrets, parakeets and many migratory birds like flamingo and pelican get cut by the sharp threads flying thousands of kites, and bleed to death / become handicapped due to the wounds.

(ix) Help in Suffering (HIS): It is a registered Charitable Trust, founded in the year 1980 at South Jaipur, for working for the benefit of animals in India. It works on 6 different animal welfare projects with 35 staff members and 3 rescue ambulances and 2 mobile clinics. It has provided refuge shelter and veterinary hospital for many animals, inside its peaceful and garden-like grounds inside its compounds and works for 're-homing' of un owned / disowned animals. It has built a new specialized 'Camel Rescue Centre' at Bassi Village on Agra Road to serve draught camels.

(x) Let's Live Together: It is an animal welfare organization especially for dogs, founded by Ms. Achala Paani, an animal welfare activist since 2005. The project- 'Life on the Street' of 'Let's Live Together' has been encouraging people who are interested in buying puppies for keeping as pet-dogs to adopt the homeless puppies and keep them as pets. 'Let's Live Together'

has been helpful in motivating and assisting more than 1000 adoptions of homeless puppies and helping to reduce the stray dogs on the streets of Bangalore.

(xi) Wildlife SOS, India: It was established in the year 1995, by a small group of individuals inspired to start a movement and make lasting change to protect and conserve India’s natural heritage, forest and wildlife wealth. It has been actively working for: protecting wildlife in India, conserving habitats and studying bio diversity by conducting research and creating alternative and sustainable livelihoods for communities dependent on wildlife for sustenance. It has been: initiating action against animal cruelty, rescuing wildlife in distress, working to resolve man-animal conflicts while promoting and educating the public about the need for habitat protection.

(xii)Federation of Indian Animal Protection Organization’: It was established on 25th November 2010 in New Delhi, has been registered under the ‘Indian Trust Act 1882’. It is a collective of animal protection organizations in India to help, represent, connect up, and inform animal protection organizations and activists across India and to campaign on ongoing projects and to make research on rights of animals.

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## **11.8 Important National Parks and Wildlife Sanctuaries of India**

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India is 12th mega-biodiversity nation and blessed with varieties of animals and plants. This includes 103 National Parks, 537 Wild Life Sanctuaries and 18 biosphere reserves. These (National Parks, Wild Life Sanctuaries and biosphere reserves) are collectively called protected areas. International Union for conservation of Nature (IUCN) has defined declares these areas. According to IUCN National Parks as its category II type of protected areas. According to IUCN Wildlife sanctuary as its category IV type of protected areas. Biosphere reserves are sites established by countries and recognized under UNESCO to promote sustainable development. The programme of Biosphere Reserve was initiated by UNESCO in 1971. The aim of the formation of the biosphere reserve is to conserve all types of biodiversity within ecosystems. Some important national parks, wildlife sanctuaries and biosphere reserves are given below:

Table-2: Some important protected areas of India and main protected fauna.

<b>S.N.</b>	<b>Name of National Parks</b>	<b>Year of Establishment</b>	<b>Main protected Animal</b>
1.	Corbett National Park, Uttarakhand (First National Park of India)	1936	Tiger, Elephant
2.	Mhadei Wildlife Sanctuary, Goa	1999	Tiger, Indian Krait, Russel’s viper
3.	Kaziranga National Park, Assam	1968	Rhinoceros
4.	Gir forest National Park, Gujarat	1965	Lion
5.	Tadoba National Park, Maharashtra	1955	Bengal Tiger, Leopards,

			Nilgai
6.	Periyar Wildlife Sanctuary, Kerala	1982	Elephant, Gaur, Lion tailed Macaque
7.	Kedarnath Wildlife Sanctuary, Uttarakhand	1972	Himalayan Musk Deer
8.	Askot Wildlife Sanctuary, Uttarakhand	1986	Himalayan Musk Deer
9.	Rajaji National Park, Uttarakhand	1983	Elephant
10.	Ranthambore National Park, Rajasthan	1980	Bengal Tiger
11.	Nilgiri biosphere reserve, Tamil Nadu, Kerala, Karnataka (First biosphere reserve of India)	1986	Bengal Tiger, Indian leopard, Lion tailed Macaque, Nilgiri Tahr
12.	Nanda Devi Biosphere reserve, Uttarakhand	1988	Himalayan Musk Deer, Himalayan snow leopard, Himalayan black bear
13.	Sunder bans biosphere reserve, West Bengal	1989	Royal Bengal Tiger, fishing cats, black capped king fisher, Gangetic Dolphin, salt water crocodile
14.	Agasthyamalai biosphere reserve, Kerala	2001	Tiger, asian elephant, Nilgiri Tahr
15.	Gulf of Mannar, Tamilnadu	1989	Dugong or Sea Cow
17.	Nokrek, Meghalaya	1988	Red Panda
18.	Pachmarhi Biosphere Reserve, Madhya Pradesh	1999	Giant Squirrel, Flying Squirrel
19.	Similipal, Odisha	1994	Gaur, Royal Bengal Tiger, Wild Elephant
20.	Great Nicobar Island Biosphere Reserve, Andaman and Nicobar Islands	1989	Saltwater Crocodile
21.	Khangchendzonga, Asam	2000	Snow Leopard, Red Panda
22.	Cold Desert, Himachal Pradesh	2009	Snow leopard

23.	Great Rann of Kutch, Gujarat	2008	Indian Wild Ass
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## 11.9 Summary

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In this unit we have discussed various aspects of environmental rights, environmental racism, environmental rights and human rights at global and national level. Besides this we have also discussed about important animals rights in India and organization which are working for the protection of animals. So far you have learnt that:

- Environmental rights are just the extension of human rights. Environmental racism is phenomena in which environmental components are not equally distributed.
- Environmental racism refers to “intentional or unintentional targeting of minority communities or the exclusion of minority groups from public and private boards, commissions, and regulatory bodies”.
- Various Laws such as Air (Prevention and Control of Pollution) Act, 1981, Biological Diversity Act, 2002, The Environmental (Protection) Act, 1986, Forest Conservation Act, 1980, The Hazardous Waste (Management & Handling) Act, 1989, Indian Forest Act, 1927, National Green Tribunal Act, 2010, Public Liability Insurance Act, 1991, Water (Prevention and Control of Pollution) Act, 1974, Wildlife Protection Act, 1972 have been implemented in India for protection of environmental components and animals and plants.
- The United Nations (UN) which is an organization of 193 Nations of the world, having its headquarters at New York city and established on October, 24, 1945 which has two important goals viz. Peace and human dignity.
- The United Nations set up the U.N. commission of human rights in 1946, as a part of the economic and social council. This commission wrote an important document, which came to be known as the Universal Declaration on Human Rights (UNDHR).
- 10 December celebrated as the World human Rights Day.
- The seven fundamental rights by the Indian constitution are: Right to equality, Right to freedom, Right against exploitation, Right to freedom of religion, Cultural and Educational rights, Right to constitutional remedies, Right to Privacy.
- U.N. conference on Environment and Development (UNCED) held in Rio de Janeiro (Brazil) in 1992 popularly called Earth summit which is emphasized on sustainable development and environmental protection.
- Various Animal Rights have been included in central Government Act Article 51A(g), The Penal Code (IPC), Prevention of Cruelty to Animals Act 1960 (PCA Act, 1960), Prevention of Cruelty to Animals, (Slaughterhouse) Rules, 2001, Food Safety and Standards Regulations, 2011, Animal Birth Control Rules 2001 (ABC Rules, 2001), Wildlife (Protection) Act, 1972

- Various organization such as Animal Welfare Board of India, Blue Cross of India (BCI), 'The Wildlife Rescue & Rehabilitation Centre, People for Ethical Treatment of Animals, Animal Aid Unlimited, Buddha Society for Animal Welfare Trust, Group of Animal Lovers, Help In Suffering', Let's Live Together' 'Wildlife SOS'-India and Federation of Indian Animal Protection Organization are working for protection of animals in India.
- There are various protected areas of India such as National Parks, wildlife sanctuaries and biosphere reserves. First national park of India is Corbett National Park, Nainital and first biosphere reserve of India is Nilgiri biosphere reserve.

## Terminal Questions

1. (a) Fill in the blank spaces with appropriate words.

It is important to know that environmental rights are just extension of human rights. As you know that The United Nations (UN) is an organization of .....of the world, having its headquarters at..... It was established on ..... The two main goals of the United Nations are: .....and.....Keeping in mind its main aim of human dignity, the United Nations set up the U.N. commission of human rights in 1946, as a part of the economic and social council. This commission wrote an important document, which came to be known as the Universal Declaration on Human Rights (UNDHR). This declaration was approved by all the member of the general Assembly of the U.N. on December 10, 1948. Therefore, .....celebrated as the World human Rights Day.

2. (a) Discuss the Environmental racism with suitable examples.  
(b) Write about animal right issues.
3. (a) What are seven fundamental human rights?  
(b) Write about animal rights in India.
4. (a) What do you understand Environmental right? Describe different environmental acts of India.
5. (a) What is UNESCO?  
(b) Write about important national parks and wildlife sanctuaries of India
6. (a) Fill the blank spaces with appropriate words.  
(b) Wildlife Protection Act was passed in the year 1972 (Yes/No)  
(c) Right to Information Act was passed in the year 2005 (Yes/No)  
(d) 10 December celebrated as World Human Right Day (Yes/No)  
(e) A Taxonomy of Justice was written by Robert Kuehn (Yes/No)  
(f) Expanded form of PETA is
7. (a) Give an account on animal wefare organizations in India.

## Answers

1. (a) 193 Nations, New York City, not old or traditional. October, 24, 1945, Peace and human dignity, 10 December, flood, diseases
2. (a) See Section 6.2.  
(b) See section 6.6.2
3. (a) See section 6.3.  
(b) See section 6.6.3.
4. (a) See section 6.5 including Table-1
5. (a) See Section-6.2  
(b) see section 6.8
6. (a) Oldest religion, Sanatana Dharma/religion, Mahabharata (Moksha 182.14-19), bones, flesh, blood, abdomen  
(b) Yes  
(c) Yes  
(d) Yes  
(e) Yes  
(f) People for Ethical Treatment of Animals 7.(a) See the section 6.7

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## **Unit 12: International Environmental Policies and Protocols**

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### **12.0 Objectives**

#### **12.1 Introduction**

#### **12.2 The Millennium development goals**

#### **12.3 The World Conservation Strategy 1975–1985**

#### **12.4 The Clean Development Mechanism (CDM)**

#### **12.5 The Convention on Biological Diversity (CBD)**

#### **12.6 Kyoto Protocol**

#### **12.7 Montreal Protocol, 1987**

#### **12.8 Trans-regional environmental policies**

#### **12.9 References**

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### **12.0 Objectives**

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After reading this unit, you will have

- An understanding of the origin, evolution and expansion of international environmental policies and protocols.
- To identify and critically analyze international environmental policies and protocols instruments.

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### **12.1 Introduction**

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It is now widely recognized that the planet is facing a range of environmental challenges, which can only be addressed through international co-operation. Developments in science and technology have enhanced the possibility of understanding the environmental implications of various naturally occurring events as well as human activities. The last few decades have witnessed an exponential increase in multilateral environmental agreements covering a wide range of issues such as ozone depletion, climate change, loss of biodiversity, toxic and hazardous products and wastes, pollution of rivers and depletion of freshwater

resources. International environmental law, policies and protocols are comparatively new branch of international law. It has expanded dramatically over the years particularly since the United Nations Conference on the Human Environment, 1972. The development of international environmental law, policies and protocols has produced mixed results. While some treaty regimes have been effective in producing the desired results (e.g. Vienna Convention on Protection of the Ozone Layer, 1985), some other regimes are struggling to produce results (e.g. United Nations Framework Convention on Climate Change, 1992).

This unit provides an overview of the development of international environmental law, policies and protocols and briefly introduces its sources and important underlying principles. This unit explains the sources of international environmental policies and protocols and narrates the development of international environmental policies and protocols in its historical context. It also highlights the expansion of international environmental law, policies and protocols and the role played by important international conferences on the environment in this process.

Early legal developments in the field of the environment were limited in nature and scope. Legal initiatives mostly focused on specific issues such as regulation of whaling, fisheries, watercourses and birds (e.g. Convention between France and Great Britain Relating to Fisheries, 1867 and Convention for the Regulation of Whaling, 1931).

In the 1930s, the trans-boundary consequences of air pollution were acknowledged in arbitral proceedings leading to the award of the arbitral tribunal in the Trail Smelter case. The Trail Smelter case (Canada v. US) (1941) laid down the rule of international law, policies and protocols on state responsibility in the context of trans-boundary pollution (and for trans-boundary effects on environment in general). It was held that: No state has the right to use or permit the use of its territory in such a manner as to cause injury by fumes in or to the territory of another or the properties or persons therein, when the case is of serious consequences and the injury is established by clear and convincing evidences.

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## **12.2 The Millennium development goals**

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The ethos of development that emerged in the 1990s continued in the new millennium, and emphasis on sustainability and human development carried forward, albeit the presence of neoliberal policies. The United Nations in September 2000, organized the Millennium Summit with attendance of heads of states of 189 countries, and adopted the Millennium Development Goals (MDG). The MDGs dominated the development discourse of 2000s, where the UN and its 189 signatory countries committed themselves to achieve the following eight Goals and 21 targets by 2015:

- Goal 1: Eradicate Extreme Poverty and Hunger
- Target 1A: Halve the proportion of people living on less than \$ 1.25 between 1990 and 2015
- Target 1B: Achieve Decent Employment for Women, Men and Young

- Target 1C: Halve the proportion of people who suffer from hunger between 1990 and 2015
- Goal 2: Achieve Universal Primary Education
- Target 2A: Achieve full course of primary schooling for all children by 2015
- Goal 3: Promote Gender Equality and Empower Women
- Target 3A: Eliminate gender disparity at all levels by 2015
- Goal 4: Reduce Child Mortality Rates
- Target 4A: Reduce under-five mortality by two-third by 2015
- Goal 5: Improve Maternal Health
- Target 5A: Reduce maternal mortality by three-fourth by 2015
- Target 5B: Achieve universal access to reproductive health by 2015
- Goal 6: Combat HIV/AIDS, Malaria and other diseases
- Target 6A: Reverse the spread of HIV/AIDS by 2015
- Target 6B: Achieve universal access to treatment of HIV/AIDS
- Target 6C: Reverse the incident of spread of malaria and other major diseases
- Goal 7: Ensure Environmental Sustainability
- Target 7A: Integrate the principles of sustainable development into country policies and programmes, reverse loss of environmental resources
- Target 7B: Reduce biodiversity loss and reduction in rate of loss
- Target 7C: Halve the proportion of population without sustainable access to safe drinking water and basic sanitation by 2015
- Target 7D: Achieve significant improvement in the lives of at least 100 million slum dwellers
- Goal 8: Develop a Global Partnership for Development
- Target 8A: Develop further an open, rule based, predictable, non-discriminatory trading and financial system
- Target 8B: Address the special needs of Least Developed Countries (LDCs)
- Target 8C: Address the special needs of landlocked developing countries and small island developing countries
- Target 8D: Deal comprehensively with the debt problems of developing countries through national and international measures
- Target 8E: In cooperation with pharmaceutical companies, provide access to affordable, essential drugs in developing countries
- Target 8F: In cooperation with the private sector, make available the benefits of new technologies, especially information and communications.

The MDGs in the new millennium reiterated the notions of human development and sustainability, along with an added emphasis on international cooperation. The notion of development within MDGs framework got a wider connotation, involving human capital, infrastructure and human rights, which intended to improve the living standards of people. The

goals intended to increase individual ‘capabilities’ and ensure the means to a productive life to the world’s poor.

The MDGs, which set for a 15 years target at the beginning of the millennium, were extended in the recent UN Sustainable Development Summit of September 2015. On 25th September 2015, 193 world leaders committed to 17 Global Goals with an aim to: (a) end extreme poverty, (b) fight inequality and injustice, and (c) fix climate change by 2030. These goals emphasized the issues of environmental sustainability and climate change; sustainable cities, poverty, hunger, education, and health. It also reiterated the need for global partnership and cooperation to achieve the goals of development.

To summarize different meanings of development over time, we may say that the concept, which started with a meaning of catching up with developed countries of west through economic growth and industrialization, has substantially changed its meaning by the beginning of the 21st Century. Eradicating poverty, access to education health and basic services, attaining environmental sustainability and mitigating climate change, achieving gender equality and all other forms of social justice, etc. have become defining elements of ‘development’, albeit the persistent emphasis on ‘economic growth’ as a means to achieve the above ends of development. The Table below befittingly sums up different meanings of development.

Table 1: Meanings of Development over Time

<b>Period</b>	<b>Perspectives</b>	<b>Meanings of Development</b>
1800s	Classical political economy	Remedy for progress, catching up
1850 >	Colonial economies	Resource management, trustee ship
1870 >	Latecomers	Industrialization, catching up
1940 >	Development economics	Economic growth – industrialization
1950 >	Modernization theory	Growth, political and social modernization
1960 >	Dependency theory	Accumulation – national, auto-centric
1970 >	Alternative development	Human flourishing
1980 >	Human development	Capitation, enlargement of people’s choices
1980 >	Neoliberalism	Economic growth – structural reforms, de-regularization, liberalization, privatization
1990 >	Post-development	Authoritarian engineering, disaster
2000 >	Millennium Development Goals	Structural reforms

Source: Nederveen, P. J. Development Theory: Deconstruction/Reconstruction. Sage, 2001, pg. 7.

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## **12.3 The World Conservation Strategy 1975–1985**

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In 1975 IUCN started work on the World Conservation Strategy (1980). The drafting process, and the discussions with the UN agencies involved, led to an evolution in thinking within IUCN and growing acceptance of the fact that conservation of nature by banning human presence no longer worked. The Strategy was followed in 1982 by the World Charter for Nature, which was adopted by the United Nations General Assembly, after preparation by IUCN.

In 1980, IUCN and WWF moved into shared new offices in Gland, Switzerland. This marked a phase of closer cooperation with WWF, but the close ties between IUCN and WWF were severed in 1985 when WWF decided to take control of its own field projects, which so far had been run by IUCN.

❖ **Sustainable development and regionalization: 1985 to present day:**

In 1982, IUCN set up Conservation for Development Centre within its secretariat. The Centre undertook projects to ensure that nature conservation was integrated in development aid and in the economic policies of developing countries. Over the years, it supported the development of national conservation strategies in 30 countries. Several European countries began to channel considerable amounts of bilateral aid via IUCN's projects. Management of these projects was primarily done by IUCN staff, often working from the new regional and country offices IUCN set up around the world. This marked a shift within the organization. Previously, the volunteer Commissions had been very influential, now the Secretariat and its staff began to play a more dominant role. In 1989, IUCN moved into a separate building in Gland, close to the offices it had shared with WWF. Initially, the focus of power was still with the Headquarters in Gland but the regional offices and regional members' groups gradually got a bigger say in operations. In 1991, IUCN (together with UNEP and WWF) published *Caring for the Earth*, a successor to the World Conservation Strategy.

❖ Social aspects of conservation were now integrated in IUCN's work; at the General Assembly in 1994 the IUCN mission was redrafted to its current wording to include the equitable and ecologically use of natural resources.

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## **12.4 The Clean Development Mechanism (CDM)**

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The Clean Development Mechanism (CDM), a cooperative mechanism established under the Kyoto Protocol, has the potential to assist developing countries in achieving sustainable development by promoting environmentally friendly investment from industrialized country governments and businesses. This document provides an overview of the CDM's background, structure, and project cycle, and examines the potential value and benefits for participating developing countries. The document also suggests steps for developing a national CDM strategy and provides examples of CDM projects. While the basic rules have been established, the CDM is a work in progress by participating governments. This document presents the latest available information and will be updated in the future to reflect important changes.

The 1997 Kyoto Protocol, a milestone in global efforts to protect the environment and achieve sustainable development, marked the first time that governments accepted legally-binding constraints on their greenhouse gas emissions. The Protocol also broke new ground with its innovative “cooperative mechanisms” aimed at cutting the cost of curbing these emissions. As it does not matter to the climate where emission reductions are achieved, sound economics argues for achieving them where they are least costly. The Protocol therefore includes three market-based mechanisms aimed at achieving cost-effective reductions — International Emissions Trading (IET), Joint Implementation (JI), and the CDM. The CDM, contained in Article 12 of the Kyoto Protocol, allows governments or private entities in industrialized countries to implement emission reduction projects in developing countries and receive credit in the form of “certified emission reductions,” or CERs, which they may count against their national reduction targets. The CDM strives to promote sustainable development in developing countries, while allowing developed countries to contribute to the goal of reducing atmospheric concentrations of greenhouse gases.

The Protocol establishes three cooperative mechanisms designed to help industrialized countries (Annex I Parties) reduce the costs of meeting their emissions targets by achieving emission reductions at lower costs in other countries than they could domestically.

- International Emission Trading permits countries to transfer parts of their ‘allowed emissions’ (“assigned amount units”).
- Joint Implementation (JI) allows countries to claim credit for emission reductions that arise from investment in other industrialized countries, which result in a transfer of equivalent “emission reduction units” between the countries.
- The Clean Development Mechanism (CDM) allows emission reduction projects that assist in creating sustainable development in developing countries to generate “certified emission reductions” for use by the investor.

The mechanisms give countries and private sector companies the opportunity to reduce emissions anywhere in the world—wherever the cost is lowest—and they can then count these reductions towards their own targets. Through emission reduction projects, the mechanisms could stimulate international investment and provide the essential resources for cleaner economic growth in all parts of the world. The CDM, in particular, aims to assist developing countries in achieving sustainable development by promoting environmentally friendly investment from industrialized country governments and businesses.

The funding channeled through the CDM should assist developing countries in reaching some of their economic, social, environmental, and sustainable development objectives, such as cleaner air and water, improved land use, accompanied by social benefits such as rural development, employment, and poverty alleviation and in many cases, reduced dependence on imported fossil fuels. In addition to catalyzing green investment priorities in developing countries, the CDM offers an opportunity to make progress simultaneously on climate, development, and local environmental issues. For developing countries that might otherwise

be preoccupied with immediate economic and social needs, the prospect of such benefits should provide a strong incentive to participate in the CDM.

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## **12.5 The Convention on Biological Diversity (CBD)**

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The CBD is one of the three conventions agreed by governments at the 1992 Rio Earth Summit. It is probably the most important international agreement ever adopted. It recognizes that setting social and economic goals for the use of biological resources and the benefits derived from genetic resources is central to the process of sustainable development, and that this in turn will support conservation.

The United Nations Environment Programme (UNEP) convened the Ad Hoc Working Group of Experts on Biological Diversity in June 1987 to explore the need for an international convention on biological diversity. Soon after, in May 1989, it established the Ad Hoc Working Group of Technical and Legal Experts to prepare an international legal instrument for the conservation and sustainable use of biological diversity. The experts were to take into account "the need to share costs and benefits between developed and developing countries" as well as "ways and means to support innovation by local people".

By February 1991, the Ad Hoc Working Group was re-named as the Intergovernmental Negotiating Committee. Its work culminated on 22 May 1992 with the Nairobi Conference for the Adoption of the Agreed Text of the Convention on Biological Diversity.

The Convention was opened for signature on 5 June 1992 at the United Nations Conference on Environment and Development (the Rio "Earth Summit"). It remained open for signature until 4 June 1993, by which time it had received 168 signatures. The Convention entered into force on 29 December 1993, which was 90 days after the 30th ratification. The first session of the Conference of the Parties was scheduled for 28 November – 9 December 1994 in the Bahamas.

The Convention on Biological Diversity was inspired by the world community's growing commitment to sustainable development. It represents a dramatic step forward in the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of benefits arising from the use of genetic resources.

❖ Objectives of the Convention of Biological Diversity (Article 1): The Convention, while reaffirming sovereign rights of nations over their biological resources, establishes three main goals:

- The conservation of biological diversity
- The sustainable use of components of biological resources;
- Fair and equitable sharing of the benefits arising out of the utilization of genetic resources

❖ Important Definitions (Article 2)

- "Biological diversity" means the variability among living organisms from all sources including, inter alia, 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.
- "Biological resources" includes genetic resources, organisms or parts thereof, populations, or any other biotic component of ecosystems with actual or potential use or value for humanity.
- "Biotechnology" means any technological application that uses biological systems, living organisms, or derivatives thereof, to make or modify products or processes for specific use.
- "Country of origin of genetic resources" means the country which possesses those genetic resources in in-situ conditions. "Country providing genetic resources" means the country supplying genetic resources collected from in-situ sources, including populations of both wild and domesticated species, or taken from ex-situ sources, which may or may not have originated in that country.
- "Domesticated or cultivated species" means species in which the evolutionary process has been influenced by humans to meet their needs.
- "Ecosystem" means a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.
- "Ex-situ conservation" means the conservation of components of biological diversity outside their natural habitats.
- "Genetic material" means any material of plant, animal, microbial or other origin containing functional units of heredity.
- "Genetic resources" means genetic material of actual or potential value.
- "Habitat" means the place or type of site where an organism or population naturally occurs.
- "In-situ conditions" means Conditions where genetic resources exist within ecosystems and natural habitats, and, in the case of domesticated or cultivated species, in the surroundings where they have developed their distinctive properties.
- "In-situ conservation" means the conservation of ecosystems and natural habitats and the maintenance and recovery of viable populations of species in their natural surroundings and, in the case of domesticated or cultivated species, in the surroundings where they have developed their distinctive properties.
- "Protected area" means a geographically defined area which is designated or regulated and managed to achieve specific conservation objectives.
- "Regional economic integration organization" means an organization constituted by sovereign States of a given region, to which its member States have transferred competence in respect of matters governed by this Convention and which has been duly authorized, in accordance with its internal procedures, to sign, ratify, accept, approve or accede to it.
- "Sustainable use" means the use of components of biological diversity in a way and at a rate that does not lead to the long-term decline of biological

- diversity, thereby maintaining its potential to meet the needs and aspirations of present and future generations.
- "Technology" includes biotechnology
- ❖ Principles of CBD (Article 3): The underlying principles of the convention are:
  - States have sovereign right to exploit their own resources pursuant to their own environmental policies.
  - States have responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction.
  - Principles of CBD lays down the rights as well as obligations of the Member states.
- ❖ Cooperation (Article 5):
  - Each Contracting Party shall, as far as possible and as appropriate, cooperate with other Contracting Parties, for the conservation and sustainable use of biological diversity.
  - The Cooperation can be bilateral or Multilateral.
  - If required any party can through competent international organizations, in respect of areas beyond national jurisdiction and on other matters of mutual interest seek help for arranging cooperation.
- ❖ Obligations of the States (Article 6): Each Contracting Party shall, in accordance with its particular conditions and capabilities:
  - Develop national strategies, plans or programmes for the conservation and sustainable use of biological diversity or adapt for this purpose existing strategies, plans or programmes which shall reflect, inter alia, the measures set out in this Convention relevant to the Contracting Party concerned; and
  - Integrate, as far as possible and as appropriate, the conservation and sustainable use of biological diversity into relevant sectoral or cross-sectoral plans, programmes and policies.
- ❖ Identification and Monitoring (Article 7): Enhancing knowledge and understanding of biological diversity and the impacts on it are important measures addressed in the Convention. Signatories are required to identify (for example, through surveys) and monitor important ecosystems, species and genetic components of biological diversity, as well as processes and activities that have or are likely to have significant adverse impacts on biological diversity. Countries are then able to determine their priorities with regard to conservation and sustainable use measures which need to be undertaken.
- ❖ In-situ & Ex-situ conservation (Article 8 and 9): In-situ conservation is the conservation of ecosystems, natural habitats and species in their natural surroundings. Signatories are required to give emphasis to in-situ conservation through a broad range of actions, including
  - Establishment and management of protected areas;

- Conservation and sustainable use of biological resources within and outside protected areas;
- Promotion of environmentally sound and sustainable development in areas adjacent to protected areas;
- Rehabilitation and restoration of degraded ecosystems; control of alien species and genetically modified organisms;
- Protection of threatened species and populations; and regulation of damaging processes and activities.

While the Convention emphasised the importance of in-situ conservation, it also acknowledges that ex-situ measures also have an important role to play. Ex-situ conservation means conservation outside natural habitats, for example in zoos, botanic gardens and seed banks. Parties are to take ex- situ measures, while ensuring that ecosystems and natural populations of species are not threatened.

❖ **Conservation and Sustainable Use of Biological Diversity:** An overarching objective of the CBD is encouraging the conservation and sustainable use of the components of biological diversity. The CBD requires Parties to integrate considerations relating to conservation and sustainable use into national decision-making (Article 10).

It requires its Parties to adopt measures relating to the use of biological resources to avoid or minimize adverse impacts on biological diversity (Article 10(b)). Further, Parties are encouraged to integrate the conservation and sustainable use of biological diversity into relevant sectorial or cross-sectorial plans, programmes and policies (Article 6(b)). Parties are responsible for identifying the processes and categories of activities that have or are likely to have significant adverse impact on biological diversity and monitoring their effects (Article 7(c))

❖ **Access to and the Fair and Equitable Sharing of Benefits arising from the Utilization of Genetic Resources:** The CBD encourages the parties to provide access to and to equitably share the benefits arising from the utilization of genetic resources, as also the CBD seeks to establish incentives to conserve biodiversity. The CBD approach is first of all based on the fundamental premise that nation states have sovereign rights over the biological diversity within their territory (Preamble and Article 15(1)). The CBD also recognizes that national governments have the authority to determine access to these resources in accordance with national legislation (Article 15(1)). It provides that access to genetic resources must be obtained with the Prior Informed Consent (PIC) of the CBD party, and on mutually agreed terms (Article 15(4) and (5)). The CBD envisages the use of legal measures that could feasibly include IPRs (Article 15(7)), by calling on Parties to take legislative, administrative or policy measures to ensure the benefits arising from research, development and commercial use of genetic resources are shared in an equitable way with the provider of the genetic resources. The Conference of the Parties (COP) has established a number of subsidiary bodies to consider access and benefit sharing. First, it has established a Panel of Experts on Access and Benefit Sharing whose role is to develop a common understanding of basic concepts and to explore all options for Access and Benefit

Sharing on mutually agreed terms including guiding principles, guidelines, and codes of best practice for Access and Benefit- Sharing arrangements

❖ **Capacity Building under CBD through Research and Training:** Effective global action requires the expansion of national capacities, particularly in developing countries, for the conservation and sustainable use of biological diversity. In this regard the Convention provides for national and international action on research, training, the exchange of public information, and scientific and technical co-operation with emphasis on building national capabilities through human resource development and institution building. Provisions for encouraging public understanding of the significance of biological diversity and the measures required for its conservation are also included. Technology transfer of this and other pertinent information is an important aspect of ensuring the convention meets its objectives.

❖ **Institutional Arrangements:** The Convention establishes a number of institutional arrangements necessary to ensure effective implementation. The Conference of the Parties (Article 23) is the key decision-making body responsible for monitoring the implementation of the Convention and has a major role in funding matters. Signatories are required to submit reports on measures taken for the implementation of the Convention and their effectiveness in meeting the objectives of the Convention.

The Subsidiary Body on Scientific, Technical and Technological Advice (Article 25) is to provide the Conference of the Parties with advice relating to the implementation of the Convention, including the status of biological diversity and the effectiveness of measures taken to give effect to the Convention. It also has a major role in identifying technologies for the conservation and sustainable use of biological diversity suitable for transfer to developing countries.

❖ **Settlement of Disputes (Article 27):** In the event of a dispute between Contracting Parties concerning the interpretation or application of this Convention, the parties concerned shall seek solution by negotiation. If the parties concerned cannot reach agreement by negotiation, they may jointly seek the good offices of, or request mediation by, a third party. The party can also resort to compulsory dispute settlement mechanisms as Arbitration or Submission of the dispute to the International Court of Justice.

❖ **Protocols to Convention on Biological Diversity Cartagena Protocol:** The Cartagena Protocol on Biosafety to the Convention on Biological Diversity is an international treaty governing the movements of living modified organisms (LMOs) resulting from modern biotechnology from one country to another. It was adopted on 29 January 2000 as a supplementary agreement to the Convention on Biological Diversity and entered into force on 11 September 2003.

The Protocol seeks to protect biological diversity from the potential risks posed by living modified organisms resulting from modern biotechnology. It establishes an advance informed agreement (AIA) procedure for ensuring that countries are provided with the information necessary to make informed decisions before agreeing to the import of such

organisms into their territory. The Protocol contains reference to a precautionary and reaffirms the precaution language in Principle 15 of the Rio Declaration on Environment and Development. The Protocol also establishes a Biosafety Clearing- House to facilitate the exchange of information on living modified organisms and to assist countries in the implementation of the Protocol.

❖ Nagoya Protocol: The Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization (ABS) to the Convention on Biological Diversity is a supplementary agreement to the Convention on Biological Diversity. It provides a transparent legal framework for the effective implementation of one of the three objectives of the CBD: the fair and equitable sharing of benefits arising out of the utilization of genetic resources.

The Nagoya Protocol on ABS was adopted on 29 October 2010 in Nagoya, Japan and entered into force on 12 October 2014, 90 days after the deposit of the fiftieth instrument of ratification. Its objective is the fair and equitable sharing of benefits arising from the utilization of genetic resources, thereby contributing to the conservation and sustainable use of biodiversity.

The Nagoya Protocol sets out core obligations for its contracting Parties to take measures in relation to access to genetic resources, benefit-sharing and compliance. The Nagoya Protocol addresses traditional knowledge associated with genetic resources with provisions on access, benefit-sharing and compliance. It also addresses genetic resources where indigenous and local communities have the established right to grant access to them. Contracting Parties are to take measures to ensure these communities' prior informed consent, and fair and equitable benefit-sharing, keeping in mind community laws and procedures as well as customary use and exchange.

❖ United Nations Decade of Biological Diversity

The United Nations General Assembly at its 65th session declared the period 2011 - 2020 to be “the United Nations Decade on Biodiversity, with a view to contributing to the implementation of the Strategic Plan for Biodiversity for the period 2011-2020” (Resolution 65/161). The United Nations Decade on Biodiversity will serve to support the implementation of the Strategic Plan for Biodiversity and promote its overall vision of living in harmony with nature. Its goal is to mainstream biodiversity at different levels. Throughout the United Nations Decade on Biodiversity, governments are encouraged to develop, implement and communicate the results of national strategies for implementation of the Strategic Plan for Biodiversity.

❖ Key Elements of the Strategic Plan 2011 – 2020

- Rationale: The rationale for the new plan is that biological diversity underpins ecosystem functioning and the provision of ecosystem services essential for human well-being. It provides for food security, human health, the provision of clean air and water; it contributes to local

livelihoods, and economic development, and is essential for the achievement of the Millennium Development Goals, including poverty reduction.

- Vision: The vision for the new plan is: "Living in Harmony with Nature" where "By 2050, biodiversity is valued, conserved, restored and wisely used, maintaining ecosystem services, sustaining a healthy planet and delivering benefits essential for all people."
- Mission: The mission of the new plan is to "take effective and urgent action to halt the loss of biodiversity in order to ensure that by 2020 ecosystems are resilient and continue to provide essential services, thereby securing the planet's variety of life, and contributing to human well-being, and poverty eradication. To ensure this, pressures on biodiversity are reduced, ecosystems are restored, biological resources are sustainably used and benefits arising out of utilization of genetic resources are shared in a fair and equitable manner; adequate financial resources are provided, capacities are enhanced, biodiversity issues and values mainstreamed, appropriate policies are effectively implemented, and decision-making is based on sound science and the precautionary approach."
- Implementation:

Means for implementation: The Strategic Plan will be implemented primarily through activities at the national or subnational level, with supporting action at the regional and global levels. The means of implementation for this Strategic Plan will include provision of financial resources in accordance with respective obligations under the Convention, taking into account Article 20 of the Convention.

- Programmes of work: The thematic programmes of work of the Convention include: biodiversity of inland waters, marine and coastal biodiversity, agricultural biodiversity, forest biodiversity, biodiversity of dry and sub-humid lands, mountain biodiversity and island biodiversity. Together with the various cross-cutting issues, they provide detailed guidance on implementation of the Strategic Plan, and could also contribute to development and poverty reduction.
- Broadening political support: for this Strategic Plan and the objectives of the Convention is necessary, for example, by working to ensure that Heads of State and Government and the parliamentarians of all Parties understand the value of biodiversity and ecosystem services.
- Partnerships: Partnerships at all levels are required for effective implementation of the Strategic Plan, to leverage actions at the scale necessary, to garner the ownership necessary to ensure mainstreaming of biodiversity across sectors of government, society and the economy and to find synergies with national implementation of multilateral environmental agreements.
- Reporting by Parties: Parties will inform the Conference of the Parties of the national targets or commitments and policy instruments they adopt to implement the Strategic Plan, as well as any milestones towards these targets, and report on progress towards these targets and milestones, including through their fifth and sixth national reports.

- Review by the Conference of the Parties: The Conference of the Parties, with the support of other Convention bodies, in particular the Ad Hoc Open-ended Working Group on Review of Implementation of the Convention, will keep under review implementation of this Strategic Plan, and support effective implementation by Parties ensuring that new guidance is informed by the experience of Parties in implementing the Convention, in line with the principle of adaptive management through active learning.

The Convention on Biological Diversity is the only international treaty which protects the biological resources of a country. Biological resources and the traditional knowledge of indigenous people is the asset of the country owned exclusively by the people of that country. Thus, there is a need, at international level, to ensure protection against unauthorized and illegal exploitation of biological resources by another country. At the same time, intra country too, judicious use of the resources must be promoted.

The Convention on Biological Diversity is a step in this direction which promulgates the principles of prior consent before the access of the resources and benefit sharing wherein the indigenous people who are true owners of such resources are recognized and get due share from usage of such resources. Another vital aspect being covered by the Convention is that it stipulates transfer of technology, a much needed step for optimal utilization of the biological resources and to strike balance between resource rich developing countries and technology rich developed countries and provide adequate legal framework for the same. Irrespective of the aforesaid, the Convention is mere framework and stronger initiative on the parts of the signatory states is required to practice the principles embedded in the Convention and realize the UN Goals laid down in the General Assembly resolution declaring 2011 -2020 as UN Decade of Biological Diversity.

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## **12.6 Kyoto Protocol**

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UNFCCC provided for a framework to deal with climate change and laid down the obligations of the parties to reduce the emission of GHG but it did not lay down any specific targets to be achieved within a specific time frame. Instead it left the same to be decided by COP. Framework Convention also contained provisions for further amendments and for adoption of Protocols to achieve the objectives of the Convention. Accordingly, immediately after adoption of UNFCCC and its entry into force in 1994, there was felt a need to have specific targets for parties for reducing emission of GHG within a specific time frame and to further strengthen the Convention. Accordingly, negotiations began for adoption of a Protocol and within an year of entry into force of the Convention, the Protocol was negotiated. The Protocol was finally adopted on December 11, 1997 in Kyoto, Japan by consensus with more than 150 signatories. The Protocol is known as Kyoto Protocol. The main feature of the Protocol is that it laid down mandatory targets for reduction of GHG emissions which were accepted by leading developing nations of the World. The Protocol provided for reduction of emission of six major GHGs viz., carbon dioxide, methane, nitrous oxide, hydro fluorocarbons, per fluorocarbons and sulfur hexafluoride.

In 2001, at Marrakesh, Morocco, detailed rules for implementation of Kyoto Protocol were adopted. It called for establishment of Special Climate Change Fund to finance projects for mitigation and adaptation to climate change and for development and transfer of technology to developing countries. In addition, Least Developed Countries Fund was also created. In 2003, reporting guidelines for reporting under the Protocol were adopted on the recommendations of IPCC. It is worth mentioning here that USA did not ratify the Protocol and it was only when Russian Federation ratified the Protocol in November 2004 that the path was set for the entry into force of the Protocol. The Protocol entered into force on 16th February 2005.

The object of the Protocol was to reduce emission of GHG by at least 5% below 1990 levels during the first commitment period i.e. 2008-2012. The Protocol was based on CBDR and RC and therefore the targets were different for different countries like the target was 8% for European Union, 6% for Canada, Hungary, Japan, Poland, 7% for USA. As a matter of fact, European Union was able to go beyond their stipulated targets during the first commitment period. USA indicated that it shall not ratify Kyoto Protocol and Canada withdrew from the Kyoto Protocol in 2011 claiming that the Protocol is not workable because the highest emitters of GHG viz USA and China have not ratified the Protocol.

The Protocol was made for the period upto 2012 and was set to expire thereafter. Accordingly on December 8, 2012 at Doha, Qatar, Doha Amendment to Kyoto Protocol was adopted. Doha Amendment introduced Second Commitment Period i.e. from 01st January 2013 to 31st December 2020. The amendment introduced revised list of GHG and the commitment of parties to reduce GHG emission. Doha Amendment added seventh GHG to the list of gases whose emission is to be limited i.e. Nitrogen Trifluoride. It has prescribed higher emission reduction targets for the second commitment period. Annex II countries decided to reduce their GHG emission by 18% of their 1990 level. European Union has agreed to have joint target of 20% reduction of GHG of its 1990 level.

The Protocol offers flexibility to the nations to reduce emissions in their own territory or to finance projects in other countries to reduce emissions. Further, the emission targets can be compensated by increasing sinks of carbon dioxide. Oceans and forests are the sinks of carbon dioxide therefore increasing forest cover can reduce increased carbon dioxide from the atmosphere.

Mechanism under Kyoto Protocol Clean Development Mechanism: Protocol has also established Clean Development Mechanism (CDM) which allows flexibility to developed countries to achieve their emission reduction targets by sponsoring emission reduction projects in developing countries and earning saleable Certified Emission Reduction (CER) credits each credit being equivalent to one tonne of carbon dioxide which can be used to achieve reduction targets. CDM project may include Rural Electrification projects based on solar power. Mechanism became

operational in 2006 and since then it has more than 1650 projects registered under it.

❖ **Joint Implementation:** Kyoto Protocol offers flexibility in the form of Joint Implementation as well. This mechanism allows a party (annex B party) which is obligated to have reduction in emission of GHG to have a project in another country having emission reduction target i.e. another annex B country and earn units which can be utilized to achieve their targets.

❖ **Emission Trading:** First Commitment Period allowed parties with emission reduction responsibility to sell their unused units of emission reduction targets

i.e. the parties, who have been allowed to have emissions upto certain level but have not utilized them, can sell their assigned units which is known as Carbon Trading.

As of date only 108 parties have ratified Doha Amendment to the Kyoto Protocol as against total of 144 countries required for entry into force of Doha Amendment. Moreover, New Zealand, Japan and Russia have decided not to participate in the second commitment period. India has ratified Second Commitment Period of the Kyoto Protocol in 2017. Further, in the absence of US, China, Russia, the total emission of countries who have ratified the Doha Amendment is not more than 20% of the total global GHG emission. ([www.bmub.bund.de](http://www.bmub.bund.de)). Hence, the gains made by reduction of emission of GHG by select developed countries are offset by increased emission of developing countries like China and India. The problem is further aggravated by non participation of various developed countries like Russia, USA, New Zealand and Canada.

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## **12.7 Montreal Protocol, 1987**

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Discovery of abnormally low ozone concentration levels near South Pole in 1985 later termed as Ozone hole led to increased international emphasis on taking concrete measures to control, limit and phase out ODS in a time bound manner. Initially when it was pointed out that this ozone layer is the result of increased level of CFCs in the atmosphere, the CFC industry opposed it on the ground that there is no enough scientific evidence to suggest that the hole is caused by the CFC emissions. Further, it was argued that in the absence of certainty in scientific information, it was not worthwhile to take concrete action as they thought that there was no imminent danger at that point of time. However, further research and the results of such research showed the linkage between depletion of ozone layer and ODS emissions which led to the negotiations for establishing a framework and for creating legally binding responsibilities to identify and phase out ODS in a time bound manner to protect the ozone from further depletion. The negotiations led to the adoption of a Protocol in Montreal on Substances that Deplete the Ozone Layer. The Protocol was agreed in September 1987 by forty six countries and it entered into force on January 1, 1989. Like Vienna Convention, Montreal Protocol also achieved universal ratification in 2009.

Montreal Protocol is based on two important principles of international environmental jurisprudence i.e.

- Precautionary Principle

- Principle of Common but Differentiated Responsibilities

As stated earlier that at the time when Vienna Convention and Montreal Protocol were adopted, there was lack of scientific certainty and therefore, the reduction of emission of ODS was basically adopted on Precautionary Principle to save the ozone layer from probable effect of emission of ODS. Further, it was recognized that the damage to ozone is the result of emission of ODS particularly by developed countries, therefore, the primary responsibility was theirs to control, limit and phase out ODS. Furthermore, the developing countries also had their right to development and to tap their resources, therefore, greater onus was put on developed countries while recognizing the need of developing countries on the basis of the Principle of Common but Differentiated Responsibilities and Respective Capabilities. Accordingly, special provisions were made for developing countries in the phase out schedules. Developing countries with reference to the Protocol imply a country where consumption of Annex A controlled substances was less than 0.3 kg per capita till 01st January 1999 (Article 5).

- ❖ Control Measures under the Protocol

As stated earlier, Montreal Protocol laid down legally binding responsibilities for the parties to phase out ODS in a time bound manner. These ODS have been identified from time to time in accordance with new scientific and technological advancements and are included in the list of controlled substances under various provisions of Article 2 by way of amendment to the Protocol. Various controlled substances identified so far and for which phase out schedule has been laid down are CFCs (Chlorofluorocarbons), Halons, Fully Halogenated CFCs, Carbon Tetrachloride, Methyl Chloroform, Hydro chlorofluorocarbons (HCFC), Hydro-bromo-fluorocarbons (HBFC), Methyl Bromide and Bromo-choloro-methane and HFCs. The time schedule for the phasing out of these ODS is given in the next section after discussion on amendments to Montreal Protocol.

In addition, Protocol has prohibited trade i.e. import or export of controlled substances with non-parties with a view to compel non-parties to join the Protocol and therefore to achieve control over controlled circumstances so as to protect Ozone layer from depletion (Article 4). Protocol further provides that if a party is unable to stop production of a controlled substance even after its best efforts during the time frame provided in the Protocol, in such an eventuality, such party must stop export of used, recycled or reclaimed quantities of such substance except for the purpose of destruction (Article 4A). The parties to the Protocol are obligated to establish a system of licensing of import and export of the controlled substances in a time bound manner (Article 4B). Special provisions have been incorporated for developing countries based on the Principle of Common but Differentiated Responsibilities and respective capacities. For developing countries, the phase out schedule has been delayed/relaxed keeping in view their development needs. The details of the same are given in the phase out schedule discussed in the table given hereinafter.

Further, the parties have been obligated to report data regarding production, import and export of controlled substances for the base year and subsequently (Article 7). Protocol mandates parties to cooperate in conducting research and development on controlled

substances and in creating public awareness and exchange of Information (Article 9). Parties are required to submit a summary of activities every two years. The Protocol obligates parties to cooperate -

- For finding out best technologies for improvement, recovery, recycling or destruction of controlled substances, for reducing their emissions
- To find out Alternatives to controlled substances
- To promote public awareness on environmental effects of emissions of controlled substances

❖ Amendments to the Protocol: Mechanism for monitoring and reviewing the implementation of the Protocol and for making adjustments and amendments to the Protocol has been vested in Meeting of Parties (MOP). Parties are required to meet at regular intervals. MOP is required to take decisions regarding reduction/alteration in emission targets and to review the implementation of the Protocol. MOP has in various meetings adopted six amendments to the Montreal Protocol keeping in view scientific and technological advancements. These are discussed hereinafter

❖ Montreal Amendment, 1997: Montreal Amendment was adopted on 17-09-1997 in the 9th MOP. The amendment made the following changes to Montreal Protocol

- Imposed prohibition on trade in Methyl bromide with non parties (Article 4A)
- Required all Parties to institute a system of licensing for the import and export of all new, used, recycled, and reclaimed controlled substances, including methyl bromide (Article 4B)

❖ Implementation of Montreal Protocol in India

India is a developing country but it has made its contribution in acceding to international instruments and in discharging international obligations concerning environment. Regarding ODS; India became party to Vienna Convention on 18th March 1991 and to Montreal Protocol on 19th June 1992. To implement the Protocol Implementation authority has been vested in the Union Ministry of Environment, Forests and Climate Change. The Ministry has established an Empowered Steering Committee Chaired by Secretary, Environment Forests and Climate Change. This apart, Ministry has also established Technology and Finance Standing Committee (TFSC) and the Standing Committee on Monitoring for implementing the objectives and provisions of the Protocol. In addition, Ozone Cell has been constituted. To implement the objectives of Montreal Protocol a detailed Country Plan was prepared in 1993 to phase out ODS in accordance with the requirements of the Protocol. In accordance with the aims and purposes of the Protocol, India has taken the following steps:

- India has phased out the production and consumption of CFCs, CTC and Halons before 1st January, 2010 (except use of pharmaceutical grade CFCs in

- manufacturing of Metered Dose Inhalers (MDIs) for Asthma and Chronic Obstructive Pulmonary Diseases.
- India has Phased-out production and consumption of Methyl Chloroform and Methyl Bromide
- On the eve of Kigali Amendment, India mandated its chemical industry to collect and destroy HFC-23 with immediate effect. As per the estimates, it is expected to prevent half Billion tonnes of CO<sub>2</sub> equivalent emissions in next 15 years (Business Wire, 2016)
- 304 projects have been approved and funded by the Executive Committee of the MLF for Implementation of the Montreal Protocol. A total amount of US
- \$279,342,203 has been approved by the Executive Committee of the MLF to phase-out 58,980 ODP tonne of ODSs (Ozone Cell, 2016). As of 2017, total 379 projects have been approved and funded by the Executive Committee of the MLF for Implementation of the Montreal Protocol and the total assistance as reached US \$ 30,43,89,305 (OZONE Cell, 2017)
- This apart, India has also enacted Ozone Depleting Substances (Regulation and Control) Rules, 2000. Salient features of these rules are:
- To regulate production, consumption, import and export of ODS - Registration of ODS producers, manufacturers of ODS based products, importers, exporters and stockists has been made compulsory.
- Monitoring Mechanism has been established in the form of maintenance of records and periodic filing of returns
- Rules have provided for obtaining compulsory licences for import and export of ODS
- Rules have prohibited the use of CFCs in manufacturing various products except Metered Dose Inhalers
- Use of Halons, CTC, methyl chloroform, methyl bromide has been prohibited
- Import of Air-conditioning and refrigeration equipments and other products using HCFCs has been banned

From the above, it is clear that India has taken steps to reduce emission of ODS controlled substances commensurate with the capabilities of the country keeping in mind the development needs of the country. From the foregoing discussion, it is safe to conclude that Vienna Convention and Montreal Protocol of Vienna Convention are one of the most successful international treaties which have achieved universal ratification. The success story of the Convention and the Protocol is owing to the application of the Principle of Common but Differentiated Responsibilities wherein the developing countries have been given an extended time frame to phase out ODS and provisions have also been made for financial support and technology transfer. Unlike the more glamorous Paris agreement that will come into force by 2020 and which does not legally bind countries to their promises to cut emissions, the amended Montreal Protocol will bind countries to their HFC reduction schedules from 2019.

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## **12.8 Trans-regional environmental policies**

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The Basel Convention on the Control of Trans-boundary Movement of Hazardous Wastes and their Disposal is one of the important international measures taken to combat the menace of hazardous wastes and its Trans-regional movement and their disposal. The Convention was adopted on 22nd March 1989 in Basel. The Convention entered into force in 1992. The objective of the Convention is to protect human health and environment from the adverse effects of hazardous wastes. The Convention was aimed at reduction of hazardous waste generation and to promote proper disposal and effective and environmentally sound management of the hazardous wastes. The Convention further aims at restricting Trans-regional movement of hazardous wastes and to provide for a regulatory system. Not only that international community has entered into various Conventions, treaties and Protocols but has also created institutions for international environmental governance like United Nations Environment Programme (UNEP), Global Environment Facility (GEF), High Level Political Forum, United Nations Development Programme, World Metrological Organization etc.

Advancements in biotechnology and development of genetically modified organisms led to concerns on biosafety. Accordingly, Cartagena Protocol on Biosafety under CBD was adopted in 2000 which entered into force on 11th September 2003. The Protocol basically aims at governing and regulating trans-boundary movement of Living Modified Organisms. The objective of the Protocol is to ensure safety and protection while dealing with the transfer of Living Modified Organisms and to ensure safe handling of such organisms during international Trans-regional movement

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**Unit 13: International Environmental Laws- Basic Aspects**

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## **13.0 Objectives**

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After reading this unit you will:

- An understanding of the origin, evolution and expansion of international environmental laws.
  - Able to identify and critically analyze international environmental laws.
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## **13.1 Introduction**

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It is now widely recognized that the planet is facing a range of environmental challenges, which can only be addressed through international co-operation. Developments in science and technology have enhanced the possibility of understanding the environmental implications of various naturally occurring events as well as human activities. The last few decades have witnessed an exponential increase in multilateral environmental agreements covering a wide range of issues such as ozone depletion, climate change, loss of biodiversity, toxic/hazardous products and wastes, pollution of rivers and depletion of freshwater resources.

International environmental law is a comparatively new branch of international law. It has expanded dramatically over the years particularly since the United Nations Conference on the Human Environment, 1972. The development of international environmental law has produced mixed results. While some treaty regimes have been effective in producing the desired results (e.g. Vienna Convention on Protection of the Ozone Layer, 1985), some other regimes are struggling to produce results (e.g. United Nations Framework Convention on Climate Change, 1992).

This unit provides an overview of the development of international environmental law and briefly introduces its sources and important underlying principles. An in-depth analysis of the substantive aspects of international environmental law is not an objective of this unit. This unit explains the sources of international environmental law and narrates the development of international environmental law in its historical context. It also highlights the expansion of international environmental law and the role played by important international conferences on the environment in this process. This unit also highlights the North-South debate in the international environmental law regime.

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## **13.2 Early Legal Developments**

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Early legal developments in the field of the environment were limited in nature and scope. Legal initiatives mostly focused on specific issues such as regulation of whaling, fisheries, watercourses and birds (e.g. Convention between France and Great Britain Relating to Fisheries, 1867 and Convention for the Regulation of Whaling, 1931).

In the 1930s, the trans-boundary consequences of air pollution were acknowledged in arbitral proceedings leading to the award of the arbitral tribunal in the Trail Smelter case. The Trail Smelter case (Canada v. US) (1941) laid down the rule of international law on state responsibility in the context of trans-boundary pollution (and for trans-boundary effects on environment in general). It was held that:

No state has the right to use or permit the use of its territory in such a manner as to cause injury by fumes in or to the territory of another or the properties or persons therein, when the case is of serious consequences and the injury is established by clear and convincing evidences.

This principle was concertized subsequently through case laws (e.g. Corfu Channel case (UK v Albania) (1949) ICJ Reports 4). A number of treaties and declarations have also incorporated this principle. For example, Article 194 of the United Nations Convention on the Law of the Sea, 1982 and Principle 21 of the Declaration of United Nations Conference on the Human Environment, 1972 reflect this principle. The Trail Smelter case is a landmark case because it influenced the subsequent development of international environmental law significantly. The case together with the treaties adopted and organizations established in the late 19th century and the early 20th century is believed to have provided the basis of international environmental law.

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## **13.3 Sources of International Environmental Law**

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Article 38(1) of the Statute of the International Court of Justice provides that treaties, customs and general principles of law recognized by civilized nations are the major sources of international law. Judicial decisions and teachings of the most highly qualified publicists are recognized as subsidiary sources. While treaties and customary law are important sources of international environmental law, the legal regime for the protection of the environment also includes a range of legally non-binding instruments generally known as ‘soft law’, which includes declarations and guidelines.

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### **13.3.1 Treaties**

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Treaties are the most frequently used source of international environmental law. The last few decades, particularly the 1980s and the 1990s, have witnessed a proliferation of multilateral environmental agreements (MEAs). Between the Stockholm Conference, 1972 and the Rio Conference, 1992, several treaties were concluded covering a range of issues such as regulation of trade in endangered species (Convention on International Trade in Endangered Species of Wild Fauna and Flora, 1973 (CITES)), marine pollution (International Convention for the Prevention of Pollution from Ships, 1973), ozone protection (Vienna Convention on Protection of the Ozone Layer, 1985) and trans-boundary movement of hazardous waste (Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal, 1989). More than 100 MEAs were concluded between 1972 and 1992. Environmental catastrophes such as the Amoco Cadiz oil spill (1978), the Chernobyl nuclear accident (1986)

and the Exxon Valdez oil spill (1989) also triggered the rapid development of international environmental law.

Even though the number of MEAs has grown significantly, this development was criticized mainly because of their ambiguous and indeterminate legal substance and non-compliance by state parties. The proliferation of MEAs has also made coordination between different treaty regimes a difficult task. Consequently, in recent years, the focus has shifted towards stronger emphasis on treaty coordination, effectiveness, and compliance as opposed to the adoption of new treaties.

The treaty making process in international environmental law has also witnessed the introduction of novel ideas, most importantly, the Convention-Protocol approach, which envisages a framework convention with broad principles. Concrete obligations and actions will be laid down in subsequent agreements known as protocols. For example, general principles pertaining to the protection of biodiversity are laid down under the Convention on Biological Diversity, 1992. However, concrete rights and duties have been laid down in subsequent protocols on different issues such as bio-safety (Cartagena Protocol on Bio-safety, 2000) and benefit sharing (Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization, 2010). The climate change regime is another example with the United Nations Framework Convention on Climate Change, 1992 as the framework convention and the Kyoto Protocol, 1997 as a subsequent agreement with concrete rights and duties.

This method is progressive on various grounds. The idea of a framework convention without concrete rights and duties helps to bring more countries on the table. The cooperation, which begins with the framework convention, in theory, would nurture cooperation and trust among parties and would help to develop a strong and effective legal mechanism subsequently. This flexible mechanism also gives an opportunity to respond to new issues according to evolving scientific evidence.

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### **13.3.2 Custom**

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Custom is also an important source of international environmental law. An important advantage of customary international law norms is that they can inform the development of treaties or be codified into a treaty as was the case of the United Nations Convention on the Non-Navigational Uses of International Watercourses, 1997.

Courts and tribunals at the international level have recognized and used customary norms on various occasions. For example, the International Court of Justice recognized the principle of reasonable and equitable utilization as a customary norm in the context of the use and conservation of international watercourses in the *Gabcikovo-Nagymaros* case (Hungary v. Slovakia) (1997) ICJ Reports 7). In the *Pulp Mills* case (Argentina v. Uruguay) (2010) ICJ Reports 14), the International Court of Justice has recognized trans-boundary environmental impact assessment as a requirement of customary or general international law.

Nevertheless, identification of international customary norms is not an easy task. Given the fact that environmental issues are evolving, it is a challenge to ascertain the two essential components of international custom – state practice and *opinio juris*. While the former denotes the actual practice followed by states, the latter denotes the part whether the states have considered it as their legal obligation to follow such practice. It is extremely difficult to ascertain the state practice of over 190 countries. Further, there is a lack of clarity as to how to ascertain these components. While the traditional method suggests that more weight ought to be given to actual state practice, the modern approach relies heavily on documents such as declarations or the work of international organizations such as the International Law Commission.

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### **13.3.3 General principles of law**

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General principles of law recognized by civilized nations are important in the context of development and expansion of international environmental law. It is to be noted that the reference to ‘civilized nations’ in Article 38(1) of the statute of the International Court of Justice is now regarded as outdated. This term refers to the colonial practice of classifying nations as civilized, uncivilized and barbarians adopted by the Europeans and probably the term was carried forward to the ICJ statute from its predecessor, that is, the Statute of the Permanent Court of International Justice, 1920.

International courts and tribunals have relied on general principles of national law in a number of cases. However, its use in the field of environmental law has been marginal. The Trail Smelter Arbitration (US v. Canada, 1941) is one classic example of an environment related case where in the general principle of national law was used. The tribunal in the Trail Smelter case relied on decisions of the United States Supreme Court on cases concerning air pollution and water pollution between states of the Union in arriving at its finding that ‘no state has the right to use or permit to the use of its territory in such a manner as to cause injury by fumes in or to the territory of another’. General principles are of great significance in the context of principles highlighted in various soft law instruments. For example, principles such as the precautionary principle, polluter pays principle, sustainable development and common but differentiated responsibility in declarations adopted at different conferences on environment (e.g. Rio Declaration, 1992) have influenced interpretation, application and development of treaties. General principles may also influence the development or concretization of customary norms.

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### **13.3.4 Judicial decisions and teachings of the most highly qualified publicists**

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Judicial decisions and teachings of the most highly qualified publicists are regarded as ‘subsidiary means for the determination of rules of law’ under the ICJ Statute. They are subsidiary when compared other three sources described above. Generally international law does not recognize precedential value of decision of international courts and tribunals.

Therefore, judicial decisions cannot be treated as a formal source of law. Article 59 of the ICJ Statute explicitly provides that a decision of the Court has no precedential value. ICJ's decisions bind only the parties to the dispute. However, in practice, decision of international courts and tribunals strongly influence subsequent decision. For example, the ICJ in the *Gabcikovo-Nagymaros (Hungary v. Slovakia, ICJ, 1997)* case relied on explicitly its advisory opinion in the *Legality of Nuclear Weapons* case (1995).

In addition to judicial decisions, teachings of the most highly qualified publicists are another 'subsidiary' source of international law. One critical issue in this regard is the reference in Article 38(1)(d) of the ICJ Statute to the terms 'most highly qualified'. It is problematic to ascertain who are the 'most highly qualified publicists' in the field of international law.

The teachings of the most highly qualified publicists are a rarely used source of international law by international courts and tribunals. A 2012 study by Michael Peil observes that the ICJ 'has explicitly cited to publicists in only 22 of its 139 Judgments and Advisory Opinions' (file:///C:/Users/ASIM/Desktop/SSRN-id2115529.pdf). Among these cases, the ICJ has referred to the work of the International Law Commission mostly rather than individual writers. For example, in the *Gabcikovo-Nagymaros (Hungary v. Slovakia, ICJ, 1997)*, the ICJ heavily relied on the work of the International Law Commission on state responsibility to determine whether Hungary's action in stopping the work of a dam as agreed under a treaty by citing environmental reasons is justified under international law and therefore does not result in liability under international law.

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### **13.3.5 Non-binding instruments**

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Non-binding instruments have also been very influential in the development of international environmental law. Even though they are technically not 'law', soft law has played a significant role in international environmental law. First, some of the most influential developments that have shaped international environmental law have been the result of non-binding instruments such as the *Stockholm Declaration, 1972* and the *Rio Declaration, 1992*.

Second, soft law instruments have played a crucial role in concretizing some of the key principles of international environmental law such as state responsibility for trans- boundary harm.

Third, soft laws form a starting point for the development of hard law. Several environmental soft law instruments have played a crucial role in the development of legally binding treaties. For example, the *Helsinki Rules on the Uses of the Waters of International Rivers, 1966* adopted by the International Law Association formed the basis of a treaty subsequently adopted on international watercourses - the *UN Convention on the Non-Navigational Uses of International Watercourses, 1997*.

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## **13.4 Important Environmental Law Conferences**

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This part describes the contributions by key international conferences on environment to the development of international environmental law.

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### **13.4.1 Stockholm Conference, 1972**

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The early 1960s saw the emergence of environmentalism based on scientific evidence of environmental degradation. This led to the realisation that national measures are not sufficient to protect the environment. Pressure was put on the international community to formulate a strategy for the protection of the global environment. The United Nations responded to this pressure by convening the United Nations Conference on the Human Environment, 1972 (Stockholm Conference).

The results of the Stockholm Conference were a non-binding Stockholm Declaration and an Action Plan consisting of 109 recommendations. The Stockholm Declaration laid the foundation for the future development of international environmental law. Some of the important provisions in this regard are Principle 11 (implicit sustainable development), Principle 21 (state responsibility for transboundary harm), and Principle 22 and 24 (liability rules). The Stockholm Conference also led to the establishment of the United Nations Environment Programme (UNEP) in 1972. It was the first institution within the UN system to have environmental protection as its main task and it played and continues to play a significant role in the international environmental law making process. The second document adopted at Stockholm - the Action Plan - contains 109 recommendations adopted by consensus. The Action Plan identifies specific actions to address environmental issues and divides them into three categories: a global environmental assessment program (Earth watch); environmental management activities; and international measures to support the national and international actions of assessment and management.

An important achievement of the Stockholm Conference was that environmental protection became a mandate of the UN, even though environmental protection was not originally and explicitly mentioned in the UN Charter.

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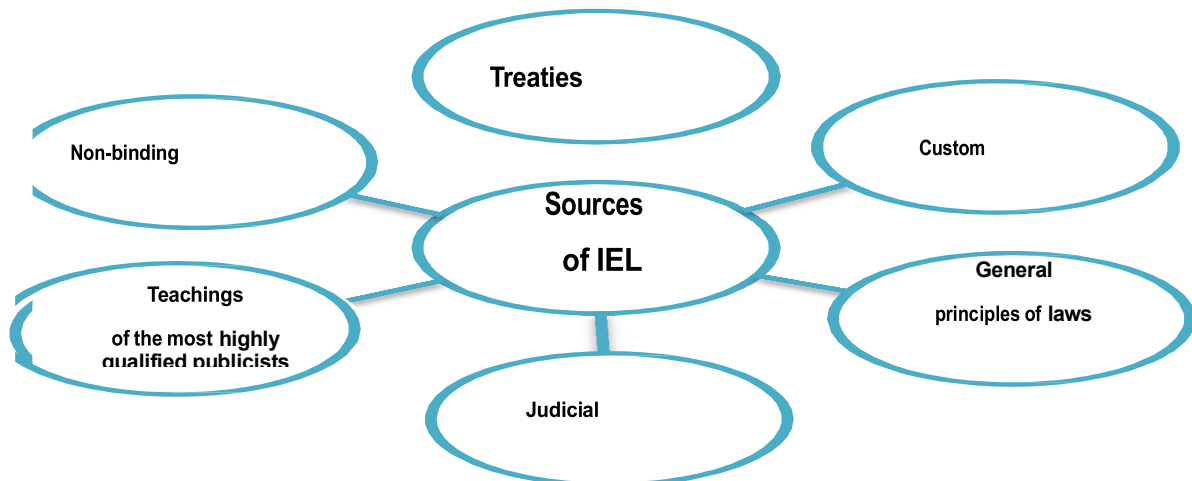
### **13.4.2 Rio Conference, 1992**

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The second major global conference on the environment - United Nations Conference on Environment and Development (UNCED or the Rio Conference) - took place in Rio de Janeiro in 1992. More than 30,000 participants from 176 countries were present at the Rio Conference. The Rio Conference produced five documents setting out the international agenda for sustainable development for the twenty-first century. They are:

- Rio Declaration on Environment and Development, a non-legally binding document containing key principles to guide international action;
- Agenda 21, an ambitious plan of measures and actions to concretely promote sustainable development;
- United Nations Framework Convention on Climate Change;
- Convention on Biological Diversity; and

- Non-Legally Binding Authoritative Statement of Principles for a Global Consensus on the Management, Conservation and Sustainable Development of all Types of Forests (Rio Forest Principles).



In addition to the abovementioned direct outcomes, the issue of desertification was highlighted by state parties during the Rio Conference and this eventually led to the adoption of the United Nations Convention to Combat Desertification in 1994. Further, the concerns of people living in the island countries were highlighted and this led to the Global Conference on the Sustainable Development of Small Island Developing States in 1994. A programme of action to assist the environmentally and economically vulnerable countries was also adopted by the Conference.

The Rio Conference is a landmark in terms of participation of representatives of states and non- governmental organizations. More than 700 NGOs participated in the Conference, which constituted a decisive moment from the participation perspective. This is a significant shift from the traditional practice where the international law making process was the exclusive domain of sovereign states. It also triggered a ‘paradigm shift’ from international environmental law to the international law of sustainable development because a large number of developmental issues got merged with environmental debates.

The Rio Conference also led to the establishment of the UN Commission on Sustainable Development (CSD) to ensure effective follow-up of the UNCED. The High Level Political Forum on Sustainable Development has replaced CSD in 2013.

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### **13.4.3 World Summit on Sustainable Development (WSSD), 2002**

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The United Nations General Assembly Resolution 55/199 convened the World Summit on Sustainable Development (WSSD or the Summit) in Johannesburg in 2002. The purpose of the Summit was to conduct a 10-year review of Agenda 21 and to ensure a balance between the three reinforcing components of sustainable development - economic development, social development and environmental protection. WSSD marks a major advancement from the Rio Conference in terms of participation. Around 21000 participants were present at the Summit

with delegates from 191 governments. WSSD did not focus on adoption of new MEAs. Instead, the focus was on implementation of existing MEAs.

The two major outcomes of WSSD are:

- Johannesburg Declaration on Sustainable Development; and
- Johannesburg Plan of Action.

WSSD was originally convened to promote sustainable development. However, the Summit ended up focusing mainly on development and it only marginally addressed environmental issues. It failed to make any significant progress in promoting the environmental agenda. At Johannesburg, the environment was treated as a sideshow and the focus was mostly on development and poverty eradication. The Plan of Implementation was also development oriented. In effect, the environment became relevant only in the context of development. For example, the Plan of Implementation indicates that measures to protect and manage natural resources are essentially viewed as a base of economic and social development. WSSD steered the development discourse in a new direction by giving more importance to the development needs of the Third World rather than the environmental part, which the developed countries had been pursuing.

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## 13.4.4 United Nations Conference on Sustainable Development (Rio+20), 2012

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The United Nations Conference on Sustainable Development took place in Rio de Janeiro from 20 to 22 June 2012. The Rio+20 outcome document, ‘The Future We Want’ outlines the key issues and challenges in the path of achievement of the goal of sustainable development. To a great extent, the Rio+20 Summit were a continuation of WSSD in terms of the nature of the discourse. The outcome document covers almost all issues pertinent to development such as inclusive and equitable economic growth; reduction of inequalities; rising of basic standards of living; equitable social development; and sustainable management of natural resources.

The outcome document reasserts the three pillars of sustainable development identified at WSSD, that is, economic development, social development and environmental protection. It also reinforces poverty eradication as an indispensable requirement for sustainable development. In addition, the outcome document emphasizes the importance of technology transfer to developing countries. It was also resolved to strengthen the institutional framework for sustainable development.



The Rio+20 outcome document does not provide any concrete ‘means of implementation’ or new and additional resources in order to achieve sustainable development. It has been observed that developed countries failed to fulfill their previous commitments on finance and technology for sustainable development. Some other critiques present an optimistic view of the Rio+20 outcomes. According to them, the mandated actions in the Rio+20 texts reflect the important work in the years ahead at the UN.

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## **13.5 International Institutions: Emerging Trends**

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The institutional framework for international environmental law used to follow the idea of establishing independent institutions for the proper implementation of MEAs. This is evident from the establishment of the UNEP and CSD in the aftermath of the Stockholm Conference and the Rio Conference respectively. These institutions have indeed played a crucial role in the development and implementation of international environmental law.

However, the institutional mechanism under international environmental law has undergone dramatic changes in the recent past. The new institutional arrangements usually comprise a Conference of Parties(COP) or Meeting of the Parties (MOP) with decision-making powers, a secretariat, and one or more specialist subsidiary bodies. At the global level, very few MEAs concluded since 1972 rely on an existing inter- governmental organization (IGO) for implementation.

COP is a post-1970 phenomenon. Previously, MEAs used to set up an IGO with legal personality. Examples include the International Whaling Commission (established by the International Convention for the Regulation of Whaling, 1946) and the International Commission for the Northwest Atlantic Fisheries (established by the International Convention for the Northwest Atlantic Fisheries, 1949). However, traditional IGOs were expensive and bureaucratic in nature. This resulted in disinterest to create new IGOs in the environmental field.

COPs are not IGOs in the traditional sense. They are freestanding and distinct both from the states that are parties to a particular agreement and from existing IGOs. They are also autonomous in the sense that they have their own law making powers and compliance mechanisms. This marks a distinct and different approach to institutionalized collaboration between states, being both more informal and more flexible, and often innovative in relation to norm creation and compliance.

COPs perform a variety of functions such as establishment of subsidiary bodies, arrangement of meetings, adoption of rules of procedure for itself and for subsidiary bodies and providing guidance to the subsidiary bodies and the secretariat. COPs also contribute to the development of new substantive obligations by the parties by amending an MEA or by adopting new protocols. Another important function of a COP is its role in ensuring implementation of and compliance with MEAs.

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## **13.6 The North-South Debate**

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The Stockholm Conference marked the beginning of the North-South divide on environmental protection and development. The South was skeptical of the conservationist approach of industrialized nations mainly because of its implications for their economic development. At the same time, the North argued in favor of protection and conservation of the environment neglecting the social and economic needs of developing countries.

The North-South divide became very clear during the Rio Conference. Developing countries argued for more distributive justice and developed countries insisted on conservation and better use of natural resources. The Forest Principles adopted at the Rio Conference is an example of the North-South divide on environmental issues. Developing countries strongly resisted a legally binding regime on forests although developed countries pushed for a legally binding agreement.

The Rio Conference attributed historical responsibility to industrialized countries for environmental degradation. While industrialized countries sought progress on climate change, biodiversity, forest loss and fisheries issues, the developing countries pushed for market access, trade, technology transfer, development assistance and capacity building. At the Rio Conference, developing countries managed to include the development agenda as part of the discourse.

Thus, the Rio Declaration represents a delicate balance between the interests of developing and industrialized countries. This balance is reflected in two sets of key principles. They are, on the one hand, the precautionary approach and the polluter- pays principle and, on the other hand, the right to development, poverty alleviation and the recognition of common but differentiated responsibilities.

The North-South debate could also be seen in the fact that developing countries made their acceptance of environmental obligations contingent upon the provision of financial assistance, and at the same time developed countries argued for effective institutions to ensure compliance. This scenario led to two developments – financial mechanism and compliance mechanism.

The North-South debate and the consequent impasse in environment negotiations resulted in finding a via media to achieve consensus between the North and the South by coining the terms ‘environment’ and ‘development’ together. It led to a paradigm shift from environmental law to the law of sustainable development. However, the concept of sustainable development remained ambiguous and susceptible to different uses by different actors.

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## **13.7 Summary**

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International environmental law has expanded dramatically both in quantitative and qualitative terms over the last few decades. While it originated with a limited focus on state responsibility for transboundary harm and protection of a limited number of species, international environmental law has been transformed into a key component of international law addressing not just environmental protection but also various other related aspects such as poverty eradication and trade. While the development of international environmental law has brought about positive changes in controlling environmental degradation in many areas (e.g. protection of the ozone layer), it proved to be inadequate and ineffective in many other areas (e.g. climate change). In some cases, old environmental problems have worsened and new environmental threats and challenges have emerged.

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## **13.8 References**

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**Unit 14: Environment Related acts**

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**14.0 Objectives****14.1 Introduction****14.2 The Atomic Energy Act, 1962****14.3 The Factories Act, 1948****14.4 National Environmental Appellate Authority Act, 1997****14.5 The Public Liability Insurance Act, 1991****14.6 The National Environment Tribunal Act, 1995****14.7 The Mines and Minerals Act, 1957****14.8 References**

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**14.0 Objectives**

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After studying this unit you will be able to

- Understand the complex scientific, historic, institutional and legal framework in respect to nuclear energy development and its use.
- Understand the objectives, scope and coverage of The Factories Act, 1948.
- Understand the depth knowledge of The National Environmental Appellate Authority Act, 1997;
- Understand the depth knowledge of The Public Liability Insurance Act, 1991;
- Understand the depth knowledge of The National Environment Tribunal Act, 1995
- Understand the depth knowledge of The Mines and Minerals Act, 1957

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**14.1 Introduction**

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The unit provides a board understanding of the Environment Related acts ie., The Atomic Energy Act, 1962; The Factories Act, 1948; The National Environmental Appellate Authority Act, 1997; The Public Liability Insurance Act, 1991; The National Environment Tribunal Act, 1995 and The Mines and Minerals Act, 1957.

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## 14.2 The Atomic Energy Act, 1962

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### ❖ Nuclear Program - Early Beginnings

The modern development of nuclear science had its beginnings as early as 1789 with the discovery of uranium by Martin Klaproth, a German chemist. Throughout the period from 1800-1900, efforts have been directed to find more about the nature, composition and use of uranium and its properties. Extraordinary works of Wilhelm Rontgen; Antoine Henri Becquerel; Pierre Curie and Marie Curie and many others in understanding the properties of uranium furthered the scientific progress. The British physicist Ernest Rutherford who is considered as the father of nuclear science for his contribution to the theory of atomic structure in 1904 wrote: If it were ever possible to control at will the rate of disintegration of the radio elements, an enormous amount of energy could be obtained from a small amount of matter (US DOE, 2006).

In 1938, Otto Hahn and Fritz Strassman through their experiments discovered the process of fission in uranium for the first time. Consequent to this, chain reaction became a possibility which subsequently made the work in developing an atomic bomb a step closer. The World War II (1939-1945) hastened the development of military application of nuclear science. On 2 December 1942, scientists led by Enrico Fermi achieved the first self-sustained nuclear chain reaction in Chicago. With the prospects of Germany acquiring the nuclear bomb seeming closer, Albert Einstein's letter to President Roosevelt informing how close are the Germans led to the formation of the Manhattan Project. The Manhattan Project was conceived in 1939 and led by the United States with participation from United Kingdom and Canada became the nerve centre in the development of atomic bomb during the years of 1942- 1945.

In July 1945, the United States tested its first atomic bomb in Los Alamos, New Mexico. Soon after, in August 1945, USA exploded two atomic bombs on Hiroshima (6 August 1945) and Nagasaki (9 August 1945), showing the world the destructive power of nuclear energy, i.e., human and environmental consequences from nuclear radiation exposure. It may be remembered that the action of bombing Japan took place only few weeks after the Heads of States signed the United Nations Charter on 26 June 1945 in San Francisco. With the war ending, and knowing well that the United States and its allies may no longer hold monopoly in nuclear science, efforts were directed to control the spread of nuclear weapons. At the same time attention was also being directed for peaceful application of nuclear energy. The newly formed United Nations became the focal point in this effort.

These efforts led to the development of nuclear energy law as we know it today. As Werner Boulanger stated, the purpose and function of nuclear law is to promote and to protect: to promote the development of nuclear science and technology and to protect mankind against any hazards possibly connected with nuclear energy [1]. Nuclear energy law in effect had to confront or deal with multiple factors such as proliferation (diversion of civilian use to weapons program); protecting the industry and the public equally (from massive compensation claims

and provision for the same); establishment of an effective and credible regulator (for ensuring that the operator and all others follow the strictest regulations for a safe program) and also making sure that the program does not have any unintended consequences for the environment and people (like waste management, public consultation, radiation risk etc.)

### ❖ Institutional Developments

#### • **Development of the United Nations Atomic Energy Commission**

The United Nations shouldered much of the responsibility to answer the nuclear question - its uses and concerns, since this topic is best discussed formally at a multi-lateral institutional level involving all the permanent five members of the UN Security Council (they include China, France, Russia, the United Kingdom, and the United States) and other countries. In 1945, there were extensive consultations in particular between the United States, the United Kingdom, Canada and later the USSR on “the need in an effort to reach agreement on the conditions under which international co-operation might replace rivalry in the field of atomic power” (Bathurst, 1947). Subsequently, on 15 November 1945, during a summit in Washington DC, the United States, the United Kingdom and Canada issued the Agreed Declaration on Atomic Energy stating that: in order to attain the most effective means of eliminating entirely the use of atomic energy for destructive purposes and promoting its widest use for industrial- and humanitarian purposes, a commission should be set up at the earliest practicable date, under the United Nations, to prepare recommendations for submission to that Organization. On 27 December 1945, at a meeting of the Council of Foreign Ministers in Moscow, the United States and the United Kingdom proposed, and the USSR agreed, to create the United Nations Atomic Energy Commission (UNAEC). On 24 January 1946, the United Nations General Assembly passed the 1st Resolution in its first Session creating the UNAEC with representatives from the United States, USSR, Canada, United Kingdom and others in an effort, “to consider problems arising from the discovery of atomic energy and related matters” (Fischer, 1947).

Though well intended in its efforts to establish an international oversight of the use of atomic energy with the hope of avoiding unchecked proliferation of nuclear power post-World War II, the working of the UNAEC has been contentious. The United States and the then USSR proposed different proposals, i.e. Baruch and Gromyko Plans at the UNAEC leading to non-acceptance of either proposal. After three years of deliberation and almost 200 meetings, the UNAEC failed to reach any major agreement. In September 1949, the USSR conducted its first nuclear weapons test followed by the United Kingdom in 1952. The Soviet nuclear test effectively ended the UNAEC’s role and the UN General Assembly, by its resolution 502(VI) of January 1952, formally dissolved the UNAEC, creating in its place the United Nations Disarmament Commission under the Security Council with a general mandate on disarmament.

#### • **Towards peaceful uses of nuclear energy**

While negotiations were going on, countries continued their research to establish their technical superiority over nuclear energy. An important effort towards the production of electricity from atomic energy became successful in 1951 when electricity was first generated from a nuclear

reactor, the EBR-I (Experimental Breeder Reactor-I) at the National Reactor Testing Station in Idaho, USA. Many countries initiated their programs during this period. India was one of the early starters of the program, which is briefly discussed below. Immediately after World War II, in order to institutionalize the post-world war nuclear energy program, the United States government enacted the Atomic Energy Act, 1946 on 1 August 1946 (AE Act) emphasizing the need to harness atomic energy for peaceful purposes (section 1(a)). The AE Act created the United States Atomic Energy Commission (USAEC) as a civilian controlled authority. Acknowledging the importance of civilian applications, US Congress while enacting the AE Act stated: “atomic energy should be employed not only in the Nation’s defense, but also to promote world peace, improve the public welfare, and strengthen free competition in private enterprise” (Buck 1983). In parallel, throughout the 1940s, the USSR also directed much of its effort to the development of nuclear technology; including both for military and civilian purposes. In respect of the civilian power program, the 1940s saw giant strides at various centers in refining existing reactor designs and developing new ones. The Institute of Physics and Power Engineering (FEI) was set up in May 1946 at the then-closed city of Obninsk, 100 km southwest of Moscow, to develop nuclear power technology (WNA, 2014). Obninsk became one of the nerve centers of the Soviet nuclear energy program and became famous when on 27 June 1954, the world’s first nuclear power station at Obninsk with a capacity of 5MW was connected to the Moscow grid.

Dr. Morokhov, the First Deputy Chairman of the State Committee on the Utilization of Atomic Energy of the USSR in his speech to the IAEA in 1968 said that invaluable conclusions on the power program have been drawn from the operation of the Obninsk reactor, which are, (1) transformation of nuclear energy to electricity was proved to be practical; (2) atomic power was sufficiently reliable and flexible in operation and fulfilled the requirements for utilization in an electrical network; and (3) it was completely safe both for personnel in the plant as well as the surrounding population.

- **Creation of the International Atomic Energy Agency (IAEA)**

Once all the major powers of the day acquired atomic technology, international efforts were re- directed to arrive at a common ground on the use of nuclear technology for peaceful applications. On 8 December 1953, the “Atoms for Peace” speech by US President Eisenhower before the UN General Assembly called for “the governments principally involved” (naming all the nuclear technology powers of the day) to make joint contributions from their stockpiles of normal uranium and fissionable materials to an international atomic energy agency set up under the UN.

Eisenhower spoke on the peaceful use of the proposed atomic energy agency:

- a) The more important responsibility of this atomic energy agency would be to devise methods whereby this fissionable material would be allocated to serve the peaceful pursuits of mankind. Experts would be mobilized to apply atomic energy to the needs of agriculture, medicine and other peaceful activities. A special purpose would be to provide abundant electrical energy in the power- starved areas of the world.

- b) Among the agency's responsibilities would be to store and safeguard the material and to "devise methods" whereby it would be allocated to serve the "peaceful pursuits of mankind" (IAEA transcript 1953).
- c) Moving forward on peaceful application, in 1954, the United States provided a legal basis for "Atoms for Peace" by amending the AE Act to permit peaceful international nuclear cooperation, leading to bilateral agreements with a number of States (Fischer, 1997). The amended Atomic Energy Act, 1954 (amended AE Act) drastically altered the policy thereby facilitating participation of private enterprises in the development of atomic energy (section 3).
- d) The progress of power production from atomic energy thus became a reality in 1954 in Obninsk, USSR, and along with the leap of faith through the "Atoms for Peace" speech and the amended AE Act, nuclear energy had forever crossed the divide from military uses to civilian applications.

The UN General Assembly, in a plenary session in December 1954, unanimously adopted a resolution which provided for the establishment of the International Atomic Energy Agency (IAEA), and for the holding of an international technical conference of governments under the auspices of the United Nations. This international conference was held from 8 to 25 August 1955 in the Palais des Nations, Geneva. The event was a landmark intergovernmental conference, which elucidated progress on a new technology, where international scientific community for the first time came out freely mingled and exchanged views, educated the world that peaceful applications of nuclear energy, in particular the generation of electricity, are now a reality.

The President of the Conference was India's Homi Bhabha. In the context of scientific and technological progress, he envisioned that, "during the next two decades" scientists would have found a way of "liberating [thermonuclear] fusion energy in a controlled manner... When that happens, the energy problems of the world will truly have been solved forever" (Fischer, 1997). Developing countries saw the progress and acquisition of nuclear technology as a means to give them access to unlimited energy source which can be used to develop their countries faster and catch up with the industrial world (Fischer, 1997).

For the international institutional initiative, the success of the international conference took the slow pace of negotiations to establish an international atomic nuclear agency to a level of urgency. Majority of the countries thought that the IAEA could be used to access nuclear technology in setting up nuclear power plants. The interest generated during the conference persuaded many nations to launch nuclear research and development programs and sharpened their interest in the proposed IAEA (Fischer, 1997). From 1955 to 1957, after a series of hard fought negotiations, 12 governmental representatives from Australia, Belgium, Brazil, Canada, Czechoslovakia France, India, Portugal, South Africa, the United Kingdom, the United States and the USSR concluded the drafting of the Statute of the IAEA. The Statute of the IAEA was approved on 23 October 1956 by the Conference on the Statute of the International Atomic Energy Agency, which was held at the Headquarters of the United Nations. It came into force on 29 July 1957.

The main functions of the IAEA (Article III.A) are:

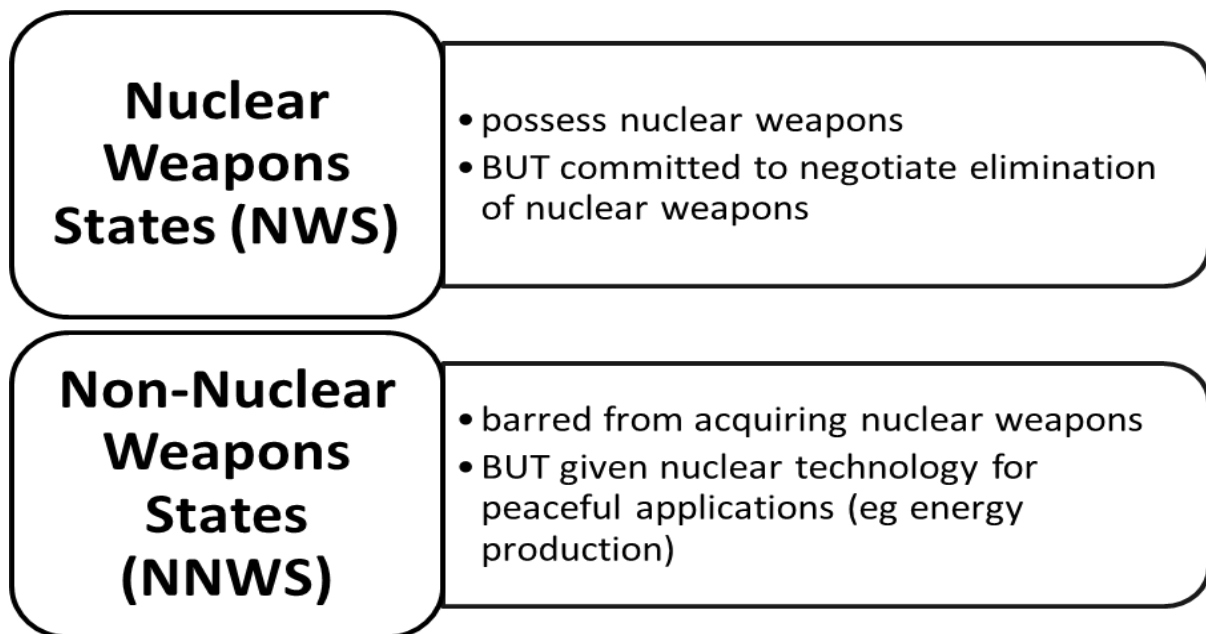
1. Take any action needed to promote research on, development of, and practical applications of nuclear energy for peaceful purposes;
2. Provide materials, services, equipment and facilities for such research and development, and for practical applications of atomic energy “with due consideration for the needs of the under- developed areas of the world”;
3. Foster the exchange of scientific and technical information;
4. Encourage the exchange of training of scientists and experts in the field of peaceful uses of atomic energy;
5. Establish and apply safeguards to ensure that any nuclear assistance or supplies with which the IAEA was associated should not be used to further any military purposes — and apply such safeguards, if so requested, to any bilateral or multilateral arrangement;
6. Establish or adopt nuclear safety standards;
7. Acquire or establish any facilities, plant and equipment useful in carrying out its authorized functions.

India is one the architects of the Statute of the IAEA and it played an instrument role in shaping the working of the IAEA. Particularly, on the constitution of the Governing Board of the IAEA, Fisher (1997) explains “in the twelve-nation group the Indian delegation came up with a complex but ingenious formula that has stood the test of time”.

- **Nuclear Non-Proliferation Treaty**

Along with the institutional developments in the form of the IAEA, the progress of nuclear technology in particular the development of nuclear weapons during the 1960s was viewed with alarm that there exists a possibility that nuclear weapons technology could become widespread. Many governments came together to reduce or eliminate such a possibility. The Nuclear Non-Proliferation Treaty (NPT) was an agreement signed in 1968 by both major nuclear and non-nuclear countries pledging their cooperation in stemming the spread of nuclear technology. 188 states are party to the NPT; only India, Pakistan, and Israel are outside the treaty regime and North Korea withdrew in 2003. Adherence to the treaty by 188 states, including five nuclear- weapon states, renders the treaty the most widely adhered to multilateral disarmament agreement.

The treaty classifies nations into two categories.



Today although many of the provisions of the treaty remain unfulfilled, there can be no doubt about the importance of the treaty towards global nuclear disarmament and promotion of nuclear energy for peaceful purposes.

- India and Nuclear Energy

India initiated its nuclear program as early as in 1945, with the establishment of the Tata Institute of Fundamental Research in Bombay. The Atomic Energy Act was passed in Parliament soon after the country gained independence in 1948, and set forth India's objective for the development and utilization of atomic energy solely for peaceful purposes. In 1954, the Government established a Department of Atomic Energy charged with the sole responsibility for all nuclear activities in the country.

The Indian Atomic Energy Act, 1948 is the principal legislation that deals with all aspects of atomic energy production and its associated activities in India. The Atomic Energy Act, 1962 gives the Central Government monopoly over production, development, usage, and disposal of atomic energy. Under the provisions of the law, the Central Government undertakes the above activities either by itself or through any authority or corporation established by it or through a government company. Towards the production of nuclear energy, India follows an unconventional path that no other country follows. Realizing that India does not have major uranium reserves but has one of the largest reserves of thorium in the world, the country, from the beginning, conceived a three-stage nuclear fuel cycle strategy. The reactor programme that was conceived was with the installation of natural uranium reactors in the first phase, followed by fast breeder reactors in the second phase, using plutonium from the first generation reactors with either uranium-238 or thorium in the blanket, followed eventually by reactors based on the self-sustaining thorium uranium- 233 cycle (Sethna IAEA).

Today, India has many nuclear reactors spread across the country producing electricity which is operated by Nuclear Power Corporation of India Limited (NPCIL). The current status and future plans are detailed in Table 1.

Table 1: Operational, under-construction and proposed sites

States	Site	Capacity (MW)		
		Operational	Under construction	Proposed (initial clearance received)
Maharashtra	Tarapur	2x160 + 2x540	—	—
	Jaitapur*	—	—	2x1650
Rajasthan	Rawatbhata	100+200+(4x220)	2x700	—
	Mahi, Banswara*	—	—	2x700
Tami Nadu	Kalpakkam	2x220	1x500	2x500
	Kudankulam	1 x 1000	1x1000	2x1000
Uttar Pradesh	Narora	2x220	—	—
Gujarat	Kakrapar	2x220	2x700	—
	Chhaya Mithi Virdi*	—	—	2x1100
Karnataka	Kaiga	4x220	—	2x700
Haryana	Gorakhpur *	—	—	2x700
Madhya Pradesh	Chutka *	—	—	2x 700
	Bhimpur *	—	—	Pre-projectactivities
Andhra Pradesh	Kovvada *	—	—	2x1500
West Bengal	Haripur *	—	—	Pre-projectActivities

Source: Rajya Sabha, 2012 and updated by the author

Government of India seems determined that the nuclear energy forms an indispensable form of energy for India towards industrialization and providing electricity access to large number of population. The advantage of nuclear energy is been stated that on small fuel and limited land there could be high output. For example, from the Jaitapur and Kudankulam projects alone, there are possibilities of having close 10000MW and 9000 MW power respectively. However, to have a successful program public acceptance will be crucial; engagement and consultation with communities living close by would greatly benefit the overall program. The Government ought to allay any fears through a sustained education program backed by clear legal regime that benefits all the parties.

❖ Legal & Regulatory Framework concerning Nuclear Energy

- Liability and Compensation Laws

Having experienced the consequences of the horrific bombings in Japan and knowing well that the traditional principles of state responsibility and liability may not suffice in respect to a nuclear accident, the Organization for Economic Cooperation and Development (OECD) established the Convention on Third Party Liability in the Field of Nuclear Energy, 1960 (Paris Convention), a nuclear liability regime for most of Western Europe. Supplementing the Paris Convention, the 1963 Convention Supplementary to the Paris Convention of 29 July 1960 (Brussels Supplementary Convention) was established to provide for enhanced compensation. The International Atomic Energy Agency (IAEA) sponsored an international regime in 1963 - the Vienna Convention on Civil Liability for Nuclear Damage (Vienna Convention), largely on the principles laid down in the Paris Convention.

The principles, detailed below, remain the bed rock of state responsibility and liability.

- a) First: no-fault liability (absolute liability);
- b) Second: liability is channeled exclusively to the operator of the nuclear installation (legal channeling);
- c) Third: only courts of the State in which the nuclear accident occurs have jurisdiction (exclusive jurisdiction);
- e) Fourth: limitation of the amount of liability and the time for claiming damages (limited liability)
- f) Fifth: limitation of time for claiming damages (limitation in time); and
- g) Sixth: the operator must secure insurance or financial guarantee to the extent of his liability amount.

With both these conventions being independent of each other, it was open to States to adopt either of these conventions. This raised the issue of coordination and harmonization between the two conventions. After the Chernobyl nuclear accident in 1986, to rectify this problem, the two conventions were linked by the Joint Protocol Relating to the Application of the Vienna Convention and the Paris Convention (1988 Joint Protocol), which came into force in 1992.

Along with this, there was a complete revision of the Paris and Brussels conventions. The 2004 Protocol to Amend the Paris Convention on Third Party Liability in the Field of Nuclear Energy of 29 July 1960 (2004 Protocol) that amended both the Paris and Brussels Conventions is the most important of these revisions. The Vienna Convention has also undergone significant changes. In 1997, over 80 States adopted a Protocol to amend the 1963 Vienna Convention on Civil Liability for Nuclear Damage (1997 Protocol), which came into force in 2003.

In addition to the Paris and Vienna conventions, at the instance of the United States, the IAEA sponsored another international nuclear liability regime – the Convention on Supplementary Compensation (Compensation Convention) in 1997. It is structured as umbrella legislation. The Compensation Convention provides additional amounts to be offered through contributions by the State parties on the basis of installed nuclear capacity. The convention is still not in force.

In India, the Civil Liability for Nuclear Damage Bill was passed by the Parliament and received Presidential assent on 21 September 2010 (Act No 38 of 2010). After a year and two months, the Act was notified, coming into force on 11 November 2011. The Civil Liability for Nuclear Damage Rules, 2011 have also been framed in respect of a few provisions, and were notified on the same day along with the Act. The Indian law retains most of the established international principles, but it is argued that it deviates on two major contentious points: one is the right of recourse against suppliers, in respect of who are covered and the extent of liability, and second is the right of citizens under tort laws to approach courts for claiming more compensation. These are yet to be settled.

- **Nuclear Regulatory Regime**

From the very beginning of nuclear energy development, countries were fully aware of the dangers associated with this form of energy and sought to create safety parameters as necessary conditions for further development. The IAEA summarizes and states, “Safety was an important concern and “prevention” was also identified as an important and effective safety factor”.

In order to do this, countries established nuclear regulatory institutions. Many institutions like the United States Nuclear Regulatory Commission (NRC) started with promotional and regulatory duties together, but later changed to perform specific regulatory roles. Today, the NRC’s regulatory activities are focused on reactor safety oversight and reactor license renewal of existing plants, materials safety oversight and materials licensing for a variety of purposes, and waste management of both high-level waste and low-level waste. In addition, the NRC is preparing to evaluate new applications for nuclear plants.

The IAEA on its part, taking forward the obligation under the Statute, has been at the forefront of framing, collaborating and disseminating standards of safety through its program - Fundamental Safety Principles, Safety Requirements and Safety Guides.

- a) As the primary publication in the IAEA Safety Standards Series, Fundamental Safety Principles establishes the fundamental safety objectives and principles of protection and safety. They convey the basis and rationale for the safety standards for persons at senior levels in government and regulatory bodies.
  - b) The Safety Requirements establish the requirements that must be met to ensure the protection of people and the environment, both now and in the future. The requirements are governed by the objective and principles of the Safety
- a) Fundamentals. The format and style of the requirements facilitate their use by Member States for the establishment, in a harmonized manner, of their national regulatory framework.
  - b) The Safety Guides provide recommendations and guidance on how to comply with the safety requirements, indicating an international consensus on the recommended measures. The Safety Guides present international good practices, and increasingly they reflect best practices, to help users striving to achieve high levels of safety.

These reflect an international consensus on what constitutes a high level of safety for protecting people and the environment from harmful effects of ionizing radiation. The IAEA safety standards are applicable throughout the entire lifetime of facilities and activities – existing and new – utilized for peaceful purposes, and to protective actions to reduce existing radiation risks.

In India, the Atomic Energy Regulatory Board (AERB) is the regulatory body that lays down safety standards and frames rules and regulations in regard to the regulatory and safety requirements envisaged under the Atomic Energy Act, 1962. The AERB was constituted on 15 November 1983 by the President of India by exercising the powers conferred by the Atomic Energy Act to carry out certain regulatory and safety functions under the Act. The regulatory authority of AERB is derived from the rules and notifications promulgated under the Atomic Energy Act and the Environment (Protection) Act, 1986. AERB is currently structured under the Atomic Energy Commission (AEC) reporting to the Chairman of the AEC. In order to provide independent legal status the government has tabled a legislation called Nuclear Safety Regulatory Authority Bill 2010 (NSRA Bill). When the bill becomes a law there will be structural changes in the current AERB and the bill says AERB may be subsumed under the NSRA Bill.

- **Addressing security and safety through national and international legal frameworks**

There are a host of national and international legal and institutional instruments in respect to nuclear energy production, its use and safe disposal of waste. The list covers terrorism, securing safety of the facilities, transboundary issues, transportation of nuclear materials, personnel working on the facilities their safety and security, export and import of nuclear materials, safe disposal of nuclear waste and its management, decommissioning, etc.

Governments, nationally and at the international level, from the beginning of the program itself have made great effort towards creating a robust safety and security system. The Three-Mile Island nuclear accident in the United States (1979), Chernobyl in the former Soviet Union (USSR) (1986), and the nuclear fallout subsequent to the earthquake and tsunami in Japan (2011) exposed the nature of nuclear accidents and their possible impacts on humans and the environment. In the post-9/11 attacks in the United States, there has been heightened concern regarding the possibility of nuclear materials getting into the hands of terrorists. Governments world over have taken a series of measures to counter this possibility.

In order to share valuable regulatory experience on safety, the Convention on Nuclear Safety was adopted in Vienna on 17 June 1994 under the auspices of the IAEA. Its aim is to legally commit participating States operating land-based nuclear power plants to maintain a high level of safety by setting international benchmarks to which States would subscribe. The obligations of the Parties are based to a large extent on the principles contained in the IAEA Safety Fundamentals document Fundamental Safety Principles (SF-1). These obligations cover for instance, siting, design, construction, operation, the availability of adequate financial and human resources, the assessment and verification of safety, quality assurance and emergency preparedness.

Nuclear energy development has had a history both as technological sensation and risks. The energy it can produce is enormous and has many medical and agriculture benefits. At the same time, a probable accident could lead to human and environmental devastation. Nuclear law as a discipline as we have observed covers legal instruments and institutions governing the production and use of nuclear energy.

World over many countries could power their economies towards industrialization based on the strength of nuclear power. They equally sought to allay any fears through establishment of robust laws and institutions for regulation and protection. The accidents in Chernobyl and now in Fukushima shows even the most technologically advanced countries still carry the risk. Further, the legal instruments that were in existence still may require more acceptances.

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### **14.3 The Factories Act, 1948**

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The Act, which came into force with effect from 1st April, 1949, contains elaborate provisions regarding health, safety and welfare of workers in factories where manufacturing process is carried on. The objective is to provide for satisfactory working conditions as well as for health, safety and welfare of factory workers. Towards the same end, the Act includes restrictive provisions regarding the working hours for adults, women and young persons, and has provided for annual leave with wages for workers in factories. As per Section 2(m) of the Act, a factory means any premises where 10 or more workers are engaged and in any part of which a manufacturing process is carried on with the aid of power, or a premises where 20 or more persons are engaged and a manufacturing process is carried on without the aid of power. A manufacturing process is also defined as any process for making, altering, repairing, ornamenting, finishing, packing, oiling, washing, cleaning, breaking up, demolishing, or otherwise treating or adapting any article or substance with a view to its use, sale, transport, delivery or disposal. It may also include pumping oil, water or sewage, or generation and transmission of power, constructing, repairing, refitting, or braking up of ships or vessels, preservation or storage of articles in cold storage, etc.

Provisions relating to health of employees: Under Sections! 1-20, the Act has laid down necessary steps to be taken for

- Cleanliness in the factory
- Disposal of wastes and effluents; m= providing adequate ventilation and such temperature in work rooms as will secure reasonable comfort to workers and prevent injury to health
- Prevention of inhalation and accumulation of dust or fume or other impurity in work room which may be injurious or offensive to the workers
- Prescribing standards and regulating the humidity in the air where it is artificially increased in the factory; prevention of overcrowding in any workroom
- Maintaining sufficient and suitable lighting
- Arranging and maintaining at suitable points sufficient supply of wholesome drinking water

- Providing latrines and urinals of prescribed types separately for male and female workers
- Arranging sufficient number of spittoons to be placed at convenient places which are to be maintained in a clean and hygienic condition.

### ❖ **Safety provisions**

The safety provisions are mostly in the nature of precautions and due safeguards in connection with the machinery used in the factory. Fencing of certain types of machinery is a very important requirement as also the dangerous parts of machinery. Precautions are required to be taken as regards work on or near machinery in motion. Where, necessary, suitable striking gear or other mechanical appliance, and suitable devices for cutting off power must be provided along with arrangement for locking the device to prevent accidental starting of transmission or other machinery. Employment of young person's on dangerous machines is prohibited unless they have been fully instructed and sufficiently trained. Likewise, employment of women and children is prohibited near cotton openers. The Act requires every hoist way and lift way to be sufficiently protected by an enclosure fitted with gates, maximum safe working load must be marked on the lift or hoist, and devices must be there to support the cage if there is breakage of ropes or chains. Precautions and safeguards are also required to be provided in the case of lifting machines, chains, ropes and lifting tackles, revolving machinery and pressure plant, against dangerous fumes, regarding the use of portable light, against explosive or inflammable dust, gas, etc. In case a manufacturing process involves risks of injury to the eyes from particles or fragments thrown off or exposure to excessive light, the state government may by rules requires require that effective screens or suitable goggles be provided for the protection of persons employed on, or in the vicinity of, the process. Certain other requirements of the Act in relation to safety are:

- (a) In every factory, all floors, steps, stairs, passages, gangways and means of access must be of sound construction, properly maintained and kept free from obstructions and substances likely to cause persons to slip, and where necessary, must be provided with handrails
- (b) If there are pits, sumps or tank in the ground or opening in floors which is a source of danger, the same must be securely covered or fenced
- (c) No person should be employed in factory to lift, carry or move any load so heavy as to be likely to cause him injury
- (d) Safeguards against results of fire are laid down in detail which includes provision of means of escape, nature of fire-fighting apparatus to be maintained, etc.

### ❖ **Provisions relating to labor welfare**

Under Section 42-49 of the Act, certain facilities are required to be provided in all factories irrespective of the number of workers employed, such as:

- (a) Separate and adequately screened washing facilities for male and female workers
- (b) Facilities for storing and drying wet clothing

- (c) Facilities for sitting for workers. Obligated to work in a standing position in order that they may take advantage of any opportunities for rest, and for workers who may be able to do their work efficiently in a sitting position
- (d) First-aid appliances kept in first-aid box or cupboard which should be readily accessible during working hours. In addition the following facilities are required to be provided in specified factories:
  - (ii) One or more canteens where more than 250 workers are ordinarily employed
  - (iii) Shelters, rest rooms and lunch rooms where more than 150 workers are employed
  - (iv) Crèches under the charge of trained women for the use of children under six years in factories where more than 30 women workers are employed. The Act also requires factories where more than 500 workers are employed to employ one or more welfare officers to take care of welfare facilities with duties prescribed by the State Government.

### ❖ Working hours for adults

Provisions in the Factories Act regulating the hours of work of adults consist of a number of rules. A summary of the rules is given below.

- h) The maximum number of hours of work that an adult worker may be required to do is 48 hours in any week, but not exceeding 9 hours in any day with a provision for at least half an hour rest after five hours of work.
  - (i) Every worker must have a weekly holiday.
  - (ii) Where a worker is deprived of any of the weekly holidays, he is to be allowed compensatory holiday within the months in which the holidays were due to him, or within two months immediately following that month.
  - (iii) When a worker is on shift duty which extends beyond midnight, the weekly holiday will be for a period of twenty four consecutive hours beginning when his shift ends. Also overlapping shifts are prohibited.
  - (iv) Workers are to be paid for overtime work (in excess of nine hours in a day or 48 hours in a week) at twice the ordinary rate of wages,
  - (v) Women workers shall not be employed except between the hours of 6 a.m. and 7 p.m.
  - (vi) An advance notice must be displayed and correctly maintained showing clearly for every day the periods during which adult workers may be required to work.
  - (vii) The manager of every factory is required to maintain a register of adult workers with the name, nature of work, and other particulars about each adult worker, complete in itself and up to date.

### ❖ Employment of children

There is absolute prohibition of employment in a factory of any child who has not completed his fourteenth year age and it is the duty of the employees to ascertain the age of children and not depend on their application. For a child who has completed his fourteenth year or is an adolescent, if employed, must be granted a certificate of fitness, and he must carry a token while at work giving reference to such certificate granted. He shall not be employed or permitted to work during the night, i.e., between 10 p.m. and 6a.m., and for more than four and

a half hours in any day. The period of work must be limited to two shifts only and these shall not overlap.

❖ **Annual leave with wages**

According to Section 79 (1), where a worker has worked for a minimum period of 240 days or more in a factory during any calendar year, he is entitled to leave with wages on the following basis:

- (a) For adults - one day for every 20 days of work
- (b) For children — one day for every 15 days of work

If a worker does not commence his services from 1st January, he is entitled to these leaves at the above mentioned rates provided he has worked for  $\frac{2}{3}$  of the total number of days in the remaining part of the calendar year. If any worker does not avail the earned leave entitled to him during the calendar year, it can be carried forward to the next calendar year subject to the maximum of 30 days for an adult worker and 40 days for a child worker.

❖ **Administrative set-up**

The State Government is responsible for the administration of the Act and the implementation of various provisions thereof in its state through the inspectorate headed by a Chief Inspector. The Chief Inspector is assisted by Additional Chief Inspectors, Joint Chief Inspectors, Inspectors and other officers as may be appointed by the State Government. The State Government has the powers to

- a. Apply all or any of the provisions of the Act even to a factory employing less than 10 workers if working with power and less than 20 workers if working without power
- b. Exempt in case of public emergency any factory or a class of factories from all or any of the provisions of the Act except Section 67 (prohibiting employment of children) for not more than 3 months at a time.
- c. Make rules for enforcement of the Act, registration and licensing of factories, and collection of license fee.

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## **14.4 The National Environmental Appellate Authority Act, 1997**

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National Environment Appellate Authority Act, 1997 comprised of 23 Sections in brief which deals with the Constitution of Appellate Authority and matters relating to the powers functions of members, Central Government to perform the functions established a body under Section 3 of the Act called as National Environment Appellate Authority.

An Act to provide for the establishment of a National Environment Appellate Authority to hear appeals with respect to restriction of areas in which any industries, operations or processes or class of industries, operations or processes shall not be carried out or shall be

carried out subject to certain safeguards under the Environment (Protection) Act, 1986 and for matters connected therewith or incidental thereto.

Be it enacted by Parliament in the Forty-eighth Year of the Republic of India as follows:—

❖ **Short title and commencement:**

- (i) This Act may be called the National Environment Appellate Authority Act, 1997.
- (ii) It shall be deemed to have come into force on the 30th day of January, 1997.

❖ **Definitions:**

In this Act, unless the context otherwise requires:

- (a) “Act” means the Environment (Protection) Act, 1986 (29 of 1986).
- (b) “Authority” means the National Environment Appellate Authority established under sub-section (1) of section 3.
- (c) “Chairperson” means the Chairperson of the Authority.
- (d) “Member” means a Member of the Authority.
- (e) “Prescribed” means prescribed by rules made under this Act.
- (f) “Vice-Chairperson” means the Vice-Chairperson of the Authority.

❖ **Establishment of Authority:**

- (i) The Central Government shall, by notification in the Official Gazette, establish a body to be known as the National Environment Appellate Authority to exercise the powers conferred upon, and to perform the functions assigned to, it under this Act.
- (ii) The head office of the Authority shall be at Delhi.

❖ **Composition of Authority**

The Authority shall consist of a Chairperson, a Vice-Chairperson and such other Members not exceeding three, as the Central Government may deem fit.

❖ **Appeals to Authority:**

- Any person aggrieved by an order granting environmental clearance in the areas in which any industries, operations or processes or class of industries, operations and processes shall not be carried out or shall be carried out subject to certain safeguards may, within thirty days from the date of such order, prefer an appeal to the Authority in such form as may be prescribed: Provided that the Authority may entertain any appeal after the expiry of the said period of thirty days but not after ninety days from the date aforesaid if it is satisfied that the appellant was prevented by sufficient cause from filing the appeal in time.
- For the purposes of sub-section:
  - (i) “person” means—
    - (a) Any person who is likely to be affected by the grant of environmental clearance
    - (b) Any person who owns or has control over the project with respect to which an application has been submitted for environmental clearance
    - (c) Any association of persons (whether incorporated or not) likely to be affected by such order and functioning in the field of environment

- (d) The Central Government, where the environmental clearance is granted by the State Government and the State Government, where the environmental clearance is granted by the Central Government; or
- (e) Any local authority, any part of whose local limits is within the neighborhood of the area wherein the project is proposed to be located.
- (ii) On receipt of an appeal preferred under sub-section (1), the Authority shall, after giving the appellant an opportunity of being heard, pass such orders, as it thinks fit.
- (iii) The Authority shall dispose of the appeal within ninety days from the date of filing the appeal: Provided that the Authority may for reasons to be recorded in writing, dispose of the appeal within a further period of thirty days.

❖ **Procedure and powers of Authority:**

- (1) The Authority shall not be bound by the procedure laid down in the Code of Civil Procedure, 1908 (5 of 1908) but shall be guided by the principles of natural justice and subject to the other provisions of this Act and of any rules made by the Central Government, the Authority shall have power to regulate its own procedure including the fixing of places and times of its inquiry and deciding whether to sit in public or in private.
- (2) The Authority shall have, for the purposes of discharging its functions under this Act, the same powers as are vested in a civil court under the Code of Civil Procedure, 1908 (5 of 1908), while trying a suit, in respect of the following matters, namely:—
  - (a) Summoning and enforcing the attendance of any person and examining him on oath
  - (b) Requiring the discovery and production of documents; (c) receiving evidence on affidavits
  - (c) Subject to the provisions of sections 123 and 124 of the Indian Evidence Act, 1872 (1 of 1872), requisitioning any public record or document or copy of such record or document from any office
  - (d) Issuing commissions for the examination of witnesses or documents; (f) reviewing its decisions
  - (f) Dismissing a representation for default or deciding it, ex parte
  - (e) Setting aside any order of dismissal of any representation for default or any order passed by it ex parte
  - (f) Any other matter which is required to be, or may be, prescribed by the Central Government.

❖ **Financial and administrative powers:**

The Chairperson shall exercise such financial and administrative powers as may be vested in him under the rules: Provided that the Chairperson shall have authority to delegate such of his financial and administrative powers as he may think fit to the Vice- Chairperson or any other officer subject to the condition that the Vice-Chairperson or such other officer shall, while exercising such delegated powers, continue to act under the direction, control and supervision of the Chairperson.

• **Staff of Authority**

- (1) The Central Government shall determine the nature and categories of the officers and other employees required to assist the Authority in the discharge of its functions and provide the Authority with such officers and other employees as it may think fit.
  - (2) The officers and other employees of the Authority shall discharge their functions under the general superintendence of the Chairperson.
  - (3) The salaries and allowances and conditions of service of the officers and other employees shall be such as may be prescribed.
- Bar of jurisdiction: With effect from the date of establishment of the Authority, no civil court or other authority shall have jurisdiction to entertain any appeal in respect of any matter with which the Authority is so empowered by or under this Act.
  - Proceedings before the Authority to be judicial proceedings: All proceedings before the Authority shall be deemed to be judicial proceedings within the meaning of sections 193, 219 and 228 of the Indian Penal Code (45 of 1860).
  - Members and staff of Authority to be public servants: The Chairperson, the Vice-Chairperson and the Members and the officers and other employees of the Authority shall be deemed to be public servants within the meaning of section 21 of the Indian Penal Code (45 of 1860).
  - Protection of action taken in good faith: No suit, prosecution or other legal proceeding shall lie against the Central Government or against the Chairperson, the Vice-Chairperson or a Member of the Authority or any other person authorized by the Chairperson, the Vice-Chairperson or a Member for anything which is in good faith done or intended to be done in pursuance of this Act or any rule or order made there under.
- ❖ **Penalty for failure to comply with orders of Authority:**

Whoever fails to comply with any order made by the Authority, he shall be punishable with imprisonment for a term which may extend to seven years, or with fine which may extend to one lakh rupees, or with both.

- Offences by companies
  - (i) Where any offence under this Act has been committed by a company, every person who, at the time the offence was committed, was directly in charge of, and was responsible to, the company for the conduct of the business of the company, as well as the company, shall be deemed to be guilty of the offence and shall be liable to be proceeded against and punished accordingly: Provided that nothing contained in this sub-section shall render any such person liable to any punishment provided in this Act, if he proves that the offence was committed without his knowledge or that he has exercised all due diligence to prevent the commission of such offence.
  - (ii) Notwithstanding anything contained in sub-section (1), where an offence under this Act has been committed by a company and it is proved that the offence has been committed with the consent or connivance of, or is attributable to any neglect on the part of, any director, manager, secretary or other officer of the company, such director, manager, secretary or other officer shall also be deemed to be guilty of that offence and shall be liable to be proceeded against and punished accordingly.

- **Explanation: For the purposes of this section:**
  - (a) “Company” means anybody corporate and includes a firm or other association of individuals
  - (b) “Director”, in relation to a firm, means a partner in the firm.
- **Power to remove difficulties:**
  - (i) If any difficulty arises in giving effect to the Provisions of this Act, the Central Government may, by order published in the Official Gazette, make such provisions, not inconsistent with the provisions of this Act, as appear to it to be necessary or expedient for removing the difficulty: Provided that no such order shall be made after the expiry of the period of three years from the date on which this Act receives the assent of the President.
  - (ii) Every order made under this section shall, as soon as may be after it is made, be laid before each House of Parliament.
- **Power to make rules**
  - (i) The Central Government may, by notification, make rules for carrying out the provisions of this Act.
  - (ii) In particular, and without prejudice to the generality of the foregoing power, such rules may provide for all or any of the following matters, namely:
    - (a) The procedure under sub-section (4) of section 8 for the investigation of misbehavior or incapacity of the Chairperson, the Vice-Chairperson or a Member
    - (b) The salaries and allowances payable to and the other terms and conditions of service of the Chairperson, the Vice-Chairperson and the Members under section 9
    - (c) The form which an appeal shall contain under sub-section (1) of section 11
    - (d) Financial and administrative powers of the Chairperson under section 13
    - (e) The salaries and allowances and conditions of service of the officers and other employees of the Authority
    - (f) Any other matter which is required to be, or may be, prescribed.
  - (iii) Every rule made under this Act shall be laid, as soon as may be after it is made, before each House of Parliament, while it is in session, for a total period of thirty days which may be comprised in one session or in two or more successive sessions, and if, before the expiry of the session immediately following the session or the successive sessions aforesaid, both Houses agree in making any modification in the rule or both Houses agree that the rule should not be made, the rule shall thereafter have effect only in such modified form or be of no effect, as the case may be; so, however, that any such modification or annulment shall be without prejudice to the validity of anything previously done under that rule.
- **Repeal and saving:**
  - (i) The National Environment Appellate Authority Ordinance, 1997 (Ord. 12 of 1997) is hereby repealed.
  - (ii) Notwithstanding such repeal, anything done or any action taken under the said Ordinance shall be deemed to have been done or taken under the corresponding provisions of this Act.

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## **14.5 The Public Liability Insurance Act, 1991**

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An Act to provide for public liability insurance for the purpose of providing immediate relief to the persons affected by accident occurring while handling any hazardous substance and for matters connected therewith or incidental thereto.

BE it enacted by Parliament in the Forty-first Year of The Republic of India as follows:

❖ **Short title and commencement:**

- (1) This Act may be called the Public Liability Insurance Act, 1991.
- (2) It shall come into force on such date<sup>1</sup> as the Central Government may, by notification, appoint.

❖ **Definitions: In this Act, unless the context otherwise requires,—**

- “Accident” means an accident involving a fortuitous or sudden or unintended occurrence while handling any hazardous substance resulting in continuous or intermittent or repeated exposure to death of, or injury to, any person or damage to any property but does not include an accident by reason only of war or radio-activity;]
- “Collector” means the Collector having jurisdiction over the area in which the accident occurs;
- “Handling”, in relation to any hazardous substance, means the manufacture, processing, treatment, package, storage, transportation by vehicle, use, collection, destruction, conversion, offering for sale, transfer or the like of such hazardous substance;
- “Hazardous substance” means any substance or preparation which is defined as hazardous substance under the Environment (Protection) Act, 1986 (29 of 1986), and exceeding such quantity as may be specified, by notification, by the Central Government;
- “Insurance” means insurance against liability under sub-section (1) of section 3;
- “Notification” means a notification published in the official Gazette;
- “Owner” means a person who owns, or has control over handling, any hazardous substance at the time of accident and includes,—
  - (i) in the case of firm, any of its partners;
  - (ii) in the case of an association, any of its members; and
  - (iii) in the case of a company, any of its directors, managers, secretaries or other officers who is directly in charge of, and is responsible to, the company for the conduct of the business of the company;]
- (g) “Prescribed” means prescribed by rules made under this Act;
- (h) “Relief Fund” means the Environmental Relief Fund established under section 7A];
- (j) “rules” means rules made under this Act;
- (k) “Vehicle” means any mode of surface transport other than railways.

❖ **Liability to give relief in certain cases on principle of no fault:**

- (1) Where death or injury to any person (other than a workman) or damage to any property has resulted from an accident, the owner shall be liable to give such relief as is specified in the Schedule for such death, injury or damage.

(2) In any claim for relief under sub-section (1) (hereinafter referred to in this Act as claim for relief), the claimant shall not be required to plead and establish that the death, injury or damage in respect of which the claim has been made was due to any wrongful act, neglect or default of any person.

❖ **Duty of owner to take out insurance policies:**

(1) Every owner shall take out, before he starts handling any hazardous substance, one or more insurance policies providing for contracts of insurance whereby he is insured against liability to give relief under sub-section (1) of section 3 provided that any owner handling any hazardous substance immediately before the commencement of this Act shall take out such insurance policy or policies as soon as may be and in any case within a period of one year from such commencement.

(2) Every owner shall get the insurance policy, referred to in sub-section (1), renewed from time to time before the expiry of the period of validity thereof so that the insurance policies may remain in force throughout the period during which such handling is continued.

1[(2A) No insurance policy taken out or renewed by an owner shall be for an amount less than the amount of the paid-up capital of the undertaking handling any hazardous substance and owned or controlled by that owner, and more than the amount, not exceeding fifty crore rupees, as may be prescribed. Explanation.— For the purposes of this sub-section, “paid-up capital” means, in the case of an owner not being a company, the market value of all assets and stocks of the undertaking on the date of contract of insurance.

(2B) The liability of the insurer under one assurance policy shall not exceed the amount specified in the terms of the contract of insurance in that insurance policy.

(2C) Every owner shall also, together with the amount of premium, pay to the insurer, for being credited to the Relief Fund established under section 7A, such further amount, not exceeding the sum equivalent to the amount of premium, as may be prescribed.

(2D) The insurer shall remit to the authority specified in sub-section (3) of section 7A the amount received from the owner under sub-section (2C) for being credited to the Relief Fund in such manner and within such period as may be prescribed and where the insurer fails to so remit the amount, it shall be recoverable from insurer as arrears of land revenue or of public demand.]

(3) The Central Government may, by notification, exempt from the operation of sub-section (1) any owner, namely:—

- (a) the Central Government;
- (b) any State Government;
- (c) any corporation owned or controlled by the Central Government or a State Government;
- or
- (d) any local authority;

Provided that no such order shall be made in relation to such owner unless a fund has been established and is maintained by that owner in accordance with the rules made in this behalf for meeting any liability under sub-section (1) of section 3.

**Verification and publication of accident by Collector:** Whenever it comes to the notice of the Collector that an accident has occurred at any place within his jurisdiction, he shall verify the occurrence of such accident and cause publicity to be given in such manner as he deems fit for inviting applications under sub-section

(1) of section 6.

❖ **Application for claim for relief:**

(1) An application for claim for relief may be made—

(a) by the person who has sustained the injury;

(b) by the owner of the property to which the damage has been caused;

(c) where death has resulted from the accident, by all or any of the legal representatives of the deceased; or

(d) by any agent duly authorized by such person or owner of such property or all or any of the legal representatives of the deceased, as the case may be:

Provided that where all the legal representatives of the deceased have not joined in any such application for relief, the application shall be made on behalf of or for the benefit of all the legal representatives of the deceased and the legal representatives who have not so joined shall be impleaded as respondents to the application.

(2) Every application under sub-section (1) shall be made to the Collector and shall be in such form, contain such particulars and shall be accompanied by such documents as may be prescribed.

(3) No application for relief shall be entertained unless it is made within five years of the occurrence of the accident.

❖ **Award of relief:**

(1) On receipt of an application under sub-section (1) of section 6, the Collector shall, after giving notice of the application to the owner and after giving the parties an opportunity of being heard, hold an inquiry into the claim or, each of the claims, and may make an award determining the amount of relief which appears to him to be just and specifying the person or persons to whom such amount of relief shall be paid.

(2) The Collector shall arrange to deliver copies of the award to the parties concerned expeditiously and in any case within a period of fifteen days from the date of the award.

(3) When an award is made under this section,—

- (a) the insurer, who is required to pay any amount in terms of such award and to the extent specified in sub-section (2B) of section 4, shall, within a period of thirty days of the date of announcement of the award, deposit that amount in such manner as the Collector may direct;
- (b) the Collector shall arrange to pay from the Relief Fund, in terms of such award and in accordance with the scheme made under section 7A, to the person or persons referred to in sub-section (1) such amount as may be specified in that scheme;
- (c) the owner shall, within such period, deposit such amount in such manner as the Collector may direct.
- (4) In holding any inquiry under sub-section (1), the Collector may, subject to any rules made in this behalf, follow such summary procedure as he thinks fit.
- (5) The Collector shall have all the powers of Civil Court for the purpose of taking evidence on oath and of enforcing the attendance of witnesses and of compelling the discovery and production of documents and material objects and for such other purposes as may be prescribed; and the Collector shall be deemed to be a Civil Court for all the purposes of section 195 and Chapter XXVI of the Code of Criminal Procedure, 1973 (2 of 1974).
- (6) Where the insurer or the owner against whom the award is made under sub-section (1) fails to deposit the amount of such award within the period specified under sub-section (3), such amount shall be recoverable from the owner, or as the case may be, the insurer as arrears of land revenue or of public demand.
- (7) A claim for relief in respect of death of, or injury to, any person or damage to any property shall be disposed of as expeditiously as possible and every endeavor shall be made to dispose of such claim within three months of the receipt of the application for relief under sub-section (1) of section 6.
- 1[(8) Where an owner is likely to remove or dispose of his property with the object of evading payment by him of any amount of award, the Collector may, in accordance with the provisions of rules 1 to 4 of Order XXXIX of the First Schedule to the Code of Civil Procedure, 1908 (5 of 1908), grant a temporary injunction to restrain such act.]

### ❖ **Establishment of Environmental Relief Fund:**

- (1) The Central Government may, by notification, establish a fund to be known as the Environmental Relief Fund.
- (2) The Relief Fund shall be utilised for paying, in accordance with the provisions of this Act and the scheme made under sub-section (3), relief under the award made by the Collector under section 7.
- (3) The Central Government may, by notification, make a scheme specifying the authority in which the Relief Fund shall vest, the manner in which the Relief Fund shall be administered, the form and the manner in which money shall be drawn from the Relief Fund and for all other

matters connected with or incidental to the administration of the Relief Fund and the payment of relief therefrom.]

❖ **Provisions as to other right to claim compensation for death, etc:**

(i) The right to claim relief under sub-section (1) of section 3 in respect of death of, or injury to, any person or damage to any property shall be in addition to any other right to claim compensation in respect thereof under any other law for the time being in force.

(ii) Notwithstanding anything contained in sub-section (1), where in respect of death of, or injury to, any person or damage to any property, the owner, liable to give claim for relief, is also liable to pay compensation under any other law, the amount of such compensation shall be reduced by the amount of relief paid under this Act.

❖ **Power to call for information:** Any person authorized by the Central Government may, for the purposes of ascertaining whether any requirements of this Act or of any rule or of any direction given under this Act have been complied with, require any owner to submit to that person such information as that person may reasonably think necessary.

❖ **Power of entry and inspection:** Any person, authorized by the Central Government in this behalf, shall have a right to enter, at all reasonable times with such assistance as he considers necessary, any place, premises or vehicle, where hazardous substance is handled for the purpose of determining whether any provisions of this Act or of any rule or of any direction given under this Act is being or has been complied with and such owner is bound to render all assistance to such person.

**Power of search and seizure:**

(1) If a person, authorized by the Central Government in this behalf, has reason to believe that handling of any hazardous substance is taking place in any place, premises or vehicle, in contravention of sub-section (1) of section 4, he may enter into and search such place, premises or vehicle for such handling of hazardous substance.

(2) Where, as a result of any search under sub-section (1) any handling of hazardous substance has been found in relation to which contravention of sub-section (1) of section 4 has taken place, he may seize such hazardous substance and other things which, in his opinion, will be useful for, or relevant to, any proceeding under this Act:

Provided that where it is not practicable to seize any such substance or thing, he may serve on the owner an order that the owner shall not remove, part with, or otherwise deal with, the hazardous substance and such other things except with the previous permission of that person.

(3) He may, if he has reason to believe that it is expedient so to do to prevent an accident dispose of the hazardous substance seized under sub-section (2) immediately in such manner as he may deem fit.

(4) All expenses incurred by him in the disposal of hazardous substances under sub-section (3) shall be recoverable from the owner as arrears of land revenue or of public demand.

Power to give directions: Notwithstanding anything contained in any other law but subject to the provisions of this Act, the Central Government may, in exercise of its powers and performance of its functions under this Act, issue such directions in writing as it may deem fit for the purposes of this Act to any owner or any person, officer, authority or agency and such owner, person, officer, authority or agency shall be bound to comply with such directions.

For the removal of doubts, it is hereby declared that the power to issue directions under this section includes the power to direct—

- (a) Prohibition or regulation of the handling of any hazardous substance; or
- (b) Stoppage or regulation of the supply of electricity, water or any other service.

**Power to make application to Courts for restraining owner from handling hazardous substances:**

(1) If the Central Government or any person authorized by that Government in this behalf has reason to believe that any owner has been handling any hazardous substance in contravention of any of the provisions of this Act, that Government or, as the case may be, that person may make an application to a Court, not inferior to that of a Metropolitan Magistrate or a Judicial Magistrate first class for restraining such owner from such handling.

(2) On receipt of the application under sub-section (1), the Court may make such order as it deems fit.

(3) Where under sub-section (2), the Court makes an order restraining any owner from handling hazardous substance, it may, in that order—

- (a) direct such owner to desist from such handling;
- (b) authorize the Central Government or, as the case may be, the person referred to in sub-section(1), if the direction under clause (a) is not complied with by the owner to whom such direction is issued, to implement the direction in such manner as may be specified by the Court.

(4) All expenses incurred by the Central Government, or as the case may be, the person in implementing the directions of Court under clause (b) of sub-section (3), shall be recoverable from the owner as arrears of land revenue or of public demand.

**Penalty for contravention of sub-section (1) or sub-section (2) of section 4 or failure to comply with directions under section 12:**

- (1) Whoever contravenes any of the provisions of 1[sub- section (1) or sub-section (2) or sub-section (2A) or sub-section (2C)] of section 4 or fails to comply with any direction issued under section 12, he shall be punishable with imprisonment for a term which shall not be less than one year and six months but which may extend to six years, or with fine which shall not be less than one lakh rupees, or with both.

(2) Whoever, having already been convicted of an offence under sub-section (1), is convicted for the second offence or any offence subsequent to the second offence, he shall be punishable with imprisonment for a term which shall not be less than two years but which may extend to seven years and with fine which shall not be less than one lakh rupees.

(3) Nothing contained in section 360 of the Code of Criminal Procedure, 1973 (2 of 1974), or in the Probation of Offenders Act, 1958 (20 of 1958), shall apply to a person convicted of an offence under this Act unless such person is under eighteen years of age.

❖ Penalty for failure to comply with direction under section 9 or order under section 11 or obstructing any person in discharge of his functions under section 10 or 11:

If any owner fails to comply with direction issued under section 9 or fails to comply with order issued under sub-section (2) of section 11, or obstructs any person in discharge of his functions under section 10 or sub-section (1) or sub-section (3) of section 11, he shall be punishable with imprisonment which may extend to three months, or with fine which may extend to ten thousand rupees, or with both.

❖ **Offences by companies:**

(i) Where any offence under this Act has been committed by a company, every person who, at the time the offence was committed, was directly in charge of, and was responsible to, the company for the conduct of the business of the company, as well as the company, shall be deemed to be guilty of the offence and shall be liable to be proceeded against and punished accordingly:

Provided that nothing contained in this sub-section shall render any such person liable to any punishment provided in this Act, if he proves that the offence was committed without his knowledge or that he exercised all due diligence to prevent the commission of such offence.

(ii) Notwithstanding anything contained in sub-section (1), where an offence under this Act has been committed by a company and it is proved that the offence has been committed with the consent or connivance of, or is attributable to any neglect on the part of, any director, manager, secretary or other officer of the company, such director, manager, secretary or other officer shall also be deemed to be guilty of that offence and shall be liable to be proceeded against and punished accordingly.

For the purposes of this section,—

(a) “Company” means anybody corporate and includes a firm or other association of individuals;

(b) “Director,” in relation to a firm, means a partner in the firm.

□ **Offences by Government Departments.**—Where an offence under this Act has been committed by any Department of Government, the Head of the Department shall be deemed to be guilty of the offence and shall be liable to be proceeded against and punished accordingly:

Provided that nothing contained in this section shall render such Head of the Department liable to any punishment if he proves that the offence was committed without his knowledge or that he exercised all due diligence to prevent the commission of such offence.

□ **Cognizance of offences.**—No court shall take cognizance of any offence under this Act except on a complaint made by—

(a) The Central Government or any authority or officer authorized in this behalf by that Government; or

(b) Any person who has given notice of not less than sixty days in the manner prescribed, of the alleged offence and of his intention to make a complaint, to the Central Government or the authority or officer authorized as aforesaid.

□ **Power to delegate:** The Central Government may, by notification, delegate, subject to such conditions and limitations as may be specified in the notification, such of its powers and functions under this Act (except the power under section 23) as it may deem necessary or expedient to any person (including any officer, authority or other agency).

□ **Protection of action taken in good faith.**—No suit, prosecution or other legal proceeding shall lie against the Government or the person, officer, authority or other agency in respect of anything which is done or intended to be done in good faith in pursuance of this Act or the rules made or orders or directions issued thereunder.

□ **Advisory Committee:**

(1) The Central Government may, from time to time, constitute an Advisory Committee on the matters relating to the insurance policy under this Act.

(2) The Advisory Committee shall consist of—

(a) Three officers representing the Central Government;

(b) Two persons representing the insurers;

(c) Two persons representing the owners; and

(d) Two persons from amongst the experts of insurance or hazardous substances. to be appointed by the Central Government.

(3) The Chairman of the Advisory Committee shall be one of the members representing the Central Government, nominated in this behalf by that Government.

(4) Effect of other laws: The provisions of this Act and any rules made thereunder shall have effect notwithstanding anything inconsistent therewith contained in any other law.

□ **Power to make rules:**

(1) The Central Government may, by notification, make rules for carrying out the purposes of this Act.

- (2) In particular, and without prejudice to the generality of the foregoing power, such rules may provide for all or any of the following matters, namely—
- a. The maximum amount for which an insurance policy may be taken out by an owner under sub-section (2A) of section 4;
  - (i) The amount required to be paid by every owner for being credited to the Relief Fund under sub-section (2C) of section 4;
  - (ii) The manner in which and the period within which the amount received from the owner is required to be remitted by the insurer under sub-section (2D) of section 4];
  - (iii) Establishment and maintenance of fund under sub-section (3) of section 4;
- (3) The form of application and the particulars to be given therein and the documents to accompany such application under sub-section (2) of section 6;
- (4) The procedure for holding an inquiry under sub-section (4) of section 7;
- (5) The purposes for which the Collector shall have powers of a Civil Court under sub-section (5) of section 7;
- (6) The manner in which notice of the offence and of the intention to make a complaint to the Central Government shall be given under clause (b) of section 18;
- (7) Any other matter which is required to be, or may be, prescribed.

Every 3[rule or scheme] made under this Act shall be laid, as soon as may be after it is made, before each House of Parliament, while it is in session for a total period of thirty days which may be comprised in one session or in two or more successive sessions, and if, before the expiry of the session immediately following the session or the successive sessions aforesaid, both Houses agree in making any modification in the 3[rule or scheme] or both Houses agree that the 3[rule or scheme] should not be made, the 3[rule or scheme] shall thereafter have effect only in such modified form or be of no effect, as the case may be; so, however, that any such modification or annulment shall be without prejudice to the validity of anything previously done under that 3[rule or scheme].

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## **14.6 The National Environment Tribunal Act, 1995**

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The objective of the NGT Act is to provide effective and expeditious disposal of cases relating to the protection of the environment including the enforcement of any legal right relating to the environment. The Tribunal is a multi-disciplinary body, with judicial and non-judicial/expert members, which hears and decides cases before it. The need to set up special environmental courts, such as the National Green Tribunal, was highlighted by the Supreme Court of India in a series of cases, 1 and by the Law Commission of India in its 186th report in 2003. The Court was of the opinion that environmental cases raised issues which required technical knowledge and expertise, speedy disposal, and continuous monitoring, and therefore they should be adjudicated upon by dedicated courts with adequate expertise and technical

assistance. The National Environmental Tribunal Act 1995 was passed by the Parliament but never implemented. Subsequently, the National Environment Appellate Authority Act 1997 was enacted under which the National Environment Appellate Authority was set up in 1997. There were several problems in the functioning of this Authority; including its limited mandate (only persons wishing to challenge environmental clearances could approach the Authority). When the National Green Tribunal was set up in 2010, it replaced the Authority. The Tribunal can be approached with cases pertaining to any of the following seven environmental laws: The Water (Prevention and Control of Pollution) Act, 1974 [Water Act], The Water (Prevention and Control of Pollution) Cess Act, 1977, The Forest (Conservation) Act, 1980, The Air (Prevention and Control of Pollution) Act, 1981 [Air Act], The Environment (Protection) Act, 1986, The Public Liability Insurance Act, 1991 and The Biological Diversity Act, 2002

According to the NGT Act, an aggrieved person can file a case before the Tribunal – could be an individual, a company, a firm, an association of person (like a NGO) - even if not registered or incorporated, a trustee, a local authority (like a municipal corporation), a government body (like the SPCB) etc. The person need not be directly affected by the project or development in question, but could be any person who is interested in protecting and preserving the environment.

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### **14.7 The Mines and Minerals Act, 1957**

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The Mines and Minerals Development and Regulation Act, 1957, ('MMDR') and the Mines Act, 1952, organized with the rules and regulations framed under them, establish the basic laws governing mineral and mining sector in India. MMDR Act-1957 applied to all minerals except petroleum. The MMDR Act was revised on numerous occasions to deliver a fair concession regime to invite private sector investments into exploration and mining sector. Government control over mining was further expended by amending the MMDR Act in 1972. In 1986 more stringent amendments were made by increasing the First Schedule minerals from 27 to 38 and also making mining plan approval compulsory. MMDR Amendment Act, 2015, substituted the first-come-first served/discretionary process for grant of mineral resources by a transparent and competitive auction process. The most recent amendment in the MMDR Act was carried out by the Mineral Laws (Amendment) Act, 2020 to ease out business and opening commercial mining and allowing domestic as well as global investors to invest. Important mining regulations enacted by the Government of India as summarized in Table 1.

**Table 1 List of important mining regulations in India**

<b>ACT</b>	<b>Mining Regulation</b>	<b>Basic Provision</b>
	Mineral Concession Rules (MCR), 1960	Defines the process and timelines of the grant of mineral concessions as per the provisions of Section 13 of The MMDR Act, 1957.

Mineral and Mining (Regulation and Development Act, 1957	Prescribes guidelines for the conservation and Mineral development of minerals as per the provisions of Section Conservation and Development Rules (MCDR), 2017 18 of the MMDR Act, 1957. The rules cover procedures for carrying out prospecting and mining operations. It covers requirement related to the preparation of mining and prospecting plans, filing of notices and returns, and guidelines for the protection of the environment.	
	State Minor Mineral Concession Rules	Various State Governments have prescribed rules for the grant of mineral concessions with respect to minerals Classified as minor minerals under the MMDR Act, 1957.
Mines Act, 1952	Mines Rules, 1955 Indian Coal Mines Regulation, 1957 Indian Metalliferous	Prescribes the laws related to the regulation of health, sanitation safety and welfare for miners and their families. Regulations for carrying out mining operations, management and inspection of mines and procedure of reporting to be followed are part of this.
	Mines Regulation, 1957 Oil Mines Regulations, 1963	
Coal Mines (Conservation and Safety) Act, 1952	Coal Mines (Conservation & Safety) Rules, 1952	The main function is to look after the stowing needs of mines in the interest of conservation.
Atomic Energy Act, 1962		It provides wide powers to Central Government for the regulation of prospecting and mining of minerals used in the production of atomic energy.
Oil Field (Regulation and Development) Act, 1948	Petroleum Concession Rules 1949	It deals with the procedure and rules regarding grant of exploration license and mining lease.

Offshore Areas Mineral (Development and Regulation) Act, 2002	Offshore Areas Mineral Concession Rules, 2006	Provides for the development and regulation of mineral resources in the territorial sea, continental shelf, EEZ, and other maritime zones of India.
Mineral Laws (Amendment) Act, 2020		The amendment is carried out to take forward the agenda of ease of doing business & opening in the mining sector and allowing domestic as well as global investors to invest.

❖ **Mineral Concession System**

In the above section we have read about important mining regulations in India. Now, let us discuss the mineral concession system of India. In the national structure of India, the State Governments are the owner of the minerals located within the boundaries of the State concerned. As per Article 297 of the Constitution of India, the Central Government is the owner of the minerals underlying the ocean within the territorial waters or the Exclusive Economic Zone of India. The State Governments grant the mineral concessions for all the minerals located within the boundary of the State under the provisions of the Mines and Minerals (Development and Regulation) Act, 1957 (MMDR) and Mineral Concession Rules, 1960 (MCR). Prior approval of the Central Government however is required in some cases.

There are three kinds of mineral concessions:

- Reconnaissance Permit,
- Prospecting License, and
- Mining Lease.

**(i) Reconnaissance Permit (RP):** This permit is approved for preliminary prospecting of a mineral through regional, aerial, geochemical or geophysical surveys and geological mapping. The reconnaissance permit for any mineral or related minerals is granted for 3 years and a maximum area of 5,000 sq. km, to be abandoned progressively. After 2 years, the area should be reduced to 1,000 sq. km or 50% of the area granted, whichever is less. At the end of third year, the area held under a reconnaissance permit should be reduced to 25 sq km. A reconnaissance permit holder must have a preferential right to obtain PL(s) in the area concerned.

**(ii) Prospecting License (PL):** This permit is granted to undertake exploration operations to locate and to prove mineral deposits. A PL for any mineral or associated minerals is granted for a maximum period of 3 years. A PL can be renewed for the total period for which a PL is granted that does not exceed 5 years. In a State, a person can be granted a maximum area of 25 sq. km in one or more PL’s. But if the Central Government believes that in the interest of the development of any mineral it is necessary to do so, the maximum area limit can be relaxed.

**(iii) Mining Lease (ML):** This lease is granted to undertake mineral winning operations of minerals. A ML for any mineral or associated minerals is granted for a minimum period of 20 years and a maximum period of 30 years. The ML can be renewed for a period not exceeding 20 years each. In a State, a person can be granted a maximum area of 10 sq. km in one or more MLs. But if the Central Government believes that in the interest of the development of any mineral it is necessary to do so, the maximum area limit can be relaxed.

The Mineral Concession Rules, 1960 outline the procedures and conditions to obtain a Prospecting License or Mining Lease. The Mineral Conservation and Development Rules, 2017 lays down guidelines to ensure mining on a scientific basis, whereas at the same time, conserving the environment. The provisions of MCR and MCDR, but are not applicable to coal, atomic minerals and minor minerals. The minor minerals that come under the purview of the State Governments are separately notified. In the next section, we will discuss in detail the Mineral Conservation and Development Rules.

#### ❖ **Mineral Conservation and Development Rules- 2017**

The Mineral Conservation and Development Rules (MCDR) were enforced for the first time in 1955 to lay adequate emphasis on the systematic development of mines, leading to the conservation of mineral resources. These rules derive power from the MMRD Act 1948. Later with the adoption of MMRD Act 1957, the MCDR were also changed and modified to MCDR 1958. The MCDR apply to all minerals except for (i) petroleum and natural gas; (ii) coal, lignite and sand for stowing; and (iii) minor minerals. The MCDR-1958 was repealed in 1988 and was replaced by MCDR-1988. Further, in supersession of the Mineral Conservation and Development Rules, 1988, the Central Government replaced it with the Mineral Conservation and Development Rules, 2017 by exercising the powers conferred to section 18 of the MMRD Act, 1957. As discussed in previous sections, the Mineral Conservation and Development Rules (MCDR) provide guidelines to ensure mining operation including mine closer on a scientific basis. The rules also define sustainable mining. The MCDR-2017 defines various rules divided into 12 chapters. The rules, concerning with the Reconnaissance and Prospecting Operations having 6 rules regarding the scheme of Reconnaissance or Prospecting Operations, its inspection by the competent authority and reports to be submitted by PL holder.

#### ❖ **Rules for Mining Operations:**

Rules for Mining Operations of MCDR-2017 comprises of 21 rules related to Mining plan, operations in Open Cast mines, Underground mining operations, stacking of different grade of ores/non-salable minerals, beneficiation studies, maintenance of records for machinery and plants, opening and closure plans of mines, abandonment of mines, responsibilities of Mining Leaseholder etc. Type of plans and sections and their preparation details defined in the rules are also given in MCDR-2017. While conducting prospecting, mining, beneficiation or metallurgical operations in the area, every holder of a mining lease is bound to take all possible precautions to undertake sustainable mining. The other environmental aspects of mining and related operations are also covered under these rules.

Every RP/PL/ML holder is bound to the MCDR-2017 to appoint geologists and mining engineers (whole time/part-time depending on the type of lease and type of mines) for scientific operations.

For these rules, the mines are divided into two types as “Category – A” mines and “Category-B” mines.

- The category 'A' mines: These mines are fully mechanized. The work is being carried out for deep whole drilling, excavation, loading and transport. by deployment of heavy mining machinery.
- Category 'B' mines mean mines other than category 'A' mines.

Overall the Mines and Minerals (Regulation and Development) Act (1957) is an Act of the Parliament of India enacted to regulate the mining sector in India. It was amended in 2015 and 2016. This act forms the basic framework of mining regulation in India.

This act is applicable to all mineral except minor minerals and atomic minerals. It details the process and conditions for acquiring a mining or prospecting license in India. Mining minor minerals comes under the purview of state governments. River sand is considered a minor mineral. For mining and prospecting in forest land, prior permission is needed from the Ministry of Environment and Forests.

Rules regarding all other aspects of the mining operations such as submission of annual and monthly returns, examination of mineral deposits and sampling, preservation of cores, geological reports, revision, penalties and maintenance of mining regulation portal etc. are also defined in the Mineral Conservation and Development Rules – 2017.

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