

BEVAE-181

## ABILITY ENHANCEMENT COMPULSORY COURSE ON ENVIRONMENTAL STUDIES

Block

# 4

## PROTECTING OUR ENVIRONMENT: POLICIES AND PRACTICES

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## **BLOCK 4: INTRODUCTION**

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In **Block 1**, Unit 1 introduces concept of environment and environmental studies. Unit 2 discusses about the concept of ecosystem and Unit 3 describes about major ecosystem. In Block 2, we discussed in detail about the importance of various natural resources, their uses in development and the effect of developmental activities on the environment. In Block 3, we discussed in detail about the various environmental issues and concerns such as loss of biodiversity, environmental hazards, pollution, waste management and some global environmental problems namely global warming, climate change, ozone layer depletion and acid rain.

In this block we will discuss about various policies and programmes initiated to tackle emerging environmental issues and concerns. This block has three units.

**Unit 12 Environmental Laws:** In order to protect human kind and other living beings from environmental problems, and to curtail the activities affecting the environment negatively, numerous agreements have been signed among the countries, and legislations have been enacted at national level. This unit will discuss some important environmental legislation. The coverage includes Indian legislations called Acts, and international legislations in the form of Conventions, Protocols and Treaties. The success of environmental legislations mainly depends on the way these are enforced. One section of this unit is, therefore, devoted to issues involved in enforcement of environmental legislations. At the end, contribution of people through PIL (Public Interest Litigation) and India's institutional arrangements for monitoring and enforcement have also been discussed.

**Unit 13 Human Communities and Environment:** In this Unit you will learn how over exploitation of natural resources has led to environmental degradation and indiscriminate industrialisation has led to deforestation and related problems of natural calamities, resettlement and rehabilitation. You will also be able to learn the Issues related to disaster management.

**Unit 14 Environmental Ethics:** This unit reviews the environmental ethics, our view and beliefs about nature and environment, issues of environmental equity, environmental crisis, environmental justice and racial discrimination at the policy and public level in managing the environment. This unit also discusses teachings about environment in the major religions practiced all over the world.

# UNIT 12

## ENVIRONMENTAL LEGISLATION

### Structure

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### 12.1 INTRODUCTION

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In this course so far we have covered many environmental issues such as depletion of natural resources, degradation of land, pollution of water and air, impacts of agricultural practices, industrialization, urbanisation and some aspects of environmental management such as sustainable development, and conservation of natural and biological resources. We have also talked about the concept of environmental quality and environmental standards, which needs to be maintained.

As human civilisation progressed, man started altering the natural environment in the pursuit of creating an economic, social and cultural environment of his own choice. This slowly resulted in the depletion of natural resources and degradation of environment. Further, with increased human population, rapid industrialisation and urbanization, and developmental projects have placed a lot of strain on natural resources. Now situation is deteriorating so fast that environmental problems are posing threats to human health and to his very existence. In order to protect human kind and other living beings from environmental problems, and to curtail the activities affecting the environment negatively, numerous agreements have been signed among the countries, and legislations have been enacted at national level. In this unit, we will discuss some important environmental legislations. The coverage includes Indian legislations called Acts, and international legislations in the form of conventions, protocols and treaties.

The success of environmental legislations mainly depends on the way these are enforced. One section of this unit is, therefore, devoted to issues involved in enforcement of environmental legislations. At the end, contribution of people through PIL (Public Interest Litigation) and India's institutional arrangements for monitoring and enforcement have also been discussed.

## Expected Learning Outcomes

After completing the study of this unit you should be able to:

- ❖ state various Acts enacted for the protection of environment at national level;
- ❖ describe various conventions and protocols framed for global environmental issues;
- ❖ explain the difficulties in the enforcement of the environmental legislations; and
- ❖ analyse the contributions of public interest litigation, Ministry of Environment, Forest and climate change, and CPCB in protection of environment.

## 12.2 CURRENT STATUS

In recent past, numerous environmental problems have become critically significant for mankind. These include air, water and land pollution, spread of toxic wastes, deforestation, mass extinction of wild life, problem of human settlement, climate change depletion of ozone layer and over exploitation of natural resources. An important aspect of environmental problems is that these have international repercussions, i.e. their impact is not confined to their source area alone but spills over far and wide. Pollution does not observe political territories and legislative jurisdictions. Thus, environmental problems are intrinsically global in nature. Therefore, to fight with the environmental problems we need not only legislation at national level but also mutually beneficial agreements at international level.

### 12.2.1 National Legislations

At national level a serious effort have been made for the improvement and protection of environment by an amendment to the Constitution of India. Our Constitution, originally, did not contain any direct provision regarding the protection of natural environment. However, after the United Nations Conference on Human Environment at Stockholm, the Constitution of India was amended, to include protection of the environment as a constitutional mandate. The constitution (Forty-Second Amendment) Act, 1976 has made it fundamental duty to protect and improve the natural environment by Clause (g) to Article 51A:

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

There is a directive, given to the State as one of the Directive Principles of State Policy regarding the protection and improvement of the environment. Article 48A states “The State shall endeavour to protect and improve the environment and to safeguard the forests and wildlife of the country”. The Department of Environment was established in India in 1980 to ensure a healthy environment for the country. This later became the Ministry of Environment and Forests in 1985, which was renamed as Ministry of Environment, Forest and Climate Change in May, 2014. This Ministry has the overall responsibility for administering and enforcing environmental legislations and policies.

The constitutional provisions are backed by a number of legislations – Acts and rules. Much of our environmental legislations are enacted as Acts by the Parliament or the State Legislatures. These Acts generally delegate powers to regulation agencies, to make rules for the purpose of their implementation.

Existing Indian environmental legislations can be grouped in following four categories:

- a) Water Acts
- b) Air Acts
- c) Forest and Wildlife Acts
- d) General Acts

To provide an overview of environmental legislations, a few important legislations of each category with brief description are given below:

#### **a) Water Acts**

To provide legislative support for prevention of water pollution, Parliament passed the Water (Protection and Control of Pollution) Act, 1974. The main objective of this Act is to prevent and control water pollution. Some important provision of the Water Act, 1974 and Amendment, 1988 are given below:

#### ***The Water (Prevention and Control of Pollution) Act of 1974 and Amendment, 1988***

- The Act vests regulatory authority in state boards and empowers these boards to establish and enforce effluent standards for factories discharging pollutants into bodies of water. A Central Board performs the same functions for union territories and coordinates activities among the states.
- The boards control sewage and industrial effluent discharges by approving, rejecting or conditioning applications for consent to discharge.
- The state boards also minimise water pollution by advising state governments on appropriate sites for new industry.
- Act granted power to the Board to ensure compliance with the Act by including the power of entry for examination, testing of equipment and other purposes and power to take the sample for the purpose of analysis of water from any stream or well or sample of any sewage or trade effluents.

- The 1988 amendment strengthened the Act's implementation provisions. Now, a board may close a defaulting industrial plant or withdraw its supply of power or water by an administrative order; the penalties are more stringent, and a citizen's suit provision supports the enforcement machinery.

### ***The Water (Prevention and Control of Pollution) Cess Act of 1977***

The Act creates economic incentives for pollution control and requires local authorities and certain designated industries to pay a cess (tax) for water consumption. These revenues are used to implement the Water Act.

#### **b) Air Acts**

To provide legislative support for prevention and control of air pollution, the Government of India enacted a central legislation called the Air (Prevention and Control of Pollution) Act, 1981 referred to as Air Act, 1981. The act aims at prevention, control and reduction of air pollution. Some details of the Air Act, 1981 and Amendment, 1987 is given below.

#### ***The Air (Prevention and Control of Pollution) Act of 1981 and Amendment, 1987***

- To enable an integrated approach to environmental problems, the Air Act expanded the authority of the central and state boards established under the Water Act, to include air pollution control.
- States not having water pollution boards were required to set up air pollution boards.
- Under the Air Act, all industries operating within designated air pollution control areas must obtain a "consent" (permit) from the State Boards.
- The states are required to prescribe emission standards for industry and automobiles after consulting the Central Board and noting its ambient air quality standards.
- Act granted power to the Board to ensure compliance with the Act include the power of entry for examination, testing of equipment and other purposes and power to take the sample for the purpose of analysis of air or emission from any chimney, fly ash or dust or any other outlet in such manner as may be prescribed.
- The 1987 Amendment strengthened the enforcement machinery and introduced stiffer penalties. Now, the boards may close down a defaulting industrial plant or may stop its supply of electricity or water. A board may also apply to court to restrain emissions that exceed prescribed limits. Notably, the 1987 Amendment introduced a citizens suit provision into the Air Act and extended the Act to include noise pollution.

#### **c) Forest and Wild Life Acts**

India is one of the few countries, which had a forest policy since 1894. To protect forest and wild life following legislations have been enacted.

***The Wild Life (Protection) Act 1972 and Amendment, 1982***

In 1972, Parliament enacted the Wild Life (Protection) Act. The Wild Life Act provides for state wildlife advisory boards, regulations for hunting wild animals and birds, establishment of sanctuaries and national parks, regulations for trade in wild animals, animal products and trophies, and judicially imposed penalties for violating the Act. Harming endangered species listed in Schedule 1 of the Act is prohibited throughout India. Hunting species, like those requiring special protection (Schedule II), big game (Schedule III), and small game (Schedule IV), is regulated through licensing. A few species classified as vermin (Schedule V), may be hunted without restrictions. Wildlife wardens and their staff administer the act.

An amendment to the Act in 1982, introduced a provision permitting the capture and transportation of wild animals for the scientific management of animal population.

India is a signatory to the Convention of International Trade in Endangered Species of Fauna and Flora (CITES, 1976). Under this, export or import of endangered species and their products are governed by the conditions and stipulations laid down therein. Indian government has also started some conservation projects for individual endangered species like Hangul launched in (1970), Lion (1972), Tiger (1973), Crocodiles (1974), and Brown-antlered Deer (1981), and Elephant (1991-92).

***The Forest (Conservation) Act of 1980***

First Forest Act was enacted in 1927. This is one of the many surviving colonial legislations. It was enacted to consolidate the law related to forest, the transit of forest produce and the duty payable on timber and other forest produce. Subsequently, the Forest (Conservation) Act was promulgated in 1980 to make certain reforms over the preceding Act of 1927.

The 1927 Act deals with the four categories of the forests, namely reserved forests, village forests, protected forests and private forests. A state may declare forestlands or waste lands as reserved forest and may sell the produce from these forests. Any unauthorized felling of trees quarrying, grazing and hunting in reserved forests is punishable with a fine or imprisonment, or both. Reserved forests assigned to a village Community is called village forests. The state governments are empowered to designate protected forests and may prohibit the felling of trees, quarrying and the removal of forest produce from these forests. Forest officers and their staff administer the Forest Act.

Alarmed at India's rapid deforestation and resulting environmental degradation, Centre Government enacted the Forest (Conservation) Act in 1980. Under the provisions of this Act, prior approval of the central Government is required for diversion of forestlands for non-forest purposes. An Advisory Committee constituted under the Act advises the Centre on these approvals.

***Biodiversity Act, 2000***

India is one of the twelve mega-biodiversity countries of the world and became a party to the International Convention on Biological Diversity in 1994. The

objectives of the convention are: the conservation of Biological Diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources. To achieve these goals, Biodiversity Bill 2000 was introduced in Parliament in May, 2000. This was finally passed only in December 2002. This bill seeks to check bio-piracy, protect biological diversity and local growers through a three-tier structure of central and state boards and local committees. These will regulate access to plant and animal genetic resources and share the benefits. The Nation Biodiversity Authority (NBA) set up under the Act, deals with all cases of access by foreigners. Its approval will be required before obtaining any intellectual property right on an invention based on a biological resource from India, or on its traditional knowledge. It will oppose such rights given in other countries. The NBA enjoys the power of a civil court. In addition, centre may issue directives to state if it feels a naturally rich area is threatened by overuse, abuse or neglect.

#### d) General Acts

The most important legislation in this category is The Environment (Protection) Act of 1986. Through this Act Central Government gets full power for the purpose of protecting and improving the quality of the environment and preventing, controlling and abating pollution. Details of this Act are given below.

#### ***The Environment (Protection) Act of 1986***

In the wake of the Bhopal tragedy, the Government of India enacted the Environment (Protection) Act of 1986. The Act is an "umbrella" legislations designed to provide a framework for Central Government Coordination of the activity of various central and state authorities established under previous Acts, such as the Water Act and the Air Act.

In this Act, main emphasis is given to "Environment" defined to include water, air and land and the inter-relationships which exist among water, air and land and human beings and other living creatures, plants, micro-organisms and property. "Environmental pollution" is the presence of pollutant, defined as any solid, liquid, or gas substance present in such a concentration as may be or may tend to be, injurious to the environment.

"Hazardous substances" include any substance or preparation, which may cause harm to human beings, other living creatures, plants, microorganisms' property or the environment. The main provisions of this Act are given below:

- Section 3 (1) of the Act empowers the centre to take all such measures as it deems necessary for the purpose of protecting and improving the quality of the environment and preventing, controlling and abating environmental pollution". Specifically, the Central Government is authorized to set new national standards for the quality of the environment (ambient standards) as well as standards for controlling emissions and effluent discharges; to regulate industrial locations, to prescribe procedures for managing hazardous substances; to establish safeguards preventing accidents, and to collect and dismantle information regarding environmental pollution.

- By virtue of this Act, Central Government has armed itself with considerable powers which include, coordination of action by State, planning and execution of nation wide programmes, laying down environmental quality standards, specially those governing emission or discharge of environmental pollutants, placing restriction on the location of industries and so on.
- The powers claimed are indeed comprehensive, the coverage includes handling of hazardous substances, prevention of environmental accidents, inspection of polluting units, research, establishment of laboratories, dissemination of information, etc.
- The Environment (Protection) Act was the first environmental legislation to give the Central Government authority to issue direct orders, included orders to close, prohibit or regulate any industry, operation or process or to stop or regulate the supply of electricity, water or any other service. Other power granted to the Central Government was to ensure compliance with the Act included the power of entry for examination, testing of equipment and other purposes and power to analyse the sample of air, water, soil or any other substance from any place.
- The Act explicitly prohibits discharges of environmental pollutants in excess of prescribed regulatory standards. There is also a specific prohibition against handling hazardous substances except in compliance with regulatory procedures and standards. Persons responsible for discharges of pollutants in excess of prescribed standards must prevent or mitigate the pollution and must also report the governmental authorities.
- The Act provides provision for penalties in the form of a fine or imprisonment or both.
- The Act provides that any person, in addition to authorized government officials, may file a complaint with a court alleging an offence under the Act.

#### *National Environmental Tribunal Act of 1995*

This act was passed by the Indian Parliament as a consequence of the Rio de Janeiro Conference. In 1995, the Central Government established the National Environment Tribunal under the National Environmental Tribunal Act 1995. This has been created to award compensation for damages to persons, property and the environment arising from any activity involving hazardous substances.

#### *National Green Tribunal (NGT) Act, 2010*

Taking into account the large number of environment cases pending in higher courts and involvement of multidisciplinary issues in such cases, as well as the views of the Supreme Court of India, The Law Commission of India recommended the setting up of environmental Court having both original and Appellant jurisdiction.

The National Green Tribunal was established on 18.10.2010 under the National Green Tribunal Act 2010 for effective and expeditious disposal of cases relating to environmental protection and conservation of forests and other

natural resources including enforcement of any legal right relating to environment and giving relief and compensation for damages to persons and property and for matters connected therewith or incidental thereto. It is a specialized body equipped with the necessary expertise to handle environmental disputes involving multi-disciplinary issues. The Tribunal shall not be bound by the procedure laid down under the Code of Civil Procedure, 1908, but shall be guided by principles of natural justice.

The Tribunal's dedicated jurisdiction in environmental matters shall provide speedy environmental justice and help reduce the burden of litigation in the higher courts. The Tribunal is mandated to make and endeavour for disposal of applications or appeals finally within 6 months of filing of the same. New Delhi is the Principal Place of sitting of the Tribunal and at present there are four zonal banches at Bhopal, Pune, Kolkata and Chennai.

The NGT jurisdictions include all environmental laws on air and water pollution, the Environmental Protection Act, the Forest Conservation Act and Biodiversity Act. The NGT has the authority to provide relief and compensation to the pollution victims.

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## SAQ 1

What are the main objectives of Environment Protection Act, 1986?

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### 12.2.2 International Conventions

Similar to national legislations, there is no international legislation body with authority to pass legislations, nor are there international agencies with power to regulate resources in a global scale. There is an international court at Hague in the Netherlands, but it has no power to enforce its decisions. Powerful nations can simply ignore the court. As a result, international legislation must depend on the agreement of the parties concerned. Certain issues of multinational concern are addressed by collection of policies, agreements, and treaties that are loosely called International Environmental legislations. Most of the international legislations are international agreements to which nations adhere voluntarily. These agreements are generally finalized through international conventions or treaties. Nations that have agreed to be bound by the convention are known as Parties. Convention provides a framework to be respected by each party, which has to adopt its own national legislations to make sure that conventions are implemented at national level. To support the conventions, some time protocols are also framed. A protocol is an international agreement that stands on its own but is linked to an existing convention. United Nations has very important role in developing and implementing conventions.

The United Nations Conference on Environment and Development, 1972, Stockholm, popularly known as the Stockholm Conference, was the first step from the United Nations to address the growing problem of Environmental degradation at international level. It also gave birth to the United Nations

Environment Programme (UNEP). Key international environmental conventions which have been agreed since the Stockholm Conference include the Convention on International Trade in Endangered Species of Wild Fauna and Flora (1973), the Convention for the Prevention of Marine Pollution from Land-Based Sources (1974), the Convention on Long-Range Trans Boundary Air Pollution (1979), the Convention for the Protection of the Ozone Layer (1985), and the Convention on the Control of Trans Boundary Movements of Hazardous Waste and their Disposal (1989).

It was again in UN Conference on Environment and Development (UNCED); also known as "Earth Summit" held in Rio de Janeiro in June 1992 many global environmental issues were taken up. The Declaration is significant in highlighting the concepts of sustainable development, the pre cautionary principle and the polluter pay principle. The key outcomes of this meeting were:

*Agenda 21:* This is a comprehensive, non-binding action plan for sustainable development. The document outlines actions to address the social, economic and environmental dimensions of sustainable development.

*The UN Commission on Sustainable Development (CSD):* The UN Commission on Sustainable Development was created with the aim of promoting implementation of Agenda 21.

Beside these two important international conventions were agreed at the conference:

- i) *The Framework Convention on Climate Change (UNFCCC), and*
- ii) *The Convention on Biological Diversity (CBD)*

On the advise of the United Nations General Assembly, United Nations organized the conference, called the World Summit on Sustainable Development (WSSD), also known as Rio+10 or Earth Summit 2002 on the ten-year review of progress achieved by the implementation of the outcome of the United Nations on Environment and Development. It was held on Aug. 26 – Sep. 6, 2002, at Johannesburg. At Rio+10, sustainable development was recognized as an overarching goal for institutions at the national, regional and international levels. Some of the set up the summit goals are:

- The establishment of a solidarity fund to wipe out poverty. This fund would be sustained by voluntary contributions; however, developed nations are urged to dedicate 0.7% of their national income to this cause.
- Cutting in half by 2015 the proportion of the world's population living on less than a dollar a day. This is a reaffirmation of a UN Millennium Summit goal.
- Cutting in half by 2015 the number of people who lack clean drinking water and basic sanitation
- Substantially increase the global share of renewable energy
- Cut significantly by 2010 the rate at which rare plants and animals are becoming extinct

- Restore (where possible) depleted fish stocks by 2015, and
- Halving the number of people suffering from hunger.

Now we will take up few important conventions on some international environmental issues such as chemicals and hazardous wastes, ozone layer, climate change biodiversity and law of the sea.

### **Conventions on Chemicals and Hazards Wastes**

*The Basel Convention* on the Control of Trans boundary Movement of Hazardous Wastes and their Disposal was adopted in 1989 and enforced on 5 may 1992. The Convention is considered the response of the international community to their problem caused by the annual world wide production of 400 million tonnes of wastes which are hazardous to people or the environment because they are toxic, poisonous, explosive, corrosive, flammable, eco-toxic, or infectious.

The main principles of the Basel Convention are:

- 1) Trans boundary movement of hazardous waste should be reduced to a minimum consistent with their environmentally sound management.
- 2) Hazardous waste should be treated and disposed of as close a possible to their source of generation
- 3) Hazardous waste generation should be reduced and minimized at source it self.

The convention is further modified to ban exports of hazardous wastes to developing countries, on the grounds that those countries mostly have neither the expertise nor the facilities to manage such wastes.

*Beside Basel convention, India is also a signatory to two similar type of international conventions:*

*The Rotterdam Convention* on the Prior Informed Consent (PIC) Procedure for Certain Hazardous Chemicals and Pesticides in International Trade. Adopted in 1998, the Rotterdam Convention is intended to protect human health and the environment by prohibiting international trade in certain hazardous chemicals unless the importing state first gives its informed consent, and by facilitating information exchange to promote the safe handling and use of such chemicals.

***The Stockholm Convention*** on Persistent Organic Pollutants (POPs). Adopted in 2001, bans or severely restricts production, trade, and use of twelve POPs known as the “u.” Most of these chemicals are no longer manufactured or used in industrialized countries; however, the nature of POPs means that people can be seriously impacted by releases of POPs that occur hundreds or even thousands of miles away. The Stockholm Convention contains provisions for the disposal and treatment of POPs wastes and stockpiles. It also establishes procedures for listing additional POPs that may be banned or severely restricted.

### **Conventions on the Ozone Layer**

In Unit 11.3, you have already studied in details the causes and effects of depletion of ozone layer in the stratosphere. The United Nations Environment Programme (UNEP) has been addressing this issue since 1977. Under the

auspices of UNEP, the nations of the world arrived at *The Convention for the Protection of the Ozone Layer* in Vienna in 1985. Through this Convention, nations committed themselves to protecting the ozone layer and to co-operation with each other in scientific research to improve understanding of the atmospheric processes and serious consequences of ozone layer depletion.

To achieve the objectives of the Vienna Convention, *Montreal Protocol* on Substances that Deplete the Ozone Layer was agreed to by nations in 1987. Its control provisions were strengthened through five amendments to the Protocol adopted in London (1990), Copenhagen (1992), Vienna (1995), Montreal (1997) and Beijing (1999). The Protocol aims to reduce and eventually eliminate the emission of man-made ozone depleting substances.

### **Conventions on Climate Change**

UN Framework Convention on Climate Change is the landmark international treaty unveiled at the United Nations Conference on Environment and Development in Rio de Janeiro in June 1992. The UNFCCC commits signatory countries to anthropogenic (i.e., human-induced) greenhouse gas emissions to levels that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure the food production is not threatened and to enable economic development to proceed in a sustainable manner.

Pursuant to the objectives of the Convention on Climate Change the *Kyoto Protocol* was agreed by the nations of world in December 1997 in Kyoto, Japan. There are now 196 Parties to the Convention and 192 Parties to the Kyoto Protocol. The Protocol does call on all Parties – developed nations and developing nations – to take a number of steps to formulate national and regional programmes to improve “local emission factors”, activity data, models, and national inventories of greenhouse gas emissions and sinks that remove these gases from the atmosphere. All parties are also committed to formulate, publish and update climate change mitigation and adoption measures, and to cooperate in promotion and transfer of environmentally sound techniques and in scientific and technical research on the climate system. The progress of convention on climate change and Kyoto Protocol was reviewed in twenty one session of the Conference of the Parties (COP 21) to the Climate Change Convention held in Paris, from 30 November to 12 December 2015.

This agreement seeks to accelerate and intensify the actions and investment needed for a sustainable low carbon future. Its central aim is to strengthen the global response to the threat of climate change by keeping a global temperature rise this century well below 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius. The Agreement also aims to strengthen the ability of countries to deal with the impacts of climate change.

During the Convention period, Governments also launched new joint initiatives. India and France led 120 countries in announcing an International Solar

Alliance supporting solar energy deployment in developing countries. More than 20 developed and developing countries launched Mission Innovation, pledging to double public investment in clean energy research and development over five years.

### Conventions on Biological Diversity

Although not formally part of the UNCED preparatory process, the Rio Summit provided political impetus for completing the negotiations on the *Convention on Biological Diversity* (CBD). The aim of the CBD is to promote the conservation and sustainable use of biodiversity through commitments relating for example to: promoting scientific and technological co-operation, establishing protected areas, eradicating alien species, respecting and maintaining traditional knowledge and practices, and providing financial resources. In January 2000, the Cartagena Biosafety Protocol was adopted to address potential risks associated with cross-border trade and accidental releases of living modified organisms. Again in the World Summit on Sustainable Development (Johannesburg, 26 August - 4 September 2002), the world's Heads of State recognized the critical role which biodiversity plays in overall sustainable development and poverty eradication, human well-being and in the livelihood and cultural integrity of people. They noted that biodiversity is currently being lost at unprecedented rates owing to human activities and that there is a need to achieve a significant reduction in the rate of biodiversity loss by 2010.

In September 2005, 150 Heads of State, meeting at the World Summit in New York called on all States to fulfill their commitment and significantly reduce the rate of biodiversity loss by 2010.

There are few more Conventions on biodiversity issues: the Convention on Conservation of Migratory Species, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (1975), the International Treaty on Plant Genetic Resources for Food and Agriculture (2004), the Ramsar Convention on Wetlands (1971), the World Heritage Convention (1972) and the International Plant Protection Convention (1952).

### Conventions on Law of the Sea

The 1982 United Nations Convention on the Law of the Sea provides, for the first time, a universal legal framework for the rational management of marine resources and their conservation for future generations.

#### Some of the key features of the Convention are:

- Coastal States exercise sovereignty over their territorial sea which they have the right to establish its breadth up to a limit not to exceed 12 nautical miles; foreign vessels are allowed "innocent passage" through those waters;
- Ships and aircraft of all countries are allowed "transit passage" through straits used for international navigation; States bordering the straits can regulate navigational and other aspects of passage;
- Archipelagic States, made up of a group or groups of closely related islands and interconnecting waters, have sovereignty over a sea area enclosed by straight lines drawn between the outermost points of the

- islands; all other States enjoy the right of archipelagic passage through such designated sea lanes;
- Coastal States have sovereign rights in a 200-nautical mile exclusive economic zone (EEZ) with respect to natural resources and certain economic activities, and exercise jurisdiction over marine science research and environmental protection;
  - All other States have freedom of navigation and over flight in the EEZ, as well as freedom to lay submarine cables and pipelines;
  - Land-locked and geographically disadvantaged States have the right to participate on an equitable basis in exploitation of an appropriate part of the surplus of the living resources of the EEZ's of coastal States of the same region or sub-region; highly migratory species of fish and marine mammals are accorded special protection.

## SAQ 2

Fill in the blank with appropriate words

- i) The United Nations Environment Programme (UNEP) was an outcome of the ..... conference.
- ii) To achieve the objectives of the Vienna convention..... was agreed by the nations.

## 12.3 ISSUES IN ENFORCEMENT

In the earlier section of this unit you have learnt about various Environmental Acts at national level and Environmental legislations at international level. Now we will take up the issues involved in their enforcement.

### 12.3.1 Problems and Prospects

You must be aware that despite so many legislative measures the state of the environment in India continues to be gloomy. The rivers and the lakes continue to be polluted with sewage and industrial waste, bio resources continue to disappear. The air quality in some major cities is at alarming stage. According to the World Health Organization, at present the Capital city of New Delhi is one of the most polluted cities in the world. All these situations force us to know the answers of following questions. Where are the problems? What can be done to reverse the process and restore a balance state of the environment? Let us first, identify the basic problems in enforcement of national environment legislations.

- After an analysis of all enactments and provisions at national level, It is to be noted that nature of most of the existing environmental legislations are essentially punitive not preventive. Only once the chemicals or substances are discharged into the air or water or soil does the act apply. The preventive measures have hardly ever evoked or worked and the concerned agencies have moved into action only after the harm has been done.

- More serious problem in the implementation of environmental legislation is overlapping powers of authorities involved in supervising the safety mechanism and devices of companies, and in granting or refusing No Objection Certificate (NOC). Thus though the water and air pollution board may refuse to grant NOC, the Municipality may grant a license to an industrial unit based on which it may start its manufacturing activity.
- In some cases statutes of environmental legislations do not lay down any guidelines on the nature of the authority and their specific rights and the obligations. For example, Delhi State Government in 2009 has banned the manufacture and use of coloured plastic, without formulating the rule to prosecute defaulters. Because of this 2009 ban did not do too well. Again Delhi State Government amended this bill 2011 and imposed a blanket ban on use, storage, sale and manufacture of plastic bags in the city. This total ban again failed to make any difference in the city largely due to poor implementation and absence of strong rules.
- A common feature with environmental legislation in India is that they exclude peoples' participation in their implementation. The enterprises, which make profits at the expense of the environment, are always well represented and their interests well protected but not those of the common person who suffer the consequences of pollution and degradation.
- Sometime enforcement of legislation is difficult due to shortage of funds. Take for example the case of rivers pollution in India. It is well known that the major source of pollution of rivers is domestic sewage, which municipalities nonchalantly dump in the nearest rivers. The colossal cleaning up operation of rivers will be an exercise in futility if it is not accompanied by a massive effort to prevent the municipalities from dumping their wastes in the river. Everyone knows that the technology for treating municipal wastes exists. But many and most of the municipalities cannot afford it its cost .
- Public opposition also makes the implementation of environmental legislation difficult. As we have seen the difficulty in implementation of the Supreme Court ruling regarding mandatory use of CNG for all public transport vehicles in Delhi. Delhi Government has taken lot of time in implementing this order. Similarly public did not support the order of Supreme Court regarding ban on diesel public vehicles that were more than 10 years old and also complete ban on the registration of diesel vehicles in NCR region.

Nevertheless, despite the existing inadequacy of legislations and the complexity of judicial procedures, some new decisions of the court specially of NGT in recent past have generated a hope that with the passage of these enactments, environmental protection will be controlled to some extent in the country and that the offending companies /agencies will be brought to book by streamlining the enforcement agencies.

Now a day's judiciary is playing a vital role in the growth and development of environmental precedents. As a watchdog it strives to maintain the sanctity

and dignity of the Constitution so that it may not remain a mere paper tiger. But these are very few examples in which people through Public Interest Litigations (PIL) seek judiciary to enforce existing environmental legislations. For highlighting the contribution of PILs, we are giving few notable examples. In year 2000, Supreme Court ordered to shut down polluting factories in residential areas of Delhi. This order was opposed by thousands of workers and factory owners. But this move has and will definitely safe guard the health of many residents who are living nearby to the polluting industries. Due to excess noise during the festival periods, the local court in Kolkata passed strict limits on noise beyond certain limits and ordered its strict enforcement. Similarly, in the capital region of Delhi, all new vehicles from April, 2012 should have pollution prevention mechanism comparable to Euro-IV levels (known as Bharat Stage-IV) prevailing in many European countries.

In recent time, laws on disposal of plastics, packaging, locating and shifting of polluting industries, and common effluent treatment plants for small scale industries and making mandatory the use of CNG in vehicles used for public transport have all become very important and these legislations are being regularly followed by implementing authorities by the order of honourable courts.

Another good example of the success of PIL is case of Taj Mahal. In this famous case, Mahesh Chandra Mehta, a prominent environment lawyer, fought for ten years to persuade the Supreme Court to ban coal-based industries emitting effluents that damaged the soft marble of the Taj Mahal, India's architectural masterpiece. The court shut down 230 factories and directed more than 300 others near the building to install pollution-control devices. For this public service Mehta has won the 1997 Ramon Magsaysay Award. Mehta also campaigned for the introduction of lead-free gasoline in India's four largest cities, which has been done, and for 250 towns and cities near Ganga to install sewage treatment plants. The Supreme Court ordered over 2,000 industries along the Ganga to clean up or close. He also won a Supreme Court decision that forced a fertilizer factory to compensate thousands of people sickened by a 1985 gas leak.

Many of the legislations such as restraining the use of plastic bags can be fully enforced if public consciousness can be raised rather than await a judicial direction. After all, many environmental legislations are essentially "social code of conduct" that should automatically be a part of a better civic sense instead of a legal framework. Thus, public awareness and environmental education together can considerably reduce the needs for multitudes of environmental legislations since enforcement under the Indian context will continue to be difficult in foreseeable future.

Though, legislations and regulations are the foundations of most environmental protection policies. Public interest Litigations and People's Movement have also played very important role in environmental protection.

## SAQ 3

Fill in the blank with appropriate words

- i) The Delhi State Government banned the use of coloured plastic in the year ..... and amended this in the year .....
- ii) In Delhi, all new vehicles should have pollution prevention mechanism comparable to ..... level.

## 12.4 INSTITUTIONAL ARRANGEMENT FOR MONITORING AND ENFORCEMENT

The Government of India recognizing the severity of environmental problems, in 1972 established a National Committee on Environmental Planning and Coordination (NCEPC) to advise the Government on environmental problems and make recommendation for their improvement. The NCEPC was replaced by a National Committee of Environmental Planning (NCEP) to discharge the following functions:

- Preparation of an annual 'State of Environment Report' for the country,
- Establishing an Environmental information and communication system to propagate environmental awareness through the mass media
- To sponsor environmental research
- Arranging public hearing or conferences and issues of environmental significance

In 1980, the Government appointed Tiwari Committee, which recommended formation of Department of Environment for ensuring environmental protection. On this basis, a full-fledged Department of Environmental was created with effect from November 1<sup>st</sup>, 1980 under the charge of the Prime Minister. Since January 1985, it formed a part of the newly created **Ministry of Environment and Forests**. This Ministry, renamed as Ministry of Environment, Forest and Climate Change (MoEFCC). This is the nodal agency for planning, promotion, coordination and supervising the implementation of the various environmental and forestry programmes. The Ministry has also overall responsibility for administering and enforcing environmental legislations and policies. The Ministry has also been designated as the nodal agency in the country for the United Nations Environment Programme (UNEP), International Centre for Integrated Mountain Development and looks after the follow-up of the United Nations' Conference on Environment and Development (UNCED). MoEFCC also implements in India the provision of the international agreement on biological diversity and on climate change. Within the overall frame work of its mandate, the activities of the Ministry includes

- Conservation and survey of flora fauna, forests and wildlife

- Afforestation and regeneration of degraded area
- Prevention and control of pollution,
- Protection of environment
- Environmental impact assessment
- Dissemination of environmental information
- Eco-regeneration
- Assistance to organization implementing environmental and forestry programmes
- Promotion of environmental and forestry research
- Extension, education and training to augment the requisite man power
- Coordination with Central Ministries, State Government
- Environmental policy and legislation, and
- International cooperation
- Creation of Environmental awareness among all sections of the population.

The Ministry has many Divisions, Departments and Boards to implement its own objectives and environmental legislation such as Botanical Survey of India, Zoological Survey of India, National Museum of Natural History, Indian Council of Forestry Research and Education, Indian Forest Services, Central Pollution and Control Board (CPCB), Forest Survey of India, National Afforestation and Eco-development Board, etc. In next part we will discuss the role of CPCB in environmental protection sketchily.

### **The Central Pollution Control Board (CPCB)**

The Central Pollution Control Board (CPCB) was constituted in September 1974 under the provisions of The Water (Prevention & Control of Pollution) Act, 1974. The main functions of CPCB, as spelt out in The Water (Prevention and Control of Pollution) Act, 1974, and The Air (Prevention and Control of Pollution) Act, 1981, are:

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

The CPCB advises the Central Government on all matters concerning the prevention and control of air, water and noise pollution and provides technical services to the Ministry for implementing the provisions of the Environmental (Protection) Act of 1986. Under this Act, effluent and emission standards in respect to various categories of industries have been notified. During 2000-2001 standards for coalmines, standards for effluents from textile industries and primary water quality criteria for bathing water have been finalized and notified in the Gazette.

Board has identified seventeen categories of heavily polluting industries. They

are: cement, thermal power plant, distilleries, sugar, fertilizer, integrated iron and steel, oil refineries, pulp and paper, petrochemicals, pesticides, tanneries, basic drugs and pharmaceuticals, dye and dye intermediates, caustic soda, zinc smelter, copper smelter and aluminium smelter.

CPCB in consultation with State Boards has also identified some critically polluted areas in the country, which need special attention for control of pollution. Action plan have been prepared and are being implemented in these areas.

The CPCB in collaboration with the SPCBs monitor the quality of fresh water resources of the country through a network of 507 monitoring stations located all over the country. Under the National Ambient Air Quality Monitoring Programme, 290 station covering over 90 cities/towns are being monitored by the CPCB.

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## SAQ 4

- i) In which year was the Department of Environment created?
  - ii) State the functions of the Central Pollution Control Board.
- 

## 12.5 ACTIVITIES

### Activity 1

Only Central Government legislation is discussed in this unit, prepare a list of environmental legislations of your State and municipality area.

### Activity 2

Discuss the outcome of the U. N. Climate Change Conference in Paris (COP 21) held on Nov 30-Dec.12, 2015.

### Activity 3

Discuss the few path breaking judgements of NGT in recent past.

## 12.6 SUMMARY

In this unit you have studied that:

- The various national and international legislations, which have been framed to stop environmental degradation.
- India is one of the few countries of the world that have made specific reference in the constitution to the need for environmental protection and improvement. The Central Government State Governments have utilized this provision to pass various Acts in order to protect the environment from destruction.
- There is a great contribution of UN in addressing global environmental challenges. To implement the agenda of UN, there is movement towards

environment protection on a worldwide scale through special conventions, protocols and multilateral agreements.

- Despite of the presence of satisfactory legislative measures and administrative set-up, it is difficult to enforce the legislation due to lack of expertise, shortage of funds, and no seriousness on the part of implementing authority.

## 12.7 TERMINAL QUESTIONS

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- List the important categories of national legislations.
- Write the various provisions of Kyoto Protocol.
- Analyse briefly the issues in the enforcement of environmental legislation.
- Explain the role of judiciary in Environmental protection.
- List the important government agencies responsible for environment protection in India.

## 12.8 ANSWERS

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### Self-Assessment Questions

- Protecting and improving the quality of the environmental and preventing controlling and abating the pollution.
- i) Stock holm  
ii) Montreal Protocol on substances that deplete the ozone layer.
- i) 2009, 2011  
ii) BSIV
- i) 1985  
ii) a) Promote cleanliness of streams and wells.  
b) Improve quality of air and to prevent, control air pollution.

### Terminal Questions

- Important categories of national legislations are: (i) Water Acts, (ii) Air Acts, (iii) Forest and wild life Acts, and (iv) General Acts.
- Refer to section 12.2.2
- Refer to section 12.3.1
- Refer to section 12.4
- Important government agencies for environmental protection in India are:  
(i) Ministry of Environment Forest and Climate Change (MOEFCC), (ii) Council of Forestry Research and Education (CFRE) , (iii) Central Pollution Control Board (CPCB). (iv) State Pollution Control Boards (SPCB), (v) Botanical Survey of India (BSI), (vi) Geological Survey of India (GSI) etc.

## 12.9 FURTHER READING

1. Divan, S. and Rosencranz, A. (2002) *Environmental Laws and Policy in India: Cases, Materials and Statutes*, New Delhi:Oxford University Press.
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# HUMAN COMMUNITIES AND ENVIRONMENT

## Structure

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- |   |  |
|---|--|
| 13.1 Introduction<br><br>Expected Learning Outcomes   | 13.5 Preparedness for Disaster Management  |
| 13.2 Human Population Growth<br>Population Growth Trends<br>Human Activities and Environmental Degradation                        | 13.6 Resettlement and Rehabilitation of People: Problems and Concerns  |
| 13.3 Human Health and Welfare<br>Community Health<br>Environment - Health Relations<br>Preventive and Mitigatory Welfare Measures | 13.7 Case Studies and People's Movement<br>13.8 Summary<br>13.9 Terminal Questions<br>13.10 Answers<br>13.11 Further Reading |
| 13.4 Natural Disaster<br><br>Earthquakes<br>Floods, Cyclones and Tsunamis<br>Droughts   |  |

## 13.1 INTRODUCTION

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In the previous unit we have discussed various acts enacted for the protection of environment and we also learnt various conventions and protocols framed for global environmental issues. You would have read as to how human beings have evolved in the natural systems as a result of interactive forces among the pre-existing biological forms. Though late to arrive on the evolutionary scene, human is the only life form to initiate drastic interventions in nature. Man has always been using natural resources around his dwellings to meet his basic, social and cultural needs. The customs, traditions, practices, beliefs, and rules ensured a balance between human needs and environmental conservation in ancient times. However, with passage of time this symbiotic relationship was gradually replaced by destructive dependence. At some point during this phase he apparently forgot that the ecosystem has certain carrying capacity that reflects a limit to its exploitability.

In this Unit you will learn how over exploitation of natural resources has led to environmental degradation and indiscriminate industrialisation has led to deforestation and related problems

of natural calamites, resettlement and rehabilitation. You will also be able to learn the issues related to disaster management.

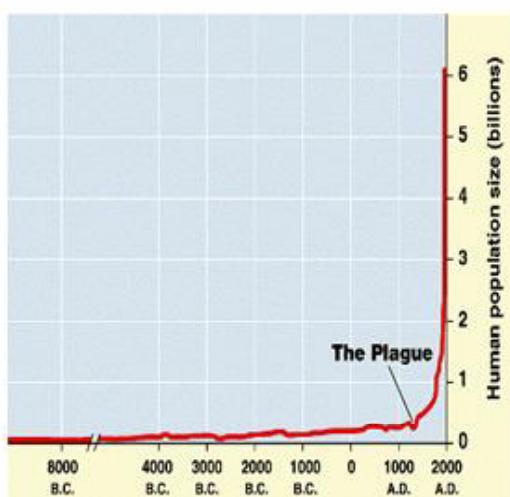
## Expected Learning Outcomes

After studying this unit you should be able to:

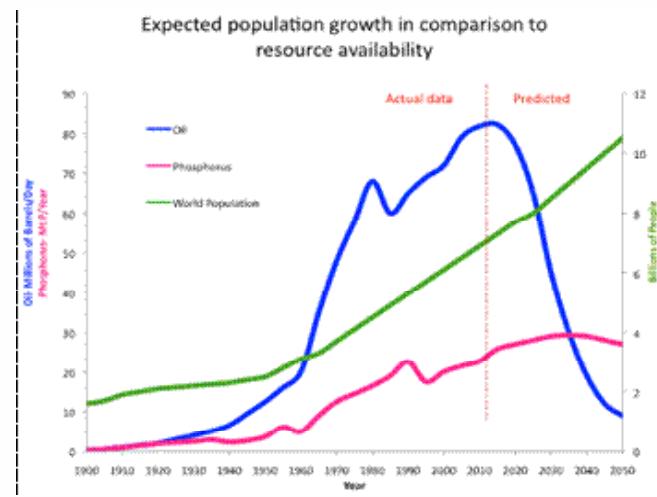
- ❖ understand the phenomenon of population growth and the human activities that are responsible for environmental degradation;
- ❖ quantify the extent to which human intervention has brought about environmental degradation;
- ❖ discuss natural calamites and their impact on society;
- ❖ highlight the need for preparedness; and,
- ❖ enumerate the issues related to human health and welfare, resettlement and rehabilitation of affected persons.

## 13.2 HUMAN POPULATION GROWTH

According to United Nations determinants and consequences of population trends, modern Homo sapiens may have appeared 50,000 B.C. At the dawn of agriculture almost 8,000 B.C. the world population was somewhere around 5 million. Throughout subsequent millennia the human population has been quite small. It has grown relatively slowly and even experienced occasional declines. Figure 13.1 shows the general trend of population growth in the last ten thousand years. As agriculture became more efficient, women began to bear more children and the human population increased. It was possible to grow more food in a given area of land. Hunter-gatherers were mostly nomadic and in their way of life, infants were a liability. In a stationary agricultural society, children are not much trouble and they can help in the farming. Therefore, the population increase between 10,000 BC and about 1800 AD was largely the result of increasing birth rates that coincided with the growth of agriculture.



(a)



(b)

Fig. 13.1: Growth of human population. (a) In the last half million years, note the rapid upturn in the world population in the last 2000 years. (b) During the past 400 years.

But our early ancestor were vulnerable to hostile environments, food was often scarce and famine and outbreak of diseases often took heavy tolls. Thus population growth remained low due to high death rates. For example, it is believed that during the 14<sup>th</sup> century the bubonic plague killed more than half the population of Europe and Asia. This is shown in Figure 13.1 (a) as a depression.

After 1800, a second and more dramatic increase in the rate of population growth occurred. This coincided with the industrial revolution. Cities grew rapidly, goods and services became more readily available. Progress in medical sciences and improved sanitation brought down the death rates drastically resulting in exponential increase in human population. From Figure 13.1 (b) we can also see that it took several thousand years for the human population to grow to 1 billion which occurred sometimes around 1800. In marked contrast, the population doubled to 2 billion persons in only 80 years and redoubled to 4 billion in hardly 45 years. Human population is expected to be 8.6 billion by mid 2030s, 9.8 billion by mid-2050s and 11.2 billion by 2100. According to one estimate world's food resources can sustain a maximum of 10 billion people.

### **13.2.1 Population Growth Trends**

In the present day world, there is an improved nutrition and better health care and consequently more newly born babies survive and people live longer. While this is good news, it is major cause in upsurge of population growth. Today total world population (2018) is more than 7.6 billion and it is increasing at the annual rate of 1.18. The total population of India at independence was around 350 million (35 crore). The total size of population increased nearly three fold and reached around 1000 million by the middle of year 2000. The population has increased to 1357 million (17.74% of world population) in 2018.

### **13.2.2 Human Activities and Environmental Degradation**

Much before we faced the effects of globalisation, calamities like floods, earthquakes, eruption of volcanoes, and forest fires were wreaking havoc on human lives. But with rapid industrialisation, exploitation of non-renewable natural resources, construction of huge dams, deforestation, indiscriminate use of chemicals and human greed for quick returns with lower inputs contributed to the escalation of the occurrence of these calamities. This, coupled with human-made disasters like nuclear accidents, industrial accidents, disposal of toxic wastes, accidents in the transportation of hazardous wastes, oil spills and emission of Green House Gases, has created a situation that threatens the existence of humanity. There are sections of scientists and social scientists who argue that all environmental calamities are human-made disasters whereas others argue that development and economic growth cannot be achieved unless we take calculated risks. These issues are debatable but the issue at stake is the survival of humanity. It is to be acknowledged that the margin between natural calamities and human-made disasters is becoming thinner gradually and this is what we are going to discuss in the following sections.

## SAQ 1

Fill in the blanks.

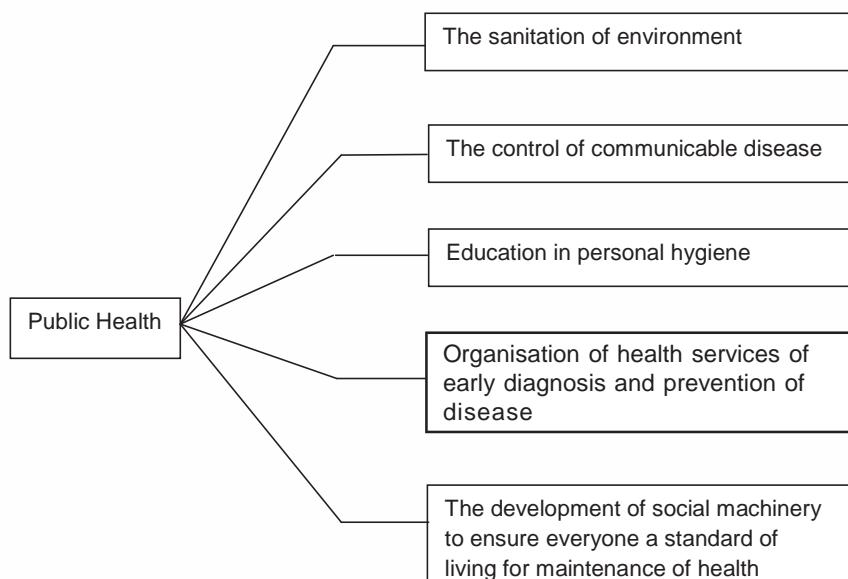
- (i) Hunter-gatherers were mostly .....
- (ii) After ..... a second and more dramatic increase in the rate population ..... occurred.
- (iii) The population has increased to 1357 million in .....
- (iv) Human being has to depend on ..... resources.

## 13.3 HUMAN HEALTH AND WELFARE

A broad and widely used definition of health given by the World Health Organisation (WHO) is that it is “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity”. One measure of health is the ability to function effectively within a given environment. Since the physical, biological and social environment keeps on changing throughout the life of an individual, good health involves a process of continuous adaptation to such changes.

Environmental health can be defined as “the aspect of public health that is concerned with all external conditions such as all forms of life, substances, forces, problems and challenges and any other condition in the surroundings of human being that may exert an influence on their health and well-being”. Disease, in this sense, represents a maladjustment of the human being to his/her environment.

Although ancient civilisations were aware of the effects of environment on health, the importance of clean environment in the modern times was realised in Europe only after the Industrial Revolution in 1842. It was known as “the great sanitary awakening”. As a consequence, the discipline of Public Health was established. It was defined as the science and art of preventing disease, prolonging life and promoting health and efficiency through organised community effort. The objectives of public health are given below.



So far, in the developing countries like ours, significant success has not been achieved for such desirable goals of public health. However, in developed countries, communicable diseases have been almost eradicated by improving sanitary conditions. So the emphasis in public health has moved to the preventive, therapeutic and rehabilitative aspects of chronic diseases and behavioural disorders, like smoking, drug abuse and alcoholism which are prevalent in these countries. Thus, today, public health gives emphasis on planning and evaluation of health activities, programmes and systems. With such challenges, public health is now termed 'Community Health'.

### **13.3.1 Community Health**

Community health is defined more broadly and encompasses the entire gamut of community-organised efforts for maintaining, protecting and improving the health of the people. It involves motivation of the individual and groups to change the pattern of behaviour. In addition, it also seeks to plan medical care to achieve optimal health of the members of community as a whole.

Previously, the subject of community health was covered in Hygiene, Public Health or Preventive and Social Medicine.

In community health, instead of studying individuals as a patient, it is essential to understand that:

- The patient represents the community.
- Diagnosis of disease in the community, (referred to as community diagnosis) is essential.
- Planning treatment for the community is the objective.

For example a single case of a cholera patient detected in a village is a danger signal. It shows that the disease is present in the community, there may be many cases of it and unless checked its spread will grip the whole village. So the appropriate measures for treatment and control of the disease are planned in advance. Since it is a water-borne disease, water sources-river, wells or underground water are examined for infection and accordingly treated. In addition, necessary treatment for the affected people and precautions such as vaccination for vulnerable people is also done.

### **13.3.2 Environment-Health Relations**

We have already told you that an individual's health is the result of interaction of a large number of influences upon him or her. We can divide these influences into the following three groups: i) genetic influences, ii) behavioural influences and iii) environmental influences. We will now briefly describe these influences.

1. **Genetic Influences** : All organisms inherit a set of genes called genome from their parents. Genes determine the physical and physiological characteristics of an organism. That is why a child bears some resemblance to his parents. We also find that some humanbeings are born with abnormalities. The inherited abnormalities are called hereditary diseases which are passed on from parents to the offspring.

#### **Some Common Genetic Diseases**

Phenylketonuria

Haemophilia

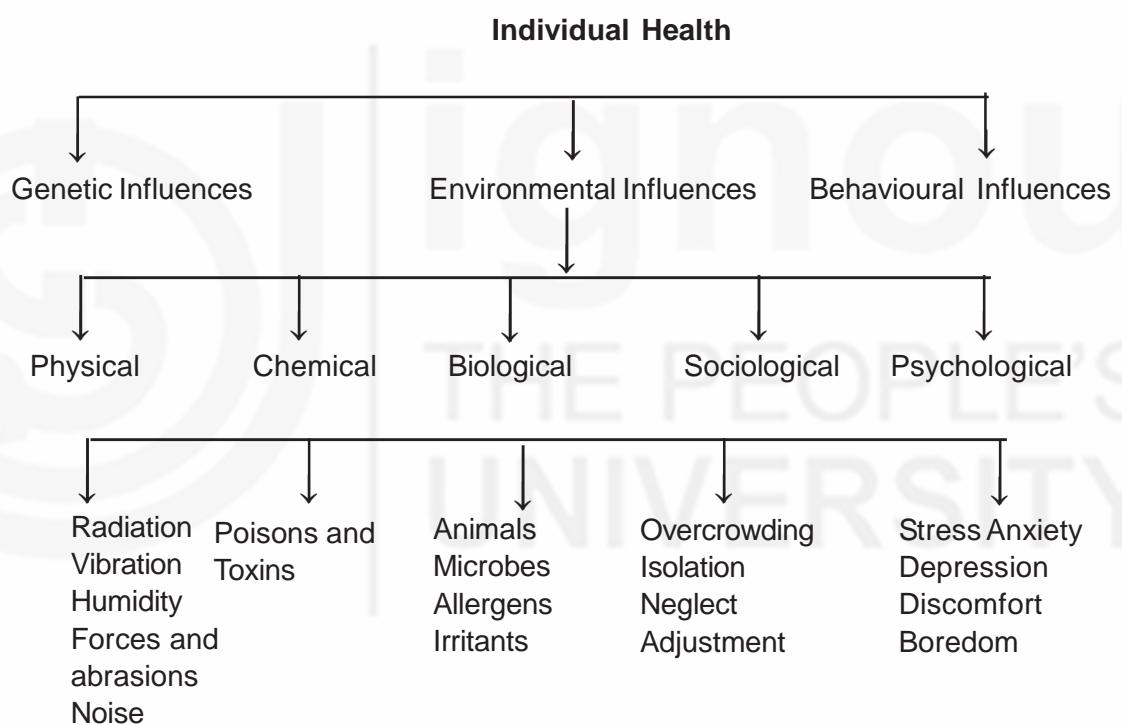
Mongolism

Sickle-cell anaemia

Thalesmia

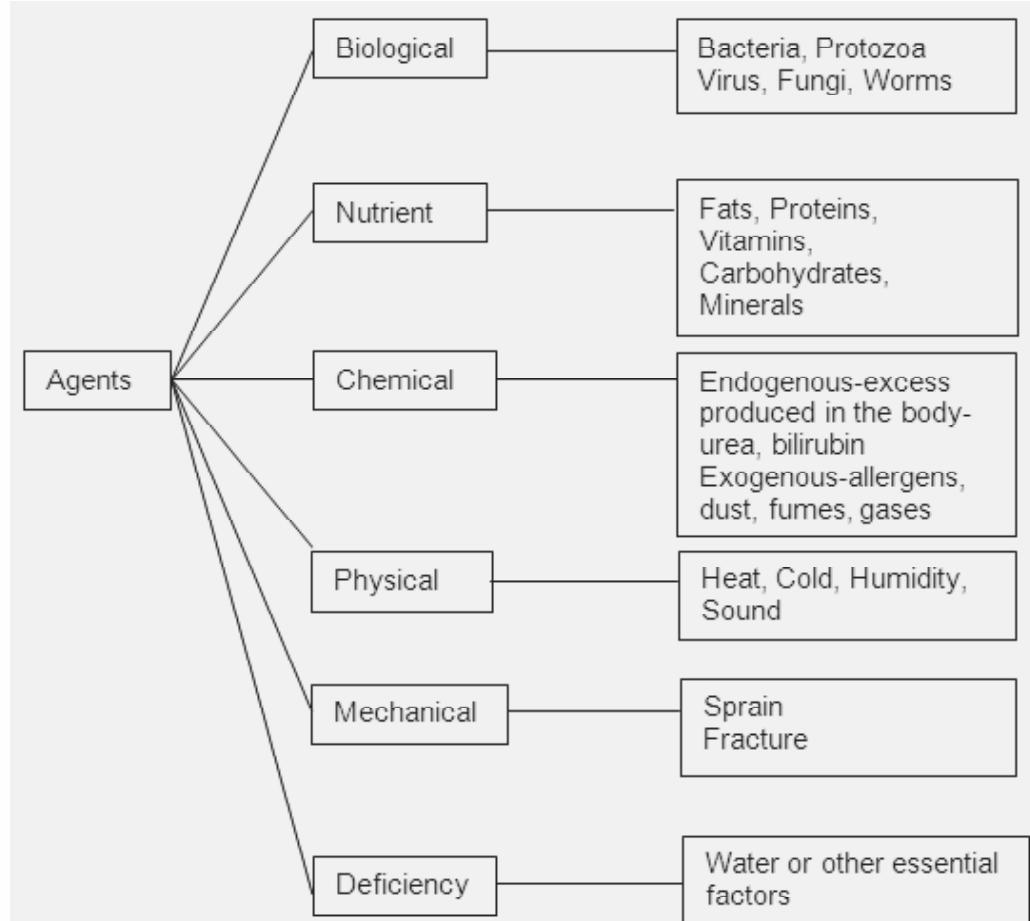
There are other diseases such as allergies, diabetes, hypertension, and schizophrenia which cannot be regarded entirely genetic in the same sense as hereditary diseases. However, they are due to the **interaction of genes with environment**. These diseases are triggered and affected by nutrition, stress, emotion, hormones, drugs and other environmental interactions. In other words, they would not occur if the environment is favourable for the person. Such diseases are referred to as due to genetic influences.

- 2) **Behavioural Influences :** Alcoholism, smoking, drugs, chewing tobacco, or irregular food habits result in various kinds of ill-health. The habits of a person change throughout ones life time. These depend upon self-responsibility, nutritional awareness, stress management, physical fitness and environmental sensitivity of an individual.
- 3) **Environmental Influences:** You know the various components of environment. All of them exert influences on our health. As shown below these are physical, chemical, biological, sociological and psychological.



#### **Agents of Ill-health**

The agent of ill health or disease may be living or non-living matter, a tangible or intangible force, an excess or lack of a substance in the body. In some ailments like heart disease and peptic ulcer. the causative agent is not known. By and large, these agents are classified as given below:



**Host:** The organism (here the man) which the parasites enter

**Pathogen:** Parasite which cause the disease

**Aetiology:** The study of the cause or origin of disease.

### **13.3.3 Preventive and Mitigatory Welfare Measures**

Disease is a complicated interaction between human and environment. Not long ago, human beings were victims of epidemics of plague, smallpox, cholera, influenza, etc. over which they had little control. Advances in science and technology have helped to understand these diseases and find their control. It was found that the spread of these diseases is linked with the environment. The deteriorating environment poses danger to the present and the future generations with new types of health problems. Hence, appropriate measures need to be taken immediately. However, the options we can exercise are rather limited and not clear-cut since they entail both costs and benefits.

The demands of modern life, it appears, cannot be met without compromising the quality of 'internal' environment. Let us take an example. Many of the serious ailments are due to the life style people have. One kind of situation arises from highly competitive culture, the so called rat race that brings physical comfort, but also tension, worries about work, career, economic status, etc. Tensions, worries and frustration can also predispose people for stress-related illnesses. In the other group are people who lack proper nutrition, poverty and ignorance suffer from various types of physical as well as psychological illnesses.

## SAQ 2

- a) Which among the following diseases are due to genetic influences?
- |                                  |                         |
|----------------------------------|-------------------------|
| i) Schizophrenia                 | ii) Hypertension        |
| iii) Hemophilia                  | iv) Diabetes            |
| v) Allergies                     | vi) Sickle cell anaemia |
| vii) Mongolism (Down's syndrome) | viii) Alcoholism        |

- b) Match the following types of environmental influences with their respective category

Environmental Influences	Category
a) Toxin	i) Psychological
b) Radiation	ii) Biological
c) Stress	iii) Physical
d) Microorganism	iv) Sociological
e) Neglect	v) Chemical

## 13.4 NATURAL DISASTER

According to the World Health Organisation, an environment disaster or calamity is an event that causes damage, economic disruption, loss of human life and deterioration in the health and health services on a scale sufficient to warrant an extraordinary response from outside the affected community or area.

Natural calamities adversely affect the lives of a large number of people, causing considerable damage to infrastructure and property. The ill effects are more pronounced in developing countries due to the lack of preparedness, lack of systems for sufficient warning, and lack of facilities for quick access to the site of calamity.

At the global level, Asia is more prone to natural calamities. It is reported that for each major natural calamity in Europe and Australia, there are ten in Latin America and Africa and fifteen in Asia. According to CRED World Disaster Report (1998), the ratio of those killed to those affected depends on the type of calamity, degree of preparedness and the density of population. Table 13.2 gives the annual average number of people killed or affected over a period of ten years (2005-2014).

**Table 13.2: Annual average number of people killed or affected over a period of ten years (2005-2014).**

Country	People Killed (approximate)	People Affected (approximate)
Bangladesh	10433	42307931
India	28777	144142963

Nepal	2683	<b>2197638</b>
Pakistan	82802	<b>49784339</b>
Sri Lanka	832	<b>9842558</b>
Bhutan	24	<b>20028</b>
Maldives	Data not available	<b>204649</b>

**Source:** CRED World Disaster Report (2015)

Natural calamities could be broadly classified under the following headings:

- i. **Atmospheric** – Rains, Hail storms, winds, lightning, fog, heat/cold waves, etc.
- ii. **Hydrological** – Floods, sea-shore waves, glacier advances, water logging, etc.
- iii. **Geological** – Land slides, avalanches, earthquakes, volcanic eruptions, shifting sands etc.
- iv. **Biological** – severe epidemics (in humans, plants, animals), forest fires, pest invasions (locusts) etc.

Under certain circumstances development can increase disaster proneness.

The location of a dam in an area of high seismic activity, the construction of roads in difficult terrains or unstable geomorphologic conditions and promotion of water intensity crops in areas off unpredictable rainfall are examples of development measures dictated by policies of globalisation leading to or aggravating the phenomena of natural disaster. In spite of the absence of prediction mechanisms to pinpoint the location, the timing and intensity of natural disasters, the preparedness, appropriate management, the pre and post operative mechanisms would go a long way in mitigating people's suffering.

Let us now discuss briefly various kinds of natural disasters.

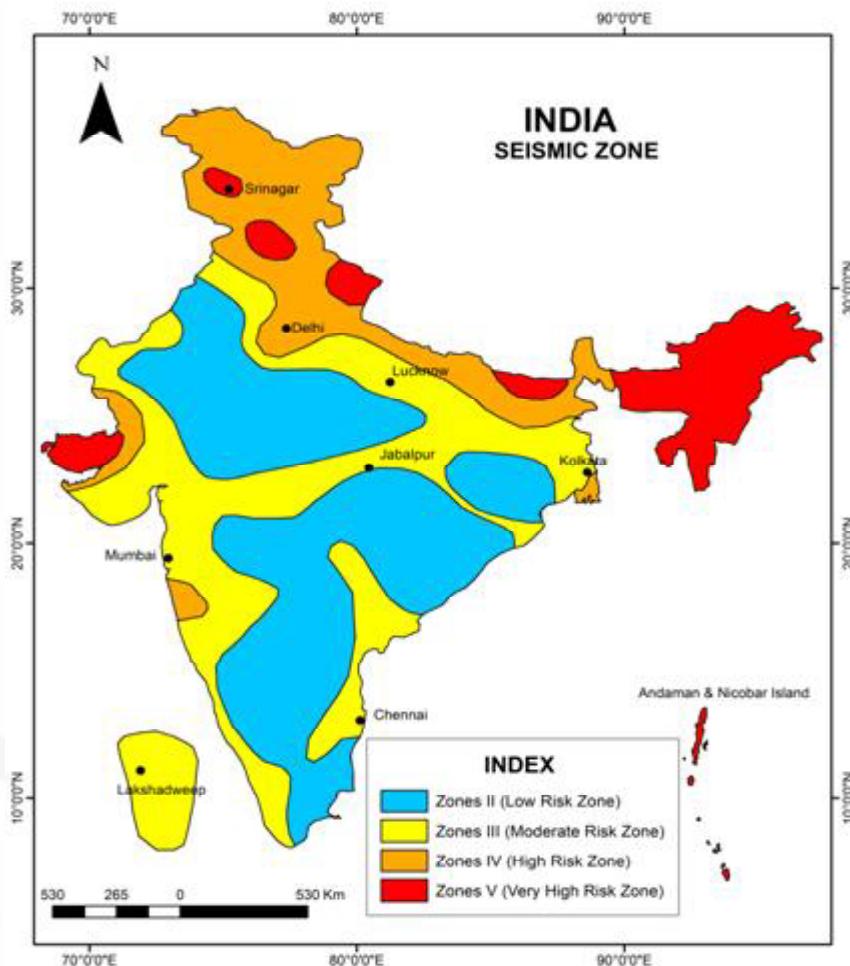
### **13.4.1 Earthquakes**

It is now generally accepted that an earthquake occurs due to vibrations(s) of the Earth produced by the release of energy. This energy radiates in all directions from its source (epicentre). Earthquakes can also occur because of atomic (nuclear) explosions or by volcanic eruptions. Large reservoirs with their hydro-static pressure of water may also induce earthquake.

In Fig. 13.3 you can see the various seismic zones of India. These are explained below:

- **Zone V:** This is the most severe seismic zone and is referred to as Very High Damage Risk Zone.
- **Zone IV:** This is referred to as High Damage Risk Zone.
- **Zone III:** This is termed to as Moderate Damage Risk Zone.

- **Zone II:** This zone is referred to as Low Damage Risk Zone.
- **Zone I:** This zone is termed as Very Low Damage Risk Zone.



**Fig. 13.2: Seismic zones in India.**

In order to understand the strength and severity of an earthquake, it is necessary to measure its intensity. There are several methods to measure the intensity of the effect an earthquake produces on life and property. The Richter scale describes the amplitude of the earthquake wave radiating out in all directions from the focus (epicentre) which is closely related to the amount of energy released. This is also a measure of ground motion as recorded on a seismograph.

It is now accepted that people must be made aware of the methods of minimising the risks. Training the public in Earthquake Resistance Construction in the earthquake prone areas may yield some results.

### **13.4.2 Floods, Cyclones and Tsunamis**

Water is essential for life. Water cycle ensures that the water that drains into the sea, evaporates and comes back as clouds to rain and snow over the earth, bringing fresh water. However, there are certain phenomena associated with the flow of water in nature that can cause untold misery to human beings. Principal among these are: floods, cyclones, hurricanes, and landslides. Tsunami caused a great deal of damage in South Asian countries and,

therefore, we have included it in our discussion. We discuss some of these calamities briefly.

### Floods

Floods are the most common of all natural calamities (Fig. 13.3). Floods regularly claim thousands of lives and adversely affect millions of human beings annually worldwide. Bangladesh and India together account for over two-third of global death count each year. More than the loss of life and damage to property, millions of people are displaced every year due to floods in the South Asian countries.

**A flood is the discharge of water that exceeds the canal capacity of the river.** Floods are caused by different factors that include:

- climate extremes – heavy and prolonged rainfall
- melting of snow and ice
- collapse of dams
- deforestation and land slides
- silting of river beds reducing the carrying capacity of rivers
- lack of coordination between officials of adjoining countries or states facing similar problems.



**Fig. 13.3: Village is over flooded with water.**

It is possible to reduce the adverse effects of floods by construction of dams and reservoirs at appropriate places, strengthening the embankments on rivers and canals, improving the carrying capacities of rivers, canals and reservoirs by periodical deepening and deepening operations.

Weather forecasting and flood plain management techniques can help in minimising causalities and damage.

### Cyclones

One of the most common coastal calamities is the cyclone. Cyclones claim many lives and cause immense damage to property every year.

Cyclones are caused in the tropical belt when sea water gets heated up to 27° C and more, so that low pressure areas develop above the water levels. The low pressure areas remain stationary for three to four days and draw energy from the sea surface. As the pressure in the centre falls, the wind speed increases and cloud burst starts spiralling around the centre causing squalls. As the pressure falls in the centre, the winds in the surrounding areas rush inwards creating spirally moving storms. The cyclone then moves landward towards areas of lowest pressure. Strong winds and heavy rain destroy and annihilate weather comes in their way.

A tropical cyclone that struck northern Bay of Bengal in 1970 caused tidal waves of 6 meters height killing three hundred thousand people and destroying 65% of the total fishing capacity of the coastal region.

Today, with the advancement in weather prediction techniques, remote sensing satellites and cooperation between countries in sharing information on weather conditions, it is possible to predict the birth of a cyclone and monitor its movements to pinpoint the area where it is likely to hit the coast. In spite of this, the damage caused is very severe, the well planned relief operations going haywire in the last minute.

### Tsunamis

A tsunami is a wave in the ocean or in a lake that is created by a geological event. They are also known as tidal waves or seismic sea waves (Fig. 13.4). Most tsunamis are very weak and have heights of only a few centimetres. But the intensity varies from time to time. Near the place of origin tsunamis may have height of many meters. As they spread out or move into the deep ocean, their heights decrease. However, their heights increase again as the tsunami waves reach shallow water near impact areas. The expected heights for the larger tsunamis are around 9 – 20 meters. Tsunamis are most often caused by earthquakes and landslides. Volcanic eruptions can also cause tsunamis.



Fig. 13.4: A sight of Tsunamis.

On 26<sup>th</sup> December 2004 the Indian coastline experienced the most devastating tsunami in the recorded history. The tsunami was triggered by an earthquake of magnitude 9.0 on the Richter scale at 3.4° N, 95.7° E off the coast of Sumatra in the Indonesian Archipelago at 06:29 hrs IST (00:59 hrs GMT). It devastated the shores of **Indonesia, Sri Lanka, India, Thailand**, and other countries with waves of up to **15 m** high, even reaching the east coast of **Africa, 4500 km** west of the **epicentre**. Almost 79,900 people were killed by the earthquake and tsunami in Indonesia. Tsunami killed at least 41,000 people in Sri Lanka, 10,000 in India, and 4,000 in Thailand.

The mangrove forests and coral reefs are natural defences against tsunamis.

#### **Box 13.1 : Mangroves as a Shield**

“Though we cannot prevent the occurrence of such natural calamities, we should certainly prepare ourselves to mitigate the impact of the natural fury on the population inhabiting the coastal ecosystems. Our anticipatory research work to preserve mangrove ecosystems as the first line of defence against devastating tidal waves on the eastern coastline has proved very relevant today. The dense mangrove forests stood like a wall to save coastal communities living behind them,” said M.S. Swaminathan, Chairman, M.S. Swaminathan Research Foundation (MSSRF), Chennai. The mangroves in Pitchavaram and Muthupet region acted like a shield and bore the brunt of the tsunami. (The Hindu, 28 December, 2004).

The massive loss of life and property caused by Tsunami of 2004 could have been avoided if only we had an advance warning system. It was therefore decided to install the equipment required for predicting tsunamis. The indigenous warning system includes putting in place a Deep Ocean Assessment and Reporting System, around 20 data buoys and a software programme that would help predict the location, time and height of any tidal formations like tsunamis based on the changes and disturbances detected underwater following seismic changes. India has tied up with the Pacific Tsunami Warning Centre and countries such as Indonesia, Thailand and Myanmar for the required international co-operation in its proposed software programme for the networking of the available data on tsunami and deep water oceanic changes.

#### **13.4.3 Droughts**

**A ‘drought’ can be defined as a prolonged period of unusually dry weather, with little rainfall, in a region where rains are normally expected (Fig. 13.5).** As such a drought differs from a dry climate which is usually associated with a region that is normally or seasonally dry. Droughts often last for years. Drought is a creeping calamity because it develops slowly and has a prolonged existence.



**Fig. 13.5: A scene of drought hit region.**

#### **Box 13.2 : Drought in Rajasthan – 2000**

Rajasthan, the largest State in India with an estimated population of about **54 million** was in the grip of a **severe drought in the year 2000**. Out of the 32 total district in the State drought was prevalent in 31 districts and among these 25 districts were affected severely. Around 73.64% villages were under the clutches of drought; affecting nearly 33.04 million people and 39.97 million cattle. The severity of the drought could be judged from the fact that **out of a total of 2647 major water reservoirs only 300 were filled in that year. Also, nearly 75 to 100% crop had been destroyed due water scarcity**. All this caused loss of livelihood leading to mass migration in search of employment.

**Source:** <http://www.un.or.in/UNDMT/states/rajas/dstatus.html>

Though climate is usually the prime reason for the triggering of drought, the situation is often made worse by the way people use the water resources. Felling trees for firewood, denuding the forest for agricultural or housing purposes, mining, unscientific farming method, indiscriminate drawing of ground water are identified as causes of droughts. It is argued that serious droughts in developing countries are more a function of global development policies than climatic conditions.

Droughts produce a series of direct and indirect impacts that usually extend far beyond the area experiencing the actual water shortage. These may be classified as

**Economic** – loss of crop, dairy, livestock, fishery produce;

**Environmental** – Damage to plant and animal species, erosion of soils; and

**Social** – Food shortage, damage to health, conflicts between water users.

It is possible to take precautions in drought prone areas by constructing reservoirs, educating people in water conservation, scientific farming and optimal use of ground water resources.

Ground water, which is found in aquifers below the surface of the Earth, is one of the most important natural resources. Ground water accounts for about 38 percent of the water in India and the city water departments supply this to

households and businesses (public supply). It caters to the need of drinking water for more than 97 percent of the rural population.

We now recount an illustrative example of proactive water harvesting in India.

### Water Harvesting Measures

One of the effective measures to combat drought and the resulting water shortage is to adopt water harvesting measures. It means capturing rain where it falls or capturing the run off in your own village or town and taking measures to keep that water clean by not allowing polluting activities to take place in the catchment area. The water harvesting can be undertaken through a variety of ways. Some of these are:

- Capturing runoff from rooftops,
- Capturing runoff from local catchments,
- Capturing seasonal floodwaters from local streams, and
- Conserving water through watershed management.

These techniques can serve the following purposes:

- Provide drinking water,
- Provide irrigation water,
- Increasing groundwater recharge,
- Reduce storm water discharges, urban floods and overloading of sewage treatment plants.
- Reduce seawater ingress in coastal areas.

#### Box 13.3 : A Case Study of Hyderabad Metropolitan Water Supply and Sewerage Board

The Hyderabad Metropolitan Water Supply and Sewerage Board (HMWSSB) has set up an ambitious plan of taking up several water harvesting measures in the twin cities of Hyderabad and Secundrabad and its vicinity through active involvement of people to improve the ground water level. The water harvesting measures, under the Neeru-Meelu (Water and You) Programme, include construction of recharge pits or a mini-treatment units, planting saplings or any other action that would improve water recharge, and green cover which ultimately increase the ground water levels. They have plans to sensitise different opinion makers like ex-servicemen, retired officials, women's groups and NGOs.

The groups would be sensitised on motivational aspects and techniques of various water harvesting structures. The trained groups would in turn reach out to communities to explain its benefits. As part of the strategy, the Board has recently created water soldiers, by sensitising ex-servicemen. It has also proposed to involve the student community in a big way so that the schools, colleges and other institutions would contribute to the cause of improving ground water table, thus enabling it to cover 25% of the 7 lakh houses with some type of water harvesting method. You can find out more about this effort at the website:

Source : [http://www.hyderabadwater.gov.in/RWH\\_Note.html](http://www.hyderabadwater.gov.in/RWH_Note.html)

You may like to reflect on the issues discussed so far. Try the following SAQ.

## SAQ 3

Match calamities given in **Column A** with the statements of **Column B**:

<b>Column A</b>	<b>Column B</b>
i) Earthquakes	a) Discharge of water exceeding the canal capacity of the river.
ii) Flood	b) Caused in the tropical belt when sea water get heated up.
iii) Cyclone	c) A wave in the ocean created by geological events.
iv) Tsunami	d) A prolonged period of unusually dry weather with little rain falls.
v) Drought	e) Energy radiates in all direction from its epicentre.

## 13.5 PREPAREDNESS FOR DISASTER MANAGEMENT

There have been specific ways of countering and minimising natural disasters or calamities in general but some important strategies can be adopted.

Emergency preparedness is viewed as a programme of long term development activity whose goal is to strengthen the overall capacity and capability of a country to manage efficiently all types of emergencies and bring about an orderly transition from relief through recovery and back to sustainable development.

Emergency preparedness is an on-going multi-sectoral activity. It forms an integral part of the national system responsible for developing plans and programmes for emergency management, prevention, mitigation, preparedness, response, rehabilitation and reconstruction.

We now briefly describe the United Nations Environmental programme (UNEP) for disaster management.

### Box 13.4 : Prevention and preparedness to reduce the costs of disasters

The fundamental goal of the United Nations Environment Programme (UNEP) disaster management programme is to reinforce the centrality of environmental concerns in disaster management. The other cornerstone is the adoption of preventive strategies and practical measures to reduce the potential loss of human lives and property, as well as destruction of the environment.

The success of this approach depends on increasing public awareness of the risks that natural, technological and environmental hazards pose to societies, and on educating people about the value of existing approaches for prevention and preparedness. UNEP contributes on this process through its programmes on environmental law, early warning and assessment, and Awareness and Preparedness for Emergencies at Local Level (APELL).

APELL programme, developed in conjunction with governments and industry, recognises that the incidence and effects of environmental disasters can be reduced by prevention and preparedness initiatives at the local level. The APELL concept has been successfully introduced to more than 30 countries and in more than 80 industrial communities worldwide.

The figure below presents the framework for disaster management. You may like to examine its applications in your specific context and modify it.

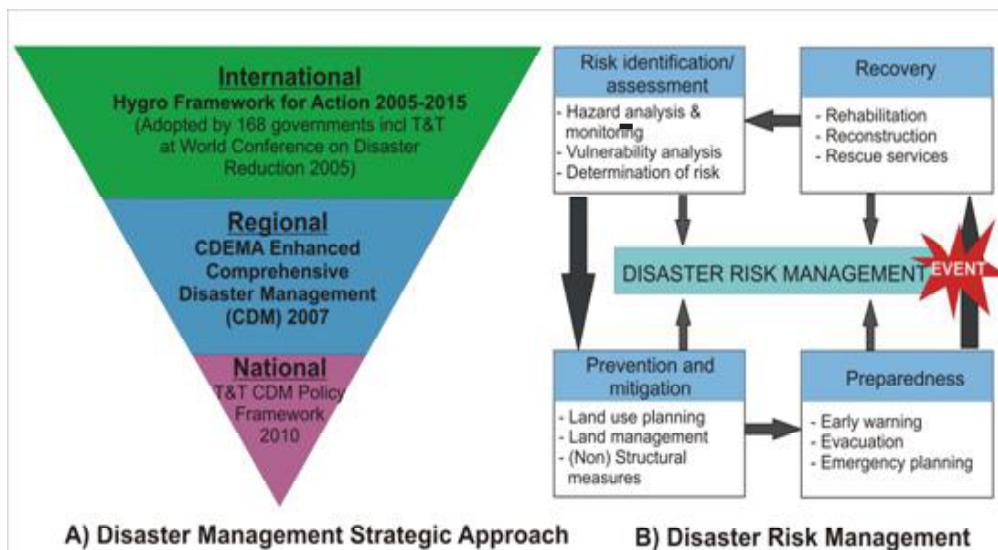


Fig. 13.6: A framework for disaster management.

Effective risk management of any calamity depends on the implementation of a sequential series of actions. The individual stages often overlap but it is crucial that they operate as closed loop because the major objective is to learn from the past experiences and prepare an action plan based on the feedback.

- Pre-planning covers a wide range of activities like construction of defensive engineering works, land use planning, formulation, dissemination and maintenance of evacuation plans;
- Preparedness for disaster management reflects the degree of alertness, immediately before and after the occurrence of calamity, arrangement for emergency warnings and preparedness based on earlier experiences;
- Response deals with events immediately before and after occurrence of the calamity and pressing into service relief activities;

- Recovery and reconstruction are long term activities that attempt to return to normalcy after the occurrence of the calamity.

It is unfortunate but true that environment is clearly not something which humans value. It is usually low on the priorities of people except when they are faced with threats to their own lives or immediate possessions.

We end this section with an exercise for you.

## SAQ 4

- What steps can be taken to prevent and mitigate human suffering due to droughts?

## 13.6 RESETTLEMENT AND REHABILITATION OF PEOPLE: PROBLEMS AND CONCERNS

It is a well-known fact that both natural and human made disasters force people to move out of their land. For example, Tsunami in South Asia in December 2004, Latur and Gujarat earthquakes, the Orissa super-cyclone and scores of floods and droughts in other parts of our country have rendered thousands of people homeless and jobless. Disasters, like the Bhopal gas tragedy in Union Carbide factory, derailment of trains, are examples of human made disaster. Landslides, common in the Himalayas, are example of nature's fury rendered damaging manifold due to faulty planning.

Strategies for rehabilitation of such displaced people are in the first place by way of preventive action. For instance, care is taken to build earthquake proof houses, gather advance information about cyclones and arrange for timely evacuation, build appropriate bunds in flood prone areas, maintain bridges that take regular up and down passing of trains/ road transport vehicles on them in order to avert likely disasters.

Secondly, advance preparation on the part of administration and local communities are made to face the consequences of sudden calamities. For both these, the primary necessity is that of creating awareness among the people in general and among administrative personnel in particular.

Development projects such as roads, dams and mining come into existence after a fairly long period of planning and awareness of displacement caused by such projects already exists among those who initiate the projects. Despite this, the project authorities pay little attention to the processes of resettlement and rehabilitation of displaced people. Those who give up substantial portions of their assets for the sake of development projects need to be recognized as stakeholders in development projects. They too should benefit from the development.

This section provides guidance for all stakeholders in collaborating to achieve equitable and appropriate support for all of the affected population, depending on their needs.

### **Shelter, Settlement, and Reconstruction**

1. Shelter is critical to survival. From the emergency phase until durable solutions, it is necessary to provide security and personal safety. Shelter and settlement support human dignity and family and community life.
2. More secure shelter in a safer settlement constitutes the immediate and sustainable physical foundation to livelihoods development.
3. Transitional reconstruction begins immediately after a disaster, as people recover what they can, however, for those affected badly it can often occur over a number of years. During transitional reconstruction, some people move, for example from owning an apartment to renting a house. For others, such as those squatting in informal settlements, a disaster may offer an opportunity for a sustainable and legal solution to their housing needs.

## **13.7 CASE STUDIES AND PEOPLE'S MOVEMENT**

Though legislations and regulations are the foundations of most environmental protection policies, the global nature of resources and pollution make international legislations and conventions essential. Public interest Litigations and People's Movement have also played very important role in environmental protection. In this section we will take up a few cases of PIL and people's movement in India against environmental degradation.

### **Taj Trapezium Zone**

Problem of pollution has now become so severe that it is not only affecting human health and livestock but it is also damaging buildings and monuments. Over the past four decades, the fate of the India's most emblematic monument, the Taj Mahal, has repeatedly come into the spotlight because of the ill effect of the pollution caused by the iron foundries, Mathura refinery, glass factories of Firozabad and brick kiln in the Taj Trapezium Zone (TTZ). This is the area around Taj spreading over 10,400 sq.km. On repeated occasions, sulphur dioxide emissions from industries in this area reached levels ten times above the prescribed standard level. Combined with oxygen and moisture, sulphur dioxide converts to highly corrosive acid, sulphuric acid.

Blaming pollution and regulatory negligence of Taj's decay, Mahesh Chandra Mehta, a prominent environmental lawyer, filed a case before the Supreme Court of India in 1984. Mehta pleaded with the court to order the various industries to take anti-pollution measures or to close. He also stressed that pollution was affecting the health of the workers and people living in Agra. Because of Mehta's efforts, in 1996, the Supreme Court finally ruled that the industries in the area were actively contributing to air pollution and ordered major industries units to install pollution control devices. "Not even one per cent chance can be taken when human life apart- the preservation of a prestigious monument like the Taj is involved," stated the court order. The court ordered 292 coal-based industries to switch to natural gas or else to relocate outside the protected zone by April 30, 1997. Because of the

opposition from industries and workers court order was not enforced completely. The Supreme Court struck again in 1997 ordering the closure of 53 iron foundries and 107 other factories in Agra that had not cleaned up their act. The Supreme Court later also banned cars and parking within 500 meters of the Taj's boundary walls. Experts agree that some of these measures have helped to improve air around the Taj.

### Chipko Movement

From the last 19<sup>th</sup> century the Himalayan forests, have been subject to rapid exploitation (Fig. 13.7). This large-scale destruction has led to severe ecological problems. Rapid soil erosion, growing frequency of floods, reduction in the availability of firewood and fodder, landslides and disappearance of water table, caused concern among people. In upper Alkananda Valley. People also resented the conversion of natural forests into monoculture plantations.



**Fig. 13.7: Chipko Movement.**

To check environmental degradation in this region, voluntary organizations like the Gangotri Gram Swarajaya Sangh (GGSS) in Uttarakashi and Dasholi Gram Swarajaya Mandal (DGSM) in Gopeshwar started Chipko Movement in the 1970s. Environmentalists like Chandi Prasad Bhatt and Sunderlal Bahuguna led the Chipko Movement in Garhwal Himalayas.

Chipko means to hug the tree. Volunteers in their attempt to stop commercial felling threatened to hug the trees if the saws came near them. Their activities popularised the movement through folk songs, street plays and widespread campaign. Its slogan was "What do the forest bear? Soil, water and pure air, Soil, water and pure air are the basis of life".

As a result of this struggle, the Government replaced the contractor system and formed Uttar Pradesh Forest Department Corporation (UDFDC) and the forest related activities were encouraged through local cooperatives. In 1981, as a response to Sunderlal Bahuguna's indefinite fast, the Government constituted an eight member expert committee to prepare a comprehensive report on the Himalayan forest policy. The government later put a fifteen-year moratorium on commercial tree fellings in the Uttrakhand Himalayas.

### Silent Valley Movement

This movement is regarded as one of the most important ecological movements in India. Silent valley is the narrow valley of the Kunthi River in the state of Kerala in the south west of India at high elevation (Fig. 13.8). Its 8950 hectares of rain forest is rich with valuable plants and animals. In 1973, the state government of Kerala decided to build a dam across the gorge in order to generate hydro electricity. It would have drowned valuable forest and threatened the loss of wild life. Even the government's ecological task force expressed its dissatisfaction over the loss of forest and wild life.



**Fig. 13.8: Silent Valley**

By 1979, students, voluntary organization like Kerala Sastra Sahitya Parishad (KSSP), science forums, teachers, progressive citizens and journalists began to work against the project. In 1979, Save Silent Valley Committee emerged. This hue and cry among all circles led the government headed by the then Prime Minister Mrs. Indira Gandhi, to set up a high-level technical committee chaired by Prof. M.G.K. Menon and accepted its recommendation that the project should not be proceeded with and that the Valley should be preserved as a precious biosphere reserve.

### SAQ 5

Fill in the blanks, with appropriate words.

- i) Both natural and human made ..... force people to move out of their land.
- ii) ..... is crucial to survival.
- iii) ..... has banned cars and parking within 500 meters of the Taj boundary.
- iv) ..... like Chandi Prasad Bhatt and Sunder Lal Bahuguna led chipko movement in Garhwal Himalayas.
- v) ..... is the narrow valley of the Kunthi river in the state of Kerala.

## 13.8 SUMMARY

Let us summarise what we have learnt so far:

- The primitive hunter-gatherers skilfully manipulated their environment in a way that it would not deplete future supplies. In contrast, agriculture has had a conspicuous impact on the environment. Industrial societies intensively utilized the environment.
- Industrialization surpasses the environmental impacts of permanent agriculture. For most of human history, people lived in small groups and population grew at a slow average rate. As a result of industrialization and medical development, average growth rate increased rapidly. The rapid increase in population size had severe effects on the other species, and, on the air, water and soil upon which we and other forms of life depend.
- The health of an individual is affected by genetic, behavioural and environmental influences. Disease represents a maladjustment of human beings to their environment.
- Since the individual of a community share a common environment, their health problems are generally common. Therefore, these are investigated and healthcare is planned at the community level.
- Most natural calamities like earthquakes, floods, droughts, and cyclones cannot be predicated in advance and when they occur they cause great loss of life and extensive damage to property and infrastructure. Natural calamities have been occurring from times immemorial but of late the damage caused has become qualitatively and quantitatively more.
- Under certain circumstances development can increase disaster proneness. The location of a dam in an area of high seismic activity, the construction of roads in difficult terrains or unstable geomorphologic conditions and promotion of water intensity crops in areas of unpredictable rainfall are examples of development measures dictated by policies of globalisation leading to or aggravating the phenomena of natural calamities.
- In spite of the absence of predication mechanisms to pinpoint the location, the timing and intensity of natural disasters, the preparedness, management, the pre and post operative mechanisms help in the mitigation of people's suffering and in reconstruction mechanisms.
- It is well known that both natural and human made disasters force people to move out of their lands.
- Strategies for rehabilitation and resettlement for displaced people are in the first place by way of preventive action. Provision of shelter is top priority.
- Taj Trapezium zone, Chipko movement, and Silent Valley movement Narmada Bachao Andolan are a few cases of PIL and people's movements in India against environmental degradation.

## 13.9 TERMINAL QUESTIONS

1. What factors have led to the rapid growth of population in the world? Why is it important to contain our population growth?
2. Discuss the causes of flood in your region? What steps can be taken to prevent and mitigate human sufferings due to floods, cyclone and tsunami?
3. Analyse the various dimensions of natural disaster management.
4. Describe the need for resettlement and rehabilitation of people following a natural disaster.
5. Discuss the following
  - a) Taj Trapezium zone
  - b) Silent Valley Movement
  - c) Chipko Movement.

## 13.10 ANSWERS

### Self-Assessment Questions

1. (i) nomadic      ii) 1800, growth      iii) 2018      iv) natural
2. A.    iii), vi), vii)  
B    a) v    b) iii    c) i    d) ii    e) iv
3. i) e    ii) a    iii) b    iv) c    v) d
4. The question is based on section – 13.4 but while answering this question you refer to subsection 13.3.3 with regard to drought.
5. (i) disasters    (ii) shelter    (iii) Supreme court    (iv) Environmentalists  
(v) Silent Valley

### Terminal Questions

1. Refer to section 13.2
2. Refer to sub-section 13.4.2
3. Refer to section 13.5
4. Refer to section 13.6
5. Refer to section 13.7

## 13.11 FURTHER READING

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### Acknowledgement

1. Fig. 13.4: A sight of Tsunamis.

Source: <https://www.sutori.com/item/untitled-264a-d50b>

2. Fig. 13.5: A scene of drought hit region.

Source: <https://www.thehindu.com/sci-tech/A-video-on-groundwater-depletion-in-India/article16876049.ece>

3. Fig. 13.7: Chipko Movement.

Source: <https://www.indiatimes.com/news/india/chipko-andolan-was-the-strongest-movement-to-conserve-forests-india-needs-it-again-342183.html>

4. Fig. 13.8: Silent Valley

[https://commons.wikimedia.org/wiki/File:Kunthipuzha\\_River\\_in\\_Silent\\_Valley\\_National\\_Park.jpg](https://commons.wikimedia.org/wiki/File:Kunthipuzha_River_in_Silent_Valley_National_Park.jpg)

# ENVIRONMENTAL ETHICS

## Structure

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- |      |                                  |       |  |
|------|----------------------------------|-------|--|
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| 14.2 | Ethical Use of Natural Resources |       | Jainism  |
| 14.3 | Three Views about Nature         |       | Buddhism   |
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|      | Anthropocentrism                 |       | Islam  |
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| 14.7 | Environmental Racism             | 14.12 | Terminal Questions   |
|      |                                  | 14.13 | Answers  |
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## 14.1 INTRODUCTION

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In Unit 13 we have discussed human population growth and its impact on environment and human health and the issues related to natural disasters together with problem of resettlement and rehabilitation. In this unit, we will discuss about many social issues in terms of ethical and moral dimensions in respect of environmental management.

Many environmental problems are in fact social issues in terms of moral and ethical values. Building a just, stable, harmonious world for the future generations should be the central organising principle for civilisation.

This unit reviews the environmental ethics, our views and beliefs about nature and environment, issues of environmental equity, environmental crisis, environmental justice and

racial discrimination at the policy and public level in managing the environment, and teachings about environment in the major religions practiced in South Asia.

## Expected Learning Outcomes

After studying this unit, you should be able to:

- ❖ discuss different ethical approaches and attitudes towards nature and environmental management;
- ❖ explain the importance of equity for environmental management;
- ❖ discuss the necessity of justice in dealing with environmental crisis;
- ❖ describe the effects of discriminatory policies and plans for environmental management; and
- ❖ explain the teachings of different religions about environmental management.

## 14.2 ETHICAL USE OF NATURAL RESOURCES

The release of noxious gases into the atmosphere, the destruction of forests and the over-exploitation of natural resources have caused irreversible environmental damage throughout the world. In some cases the damage is so severe that life-support systems, both local and global, are being threatened. Unless we curb our desire for more and more material possessions and unceasing economic growth, continued ecological damage will be unavoidable. To solve our environmental problems, there has to be a change in the way we think about and the way we interact with our environment.

Ethics, seeks to define as to what is right and what wrong we have done on a universal basis. For example stealing, lying, cheating, killing and indifference to the well-being of others are considered to be unethical. Preserving human life, concerns for others, honesty and truthfulness are considered to be ethical.

Moral values reflect the dominant belief of a particular culture about what is right and what is wrong. For example killing a person is wrong but during the wartime, killing an enemy soldier is not considered as an immoral act. It is difficult to define what is wrong and what is right because of the differences in cultural and religious beliefs. Some individuals consider it unethical, immoral to unnecessarily waste resources while others argue that maximising consumption is a moral act because it promotes the economic growth, that is a source of jobs and funds for helping the poor and protecting the environment.

When we use the term "Environmental Ethics" we refer to it as a discipline that studies the moral relationship of human beings, and also the value and moral status of the environment and its non-human contents.

Why do we need a new set of ethics for the environment? The answer includes three factors.

1. **New effects on nature:** As our modern technological civilisation affects nature greatly, we must examine the ethical consequences of these new technological actions.
2. **New knowledge about nature:** Modern science demonstrates as to how we have changed and are in the process of changing our environment in ways not previously understood, thus raising new ethical issues. For example, until the past decade, few people believed that human's activities could be changing the global environment. Now, scientists however, believe that burning fossil fuels and clearing forests have increased the amount of carbon dioxide in the atmosphere, and that this causes changes in our climate. Hence the emphasis is on a global perspective.
3. **Expanding moral concerns:** Some people argue that animals, trees, and even rocks have normal and legal rights. These expanded concerns lead to a need for a new ethic.

For most of human history, ethics has concentrated on "human rights", the rights of individuals, of families and ethnic groups. However ethics now include the rights of animals, plants and the environment beyond the human rights to rule and use them.

## 14.3 THREE VIEWS ABOUT NATURE

There are essentially three views of nature:

1. The Western (European and North American),
2. The Sineatic (Chinese, Korean and Japanese) and
3. The Indian (a combination of Hindu, Buddhist and Jain philosophies).

In the past the western view considered that nature was alien and hostile to human beings; it had to be conquered, and subsumed under human control.

The Sineatic concept of nature is that it is beautiful and perfect, but it has to be transformed to be loved. Nature creates an aesthetic awe. "Rather than being hostile, humans are part of nature, in the Sineatic view, human being have their place in nature".

The Indian spiritual tradition combines perspectives on nature from Hinduism, Buddhism and Jainism. In this case, nature is a mother. She cannot be tamed by her children. She is a Goddess.

## 14.4 ATTITUDES TOWARDS NATURE

The way we treat the environment reveals much about our beliefs regarding ourselves and the world around us? Some people regard human beings as merely one of the many species of animals; others view human being's role as caretaker or stewards of nature. This differing points of view often lead to contradictory environmental policies. Let us see some of the popular points of view towards environment.

#### **14.4.1 Anthropocentrism**

The people having an anthropocentric or human centred attitude towards nature assign significantly greater value to human being than any other non-human organisms or things. According to anthropocentric attitude, protection or promotion of human interests or well-being at the expense of nonhuman things turns out to be nearly always justified. Aristotle maintains that 'nature has made all things specifically for the sake of man' and that the value of nonhuman things in nature is merely instrumental.

In the early 1970s, with the emergence of environmental ethics as a new discipline, a challenge was posed to anthropocentrism. Environmental ethics questioned the assumed moral superiority of human beings over other species on earth and the rationales for assigning intrinsic value to natural environment. However, some theorists working in the field see no need to develop new, non-anthropocentric theories. Instead, they advocate what may be called *enlightened anthropocentrism* (or, perhaps more appropriately called, *prudential anthropocentrism*). Briefly, this is the view that all the moral duties we have towards the environment are derived from our direct duties to its human inhabitants.

#### **14.4.2 Stewardship**

Many tribal or indigenous people, both hunter-gatherers and those in traditional agricultural societies, have a strong sense of stewardship or responsibility for a particular part of nature. As custodian of resources, they see their proper role as working together with human and non-human forces to sustain life. Humanity and reverence are essential in this worldview, where humans are seen as partners in the natural process rather than masters-not outside of nature but part of it. Stewardship requires a person to consider the entire universe as her or his extended family, and all living organisms are members of the household. In this humane view, stewardship need not reject science or technology. If we are part of nature, then our intelligence and discoveries are parts of nature too. As stewards of our environment, we have a duty to use the power of science and technology to improve rather than destroy or degrade the world.

#### **14.4.3 Ecofeminism**

Many feminists argue that neither anthropocentrism, nor stewardship is sufficient to solve environmental problems or to tell us how we ought to behave as moral agents. They argue that all these philosophies have come out of a patriarchal system based on domination and duality. This worldview assigns prestige and importance to some things but not others. It claims that men are superior to women, minds are better than bodies, and culture is higher than nature. Feminists see an important connection between patriarchal domination, exploitation, and ill-treatment of woman, children, minorities and nature.

Ecofeminism is radically a new vision. It is rooted in women's biological, procreative and maternal role. Ecofeminism finds instant rapport with Eastern

concepts of 'Mother Nature'. According to some experts on the subject, 'The capitalist, patriarchal World system' is founded upon and sustains itself through three 'colonisations' - of women, of foreign people and their lands and of nature. The ecology of nature is linked to the biology of women's bodies, and the exploitation of nature to the exploitation of women's wombs. It is anti-modern science and economic growth, as both are characteristic of a violent male ethos. It envisions a work of subsistence life style, in harmony with nature and pervaded by 'feminist principle'. For the greater good of both man and woman, ecofeminism seeks to forge a 'new sexual and reproductive ecology'.

Ecofeminist, a pluralistic, nonhierarchical, relationship oriented philosophy suggests that humans could reconsider their relationship to nature in nondominating ways and this is proposed as an alternative to patriarchal systems of domination. Ecofeminism is concerned not so much with rights, obligations, ownership and responsibilities as with care, appropriate reciprocity and kinship. It promotes a richly textured understanding or sense of what human life is and how this understanding can shape people's encounters with the natural world.

According to this philosophy, when people see themselves as related to others and to nature, they will see life as bounty rather than scarcity, as a network of personal relationships rather than isolated egos. However, Ecofeminism has been subjected to severe criticism for its impracticability and its peculiar biases and distortions. It is argued all development is not patriarchal and anti-women.

#### **14.4.4 Biocentrism and Ecocentrism**

Many modern environmentalists criticise stewardship as being too anthropocentric. They instead favour the biocentric attitude thinking that all living organisms have values and rights regardless of whether they are useful or not. Aldo Leopold, in his famous essay on the Land ethic, included the whole biotic community as part of the land. Leopold pointed out that the history of civilisation has been accompanied by a gradual extension of inherent values and rights, first to men, then to women, children and minorities and more recently to nonhumans such as corporations and states. Leopold argues that values should be extended to the recognition of inherent worth to other organisms as well.

Some philosophers assert that even nonliving components of the landscape such as rocks, rivers, mountains or ecological processes such as succession or the hydrological cycle have a right to exist in their natural state without human interference. This attitude is described as ecocentric because it claims moral values and rights for both organisms and ecological systems. People having anthropocentric approach believe that the environment is in perfect balance until the evolution of modern humans who have disrupted the web of life in their quest to dominate nature; a quest which is leading to their own destruction if they do not relearn to live in harmony with the natural world.

## SAQ 1

Match Column A with Column B:

### Column A

- i) Western view
- ii) Anthropocentrism
- iii) Stewardship
- iv) Ecofeminism
- v) Biocentrism and Ecocentrism

### Column B

- a) Strong sense of responsibility for a particular part of nature
- b) All living organisms have values and rights
- c) All philosophies have come out of a patriarchal system
- d) God created humans in his own image
- e) Nature was alien and hostile to human being

## 14.5 ENVIRONMENTAL EQUITY

An ideal of equal treatment and protection for various racial, ethnic, and income groups under environmental statutes, regulations, and practices are applied in a manner that yields no substantial differential impacts relative to the dominant group - and the conditions so-created. Although environmental equity implies elements of “fairness” and “rights”, it does not necessarily address past inequities or view the environment broadly, nor does it incorporate an understanding of the underlying causes and processes.

There are three categories of environmental equity issues:

### **14.5.1 Procedural Inequity**

This issue addresses the questions of fair treatment: the extent that governing rules, regulations, and evaluation criteria are applied uniformly. Examples of procedural inequity are “stacking” boards and commissions with pro-business interests, holding hearings in remote locations to minimise public participation, and using English-only material to communicate to non-English speaking communities.

### **14.5.2 Geographical Inequity**

Some neighbourhoods, communities, and regions receive direct benefits, such as jobs and tax revenues, from industrial production while the costs, such as the burdens of waste disposal, are sent elsewhere. Communities hosting waste-disposal facilities receive fewer economic benefits than communities-generating the waste.

### **14.5.3 Social Inequity**

Environmental decisions often mirror the power arrangements of larger society and reflect the still-existing racial bias in these States. Institutional racism has influenced the noxious facilities and has let many black communities become “sacrifice zones”.

## 14.6 ENVIRONMENTAL JUSTICE

The right to a safe, healthy, productive, and sustainable environment for all, is the one where “environment” is considered in its totality to include the

ecological (biological), physical (natural and built), social, political, aesthetic, and economic environments. Environmental justice refers to the conditions in which such a right can be freely exercised, whereby individual and group identities, needs, and dignities are preserved, fulfilled, and respected in a way that provide for self-actualisation and personal and community empowerment. This term acknowledges environmental “injustice” as the past and present state of affairs and expresses the socio-political objectives needed to address them. *“Environmental justice has been defined as the pursuit of equal justice and equal protection under the law for all environmental statutes and regulations without discrimination based on race, ethnicity and /or socioeconomic status.”*

This concept applies to governmental actions at all levels - local, state and central as well as private industry activities. Providing environmental justice goes beyond the stated definition and includes a guarantee of equal access to relief and meaningful community participation with government and industry decision-makers.

## 14.7 ENVIRONMENTAL RACISM

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It is sometimes thought that environmentalism is an elitist movement, for those who have money and leisure, and who can afford to worry about maintaining open spaces for recreation, and preserving economically valueless species as a matter of principle. It is said that from the point of view of the poor, providing jobs and a good standard of living should have higher priority than a clean environment, which is a luxury that comes after other needs are met.

However, others believe that the environmental consequences of our use of natural resources fall disproportionately on certain disadvantaged racial, ethnic, and socioeconomic groups. For instance, a good case could be made that hazardous waste sites are usually located in disadvantaged communities, and in disadvantaged nations, and that the people in these locations bear the consequences of the use of hazardous materials, without reaping the benefits proportionately. The environmental justice movement is concerned with such issues.

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### SAQ 2

Fill in the blank with appropriate word:

- i) ..... decisions often mirror the power arrangements of larger society.
- ii) Environmental justice affirms the sacredness of mother .....
- iii) Environmental ..... demands the right to participate equal partners.
- iv) ..... is an elitist movement for those who have money and leisure.
- v) ..... tend to be poor and more disadvantaged than others working in the dirtiest .....

## 14.8 RELIGIOUS TEACHINGS ABOUT ENVIRONMENT

World religious and individual spiritual traditions can provide a framework for changing our attitudes. World religions teach us that the land, rivers, mountains, minerals, oceans are held in trust for God, but can be wisely used for the general welfare of humanity. Put another way, our religions tell us that we should consider ourselves only as trustees of the universe, and as trustees we are authorised by God to use natural resources, but we have no divine power over nature and the elements. From the perspective of many religions, the abuse and exploitation of nature for immediate gain is unjust and unethical.

All religions and cultures have something to offer to conservation and environment protection. From each religion, several injunctions or exhortations can be brought forth to form a code for environmentally sustainable development. No religion says that we have the right to destroy our habitat, and no religion sanctions environmental destruction. On the contrary, penalties and admonitions are mentioned for those who do so. This is amply demonstrated in the codes of all the religions. A brief review of teachings about respect of nature and conservation of natural resources as given by Hinduism, Jainism, Buddhism, Christianity, Islam and Sikhism is given in the following sections.

### 14.8.1 Hinduism

In Hinduism one finds a most challenging perspective on respect for nature and environmental conservation, and the sanctity of all life on this planet and elsewhere is clearly ingrained in this religion. Only the supreme God has absolute sovereignty over all creatures, including humans. Human beings have no dominion over their own lives or over non-human life. Consequently they cannot act as viceroys of God, nor can they assign degrees of relative worth to other species. The sacredness of God's creation demands that no damage may be inflicted on other species without adequate justification. Therefore all lives, human and non-human, are of equal value, and have the same right to existence.

According to Hindu scriptures people must not demand or take dominion over other creatures. They are forbidden to exploit nature; instead they are advised to seek peace and live in harmony with nature. The Hindu religion demands veneration, respect and obedience to maintain and protect the harmonious unity of God and nature. This is demonstrated by a series of divine incarnations, as enunciated by Dr. Karan Singh in the Assisi Declaration:

*The evolution of life on this planet is symbolised by a series of divine incarnations beginning with fish, moving through amphibious forms and mammals, and then on into human incarnations. This view clearly holds that man did not spring fully formed to dominate the lesser life forms, but rather evolved out of these forms itself, and is therefore integrally lined to the whole of creation.*

Almost all the Hindu scriptures place strong emphasis on the notion that not killing His creatures or harming His creation can receive God's grace. Many trees and plants were worshipped during the time of Rig. Veda (about 1500 BC) because they symbolised the various attributes of God.

Environmental awareness was realised even in the pre-vedic period. There are references to 'Tree Worship' in Mohanjodaro and Indus civilisations.

Environmental awareness was more manifest among humans during the Vedic period. The concept Aranyani the queen of forests identical to the concept of tree Goddesses of Indus people. Aranyanis are worshiped as the presiding spirit of forests, conceived as women is praised, honoured by herbs and described as mother of wild animals (Rigveda). Instances of attribution of divinity to plants are found in Rigveda and Atharvaveda.

Animals and nature were revered along with Gods. Hanuman and Ganapati are the most powerful deities, Peepal, Ganga, Himavan, Tulsi, Banyan trees are considered holy even today.

Vedic man identified at least four major components – Sun, Agni, Prithvi, and Sky that sustained life and therefore worshiped them as deities.

(O king of trees, these are Brahma by your root Vishnu by the middle of our body and Shiva by your front. Thou combine all the deities. We salute you. Disease vanish at your sight and by touch of you the sins Vanish. Ever cool and lasting. We salute you. (Rigveda 1-48-5).

Charrik Samhita, classical literature on Ayurvedic medicines, deals with divine herbs, with deep insight into preservation of environmental balance to benefit personal health and pollution free environment.

Planting of Trees has been proclaimed as conductive to great merit in Purans. Agni Purana and Varah Purana mention the benefits arrived from trees.

Durga Shaptasati prescribes so long as mother earth is full of trees and forests with hills, she would continue to nurse and rear the human race.

Ecological balance between nature and human beings has been depicted as part and parcel of human life and a sense of reciprocity has been felt. Such reciprocity finds references in kautilya's Arthashastra for state policies.

Through such exhortations and various writings, the Hindu religion provides moral guidelines for environmental preservation and conservation. From the perspective of the Hindu, culture the abuse and exploitation of nature for selfish gain is considered unjust and sacrilegious.

## **14.8.2 Jainism**

Jainism places great emphasis on the principle that one should refrain from avoidable acts that are harmful to others. According to Jainism violence grows out of passion, and one who has passion causes self-injury. Preventing injury to oneself and others is accomplished through control of speech, control of thought, regulation of movement, care in taking things up and putting them

down, and examining food and drink, and a vow is taken by Jains to do all of these things.

Ahimsa (non-violence), which is the fundamental tenet of the Jain way of life, a term that is clearly allied with realism, common sense, and personal worth, and responsibility. It touches the deepest and noblest aspects of human nature: *'it adheres to the universal law which states that like, order comes of order, and peace can only be achieved through peace.* It maintains that in all situations the ends and means are one and the same, and that truth, honesty and compassion must be the foundation of any truly civilised community.

### **14.8.3 Buddhism**

At the very core of the Buddhist religion are compassion, respect, tolerance and ahimsa (non-injury) towards all human beings and all the other creatures that share this planet.

Buddha also set down rules forbidding the pollution of rivers, ponds and wells. As Buddha says in Sutta-Nipata:

*Know ye the grasses and the trees .... Then know ye the worms, and the different sorts of ants.... Know ye also the four-footed animals small and great... the serpents... the fish which range in the water... The birds that are borne along on wings and move through the air....*

Buddhists regard the survival of all species as an undeniable right, because as co-inhabitants of this planet, they have the same rights as humans. In Buddhism the rivers, forests, grass, mountains and night are highly respected and regarded as bliss bestowers. Buddhist thinkers have always had great respect for the sun, moon and other planets.

The teachings of Buddhism have concentrated on the theory of Karma and the theory of cause and effect. They demonstrate that unmindful neglect of these principles of right living may lead to chaos, and thus to environmental crisis. That is why there should be no exploitation of nature beyond what is needed for survival, and if we believe that all life forms are interconnected, our exploitative tendencies towards nature can be controlled. This message that all life is interconnected and should be cared for – is the foundation of the Buddhist ethics of nature.

### **14.8.4 Christianity**

There is a common thread in the Old and New Testaments concerning the concept of nature and the rules governing our responsibility to it. Although certain verses in Genesis (1:26 and 1:28) have been interpreted as giving humans dominion and absolute control over nature, there are places where the responsibility of human beings has been clearly delineated. For example “*And the Lord God took the man and put him into the Garden of Eden to dress it and keep it*” (Genesis 2:15).

The word ‘dress’ has been interpreted as the duty of man to manage, and the word ‘keep’ has been interpreted as protecting the natural world from harm.

Furthermore the scripture clearly establishes God as the sole owner of the natural world, while humanity is actively responsible for the care of the world:

*'The earth is the Lord's and everything in it, the world, and all who live in it'.*  
(*Psalm 24:1*), and

*Every animal in the forest is mine, and the cattle on a thousand hills* (*Psalm 50:10*)

Furthermore, we are advised that we have no rightful ownership over the land: 'because the land is mine, and you are but aliens and my tenants.'

The Bible also confirms that the purpose of creation is to proclaim God's glory because it is His handiwork. Divine life is actively manifested in and through the created world. As such the Earth is not to be considered as a lifeless entity or a means to some higher end. To an extent, a harmonious triadic relationship exists between the divine and humanity, among human beings themselves, and between human beings and nature, and failure to maintain this harmony may alienate humanity from its creator and also from nature.

#### **14.8.5 Islam**

In Islam the Holy Quran and the divinely inspired words of Prophet Muhammad (Peace be upon him) form the foundation of and rules for the conservation of nature. The Quranic message is one of unity, harmony, balance and order. The Quran stresses that nature's laws must be observed, and that defined limits should not be exceeded. Man was created so that he could become a manifestation of divine attributes and serve as a mirror to reflect the beautiful image of God. The Quran says:

*"Surely, your Lord is Allaha, who created the heavens and the earth in six days.... His is to create and to govern (Quran 7:54). And there is not a thing but we have unbounded stores there of and We send it in regulated quantities (Quran 15:21). Indeed, we have created everything in proportion and due measure (Quran 54:49).*

Thus everyone has to observe the balance and acknowledge that certain limits should not be exceeded. In other words humanity has only a guardianship role in God's heaven and earth, and not a position of outright ownership; this guardianship has obligations. The Islamic ethic holds that we have a choice in our interaction with nature. People have been given the intellect and the ability to decide what is just and unjust; what is right and what is wrong.

According to Islam the riches of the earth are a common heritage. Everyone may benefit from them, make them productive, and use them for their own well-being and improvement, but our quest for progress and development must not be detrimental to the environment; instead it should ensure conservation.

In both the Quran and the Shariah, the legal codes of Islam, the rights of the natural world are strongly expressed and the abuse of them by humans is condemned. The Quran says:

"He set on the Earth, firmly rooted, mountains rising above it, and blessed the Earth and provided sustenance for all, according to their needs.

### **14.8.6 Sikhism**

Baba Guru Nanak Dev, the founder of the Sikh religion, assigned divine attributes to nature. According to Sikhism, people should respect God's creations and know the eternal truth regarding their place in the universe. God had not granted any special or absolute power to humans to control and dominate nature. To the contrary, the human race is an integral part of nature and is linked to the rest of creation by indissoluble bounds.

God Himself is the source of the birth, sustenance and eventual destruction of all living organisms. It is He who created the universe through His divine will and with His word. According to the Sikh holy book, the *Guru Granth Sahib*, 'From the Divine Command occurs the creation and the dissolution of the universe. The basis of creation was divine will, and the universe was produced by *His Hukum* (command). However, it should be noted that God is submerged in creation, as stated in the *Adi Guru Granth Sahib* (p.16)

*From Primal truth emanated air*

*From air emanated water*

*From water emanated three worlds*

*And Himself the merged with the creation*

Sikhism teaches that the natural environment and the survival of all life forms are closely linked in the rhythm of nature. The history of the Gurus contains many stories of their love and special relationship with the natural environment – with animals, birds, vegetation, earth, rivers, mountains and the sky.

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### **SAQ 3**

Match the religious teachings given in Column B with that of religious philosophies of Column A.

**Column A**

- i) Hinduism
- ii) Jainism
- iii) Buddhism
- iv) Christianity
- v) Islam
- vi) Sikhism

**Column B**

- a) Compassion, respect, tolerance and ahimsa
- b) God took the man and put him into the Garden
- c) Riches of the earth are a common heritage
- d) People should respect God's creation
- e) Violence grows out of passion
- f) Human beings have no dominion over their own live

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### **14.9 ENVIRONMENTAL COMMUNICATION AND AWARENESS**

Education for environmental awareness is essential for the younger generation as well as for the older generation. It also needs to cover both urban and rural

population. The beneficiaries at the grassroot level are as much a clientele for environmental education as are the policy makers, the decision makers and the project implementers. Hence, environment education needs to be conveyed to these different categories of people through formal education systems, non-formal education systems and the use of mass media.

### **14.9.1 Among Students Through Education**

Education in India is mainly a state subject and the responsibility is that of the Ministers of Education at the Centre and the States. The education system is divided into two major stages, namely, school and university education. Let us see what is the place of environment education at these two levels.

#### **Stage-wise content**

**School stage:** Four components are required to build up the social awareness about environment education at the school level. These are awareness, exposure to real life situations, concepts of conservation and sustainable development. These four considerations can be further adjusted in terms of the requirements at primary, secondary and higher secondary levels.

Awareness involves making the individual conscious about the physical, social and aesthetic aspects of environment. One has to appreciate the fact that humans are only one of the numerous species on the Earth; they are linked with the life support systems with six elements: air, water, land, flora, fauna and sunlight. These elements are crucial to the well being of human kind as well as other species.

Real-life situations bring people closer to the environment. These conditions are location-specific, with different environment aspects being emphasised in different areas.

As far as conservation and sustainable development are concerned, the main focus would be on sustainable utilisation of resources and not on exploitation. Contrary to the earlier notion of resource like water, soil and air being unlimited, the emphasis is now on their finite nature and thus the limits to the growth of living systems. Sustainable development aims at utilisation of resources not only by the present generation but their preservation for the future generations also, so that life can be sustained for a long period of time. Population growth and planning also form a part of this thinking.

At the primary stage of education, greater emphasis could be laid on awareness followed by real-life situation and conservation. This would prepare the child to understand the need for sustainable development at a later stage. The focus could be on sensitising child to environment. From the lower secondary stage onwards, the emphasis on awareness will begin to decrease in favour of increased knowledge about real-life situations, conservation and sustainable development. And at the higher secondary stage, conservation should get a priority over other factors. The methodologies may range from observation to practical experiences and action-oriented feedback. The school as well as college education on environment may be summarised as follows (Table. 14.1)

**Table 14.1: Summary of school and college education on environment**

<b>Stage</b>	<b>Objectives</b>	<b>Content</b>	<b>Teaching Strategy</b>
Primary	Awareness	Surroundings from home to outdoor situations	Audio-visual and field visits
Lower Secondary	Real life experiences, awareness and problem identification	As mentioned above for primary stage and general sciences	Classroom teaching, practicals, and field visits
Higher Secondary	Assimilation of knowledge, problem identification and action skills	Science based and action oriented work	Classroom teaching and field work
Tertiary/ College	Sustainable development, based on experience with conservation	College/University based on Science and Technology	Classroom teaching, practicals and action oriented field work

For the school stage, National Council of Educational Research and Training (NCERT) has done substantial work in designing syllabi, developing suitable text books and support materials like guide books, charts and video tapes.

**University Stage:** University education has three major components – teaching, research and extension, the last being the weakest link. In higher education, irrespective of the field- medical, engineering, science, fine arts, management or law – the relevant aspects of environment should be part of the curriculum.

#### **14.9.2 Among General Population Through Various Media**

So far we have been dealing with the clientele which are well defined and within the boundaries of formal education system. But there is a need to cut across the boundaries of illiteracy and reach the masses. This can be done only through the channels of adult education. Though programmes for adult education are already in progress and are duly emphasised by the New Education Policy, the time has come to emphasise environmental education for sections like women, tribals, agricultural labour, slum-dwellers and residents of drought-prone areas. The neoliterates from these groups will help to spread the environmental message to the grassroots level. Voluntary agencies have played an important role in adult education apart from the Directorates of Adult and Continuing Education. Some methods for creating environmental awareness are:

- i) Incorporation of topics in regional languages and local dialects in the primers of adult education programmes.
- ii) Information packs like posters, slides and audio-visual materials which can be utilised by the adult education centres as well as by the workers of other development agencies like agricultural extension services and primary health centres.
- iii) Special exhibitions and programmes in rural areas at the time of fairs and festivals.

### **14.9.3 Among Functionaries and Opinion Leaders Involved with Environmental Management**

There are various kinds of people engaged as functionaries in environment management. They may be government officers at various levels and in various departments like irrigation, power, agriculture, industry, health, town planning. There are voluntary organisations also working actively in these areas. Politicians and social workers also get involved in environmental issues from time to time. Those functionaries and leaders who are concerned with critical decisions should be given necessary orientation and training from time to time through carefully designed courses at their training institutions or in specialised institutions.

The National Institute of Rural Development can play an important role as far as rural functionaries are concerned. The University Department of Environment Studies/Sciences can also undertake such orientation or training colleges and programmes for specific groups. All state governments have their staff training colleges and programmes. Environmental education should become a necessary part of their curricula. The Department of Environment of the government should have a list of clientele group for systematic orientation. They should plan a series of publications for mailing to these people regularly. It should be the responsibility of the functionaries and opinion leaders to first get educated in these matters and pass this information on the other levels.

Ministry of Environment, Forests and Climate Change, Govt. of India has created an information system called ENVIS. Its main centre is located in Delhi and it has been entrusted with the responsibility to collect, compile and provide information on different aspects of environment to the users.

ENVIS can also provide information on a large number of topics related to environment as given in Table 14.2. This is, in fact, a major success. Functioning of ENVIS is being improved steadily.

**Table 14.2: ENVIS centres and areas of their activities**

Institutions	Area
Central Board for the Prevention and Control of Water Pollution, (CPCB) New Delhi	Pollution control (water & air)
Industrial Toxicology Research Centre, (ITCR) Lucknow	Toxic chemicals
Society for Development Alternatives, (SDA) New Delhi	Environmentally sound alternatives, appropriate technology
Environmental Service Group, (ESG) New Delhi	Media and Parliament related to environment
Institute for Coastal & Offshore Research, (ICOR) Andhra University, Visakhapatnam	Coastal and offshore ecology; Remote sensing for environmental mapping; and Eastern Ghats ecology
Tata Energy Research Institute, (TERI) New Delhi	Renewable energy resources and environment
Centre for Environmental Studies, (CES) College of Engineering, Anna University, Chennai	Eco-toxicology, Bio-degradation of wastes; Environmental impact assessment and systems analysis
Centre for Theoretical Studies, (CTS) Indian Institute of Science, Bangalore	Western Ghats ecology
Environmental Planning & Coordination Organisation, (EPCO) Department of Environment, Bhopal	Environmental management
National Institute of Occupational Health, (NIOH), Ahmedabad	Occupational health

In addition to the National Environmental Awareness Campaign, the Ministry of Environment, Forest and Climate Change provides funds for organising eco-clubs in educational institutions, for holding seminars and workshops, for making films on environment and various other activities which can create awareness. State Governments also allocate funds for this purpose.

Communication media like Doordarshan, and All India Radio also highlight and project the importance of environment. As a result general consciousness towards environment has grown during the last few years. Now, we find that environmental issues are discussed even by common people. Ministry of Environment, Forest and Climate Change, Government of India, has also brought out a Directory of Voluntary Organisations working in the field of environment under its ENVIS programme.

Propagation of environment awareness programmes needs a lot of searching and hunting. This process can be summarised as given in Fig. 14.1.

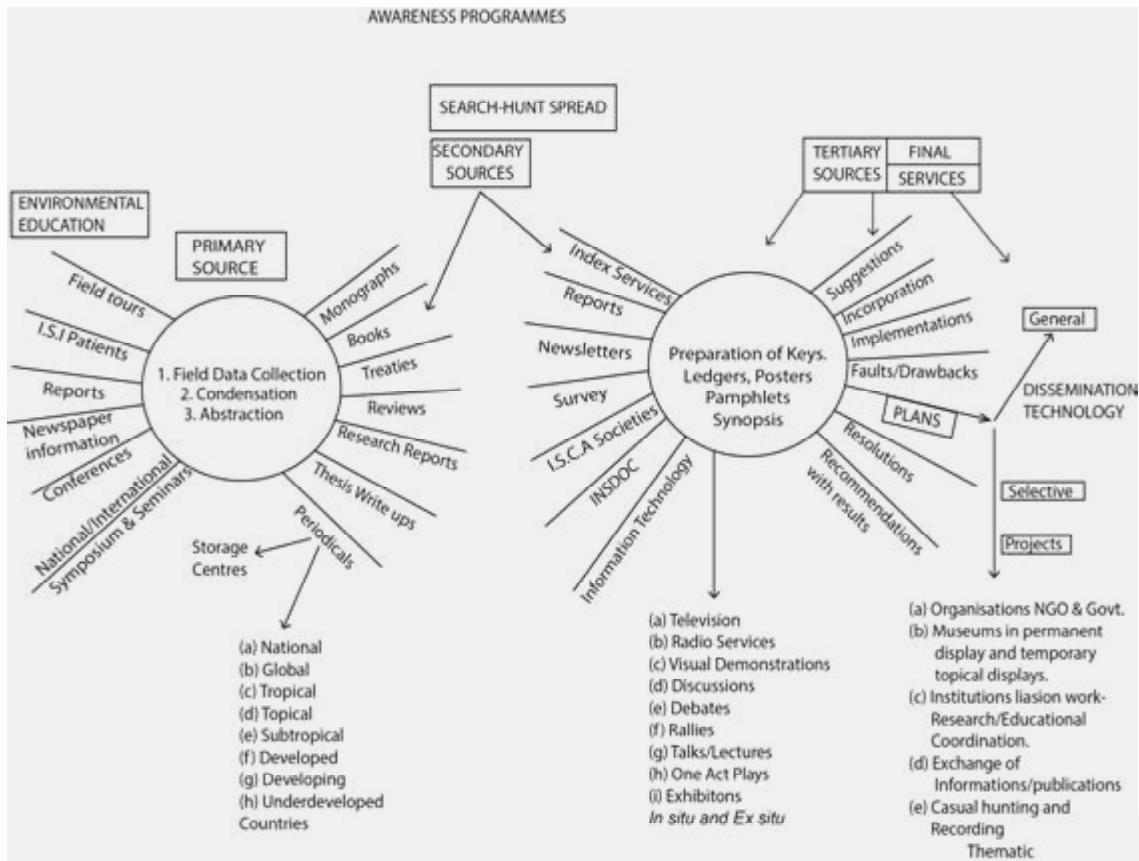


Fig. 14.1: Searching and hunting the information for analysis and propagation.

## 14.10 COLLECTIVE ACTIONS

Although it is effective to change your behaviour and activities towards sustainable patterns, it is more productive and more satisfying to work collectively for the purpose. Collective action multiples individual's power as

- You get encouragement and useful information from meeting regularly with others who share your interests.
- When working individually it is easy to get discouraged by the slow pace of change.
- Having a support group helps maintain enthusiasm.

However, there is a broad spectrum of environment and social action groups. Some will suit your particular interests, preferences or beliefs more than others.

Options that can be used for collective action include the following.

### Student Environment Groups

Organisations for school and college students could be among our most active and effective groups for environmental change. By teaching them ecology and environmental ethics at elementary and secondary school level and by training them about environmental problems and their solutions and involving them in community projects, the purposes of environmental management could be served very effectively.

“Never doubt that a small, highly committed group of individuals can change the world; indeed, it is the only thing that ever has.”

### Organising an Environmental Campaign

It is the most effective tool to bring the attention of the national and international planners, decision makers and managers towards a particular issue. It is a very dynamic process in which you must constantly adapt to changing conditions. Some basic principles apply in most situations for organising the environmental campaign. An environmental campaign should be inclusive of all stakeholders, should benefit the common people, and should be backed by scientific knowledge.

Using the communication media to get your message out is an important part of the modern environmental campaign.

### SAQ 4

Read the following sentences and write true (T) or false (F):

- i) Education for environmental awareness is essential only for younger generation. [ ]
- ii) Real life situations bring people closer to the environment. [ ]
- iii) At the primary level of education greater emphasis could be laid on awareness and conservation. [ ]
- iv) Environmental engineering includes subject like architecture, civil engineering. [ ]
- v) Ministry of Environment, Forest and Climate Change, Govt. of India has created an information system called ENVIS. [ ]
- vi) It is doubtful that a small highly committed group of individuals can change the world. [ ]

### 14.11 SUMMARY

Let us summarise what we have learnt so far:

- Many environmental problems that we face today are the result of our attitudes and cultural beliefs about environment and its management.
- Environmental degradation is considered as the result of western belief about environment according to which environment is only for human use. For most of human history, ethics has concentrated on human rights (anthropocentrism); it is only recently that ethics has formally begun to define the rights of animals, plants and other organism (biocentrism).
- Whatever our beliefs and attitudes may be, some mismanagement is done at policy and planning levels where basic condition of equity is not considered and discrimination on racial and class basis is common. Environmental justice seeks to eliminate those conditions in which communities on racial basis or on the basis of their low-income status are exposed to an inequitable share of pollution.

- It is clear from the study of teachings of different religions that every religion gives due worth to environment. Religions teach us that we should consider ourselves as trustees, not the master of environment. As trustees or stewards of environment, we can use the resources but we should not exploit them.
- For changing attitude of individuals, environmental education is an effective tool. However, individual efforts could do less for the environmental problems at international and global level.
- Student groups and environmental campaigns are effective collective actions, if organised properly.

## 14.12 TERMINAL QUESTIONS

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1. What is Environmental ethics? Explain it.
2. Explain the importance of equity for environmental management.
3. How can we preserve, protect and sustain the environment and create appropriate relationship with nature while at the same time enjoying the benefits of industrial and technological developments.
4. What are the various religious teaching that speak about sacredness of the environment?
5. In what ways can environment groups and environmental campaigns serve as effective tools of disseminating environmental awareness?

## 14.13 ANSWERS

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### Self-Assessment Questions

1. i) e ii) d iii) a iv) c v) b
2. i) Environmental ii) Earth iii) Justice iv) Environmentalism  
v) Minorities, Jobs
3. i) f ii) e iii) a iv) b v) c vi) d
4. i) F ii) T iii) T iv) T v) T vi) F

### Terminal Questions

1. Refer to Section 14.2
2. Refer to Section 14.5
3. Refer to Section 14.6
4. Refer to Section 14.8
5. Refer to Section 14.9 and 14.10

## 14.14 FURTHER READING

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1. Bharucha, E. (2005) *Textbook of Environmental Studies for*

*Undergraduate Courses*, Hyderabad: Universities Press (India) Private Limited.

2. Kaushik, A. 2<sup>nd</sup> Ed. (2004) *Environmental Studies*, New Delhi: New Age International (P) Limited.
3. Rajagopalan, R. 3<sup>rd</sup> Ed. (2015) *Environmental Studies*, New Delhi: Oxford University Press.



# **GLOSSARY**

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<b>Abyssal</b>	: Deep water, i.e., approximately below 1,000 meters
<b>Acid Rain</b>	: Toxic gases like SOX and NOX dissolve in rain water to form sulphuric acid and nitric acid and come down as acid rain.
<b>Agenda 21</b>	: A non-binding action plan of the United Nations with regards to sustainable development. The “21” in Agenda 21 refers to 21 <sup>st</sup> century.
<b>Agro-forestry</b>	: It is a land use management system in which trees or shrubs are grown around or among crops or pastureland.
<b>Anthropocentrism</b>	: Human centred attitude towards nature assign significantly greater value to human being than any other non-human organisms or things.
<b>Atomic energy</b>	: The energy released by splitting of atom in a controlled manner can be utilized for generation of electricity.
<b>Autotrophs</b>	: Organisms that synthesise their own food e.g. green plants.
<b>Benthic</b>	: On or near the bottom of an ocean or lake
<b>Biocentrism</b>	: Attitude and thinking that all living organisms have values and rights regardless of whether they are useful or not.
<b>Biodiversity</b>	: 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.
<b>Biodiversity hot spots</b>	: Hot spots are areas that are extremely rich in species, have high endemism and are under constant threat.
<b>Biological oxygen demand (BOD)</b>	: This is a measure of oxygen used by microorganism such as bacteria to decompose the organic matter like sewage, dead plant leaves, grass blades and food wastes.
<b>Bio magnification of pollutants</b>	: Bio magnification is the phenomenon of increase in the concentration of a pollutant from one link in a food chain to another.
<b>Biomass</b>	: Weight of living material
<b>Biophysical carrying capacity</b>	: Biophysical carrying capacity is the maximum population that can be supported by the resources of the planet at a given level of technology.
<b>Biosphere</b>	: It is a narrow layer around the surface of the earth where life can exist.

<b>Biota</b>	: The organisms i.e. flora and fauna of an area
<b>Biotic</b>	: Pertaining to life
<b>Carbon sink</b>	: This is a natural or artificial reservoir that accumulates and stores some carbon-containing chemical compound for an indefinite period.
<b>Carnivore</b>	: Animals which feed on other animals
<b>Chemical oxygen demand (COD)</b>	: It is the amount of oxygen required to degrade or breakdown the organic chemical compounds of wastewater.
<b>Climate change</b>	: Any significant long-term change in the expected patterns of average weather of a region or the whole earth over a significant period of time.
<b>Climbers</b>	: Climbing plants
<b>Co-generation</b>	: Producing two forms of energy from the fuel, one form being heat and the other being electrical or mechanical energy.
<b>Community health</b>	: This is broadly encompasses the entire gamut of community-organised efforts for maintaining, protecting and improving the health of the people.
<b>Convention</b>	: An agreement between states covering particular matters especially one less formal than treaty.
<b>Cyclone</b>	: A large scale air mass that rotates around a strong centre of low atmospheric pressure.
<b>Decomposer</b>	: Micro-organisms such as bacteria, fungi and maggots that obtain energy from breakdown of dead organic matter and convert them into more simple substances.
<b>Deforestation</b>	: Permanent removal or destruction of indigenous forests.
<b>Determinism</b>	: Human being is subordinate to natural environment because all aspects of human life not only depend on but are dominantly controlled by the physical environment.
<b>Detritus</b>	: Fresh or decaying organic matter of plant and animal origin
<b>Disaster</b>	: An event that causes damage, economic disruption, loss of human life and deterioration in the health and health services on a scale sufficient to warrant an extraordinary response from outside the affected community or area.
<b>Drought</b>	: A 'drought' can be defined as a prolonged period of unusually dry weather, with little rainfall, in a region where rains are normally expected

<b>Dunes</b>	: Low stretch of loess, dryland formed by wind
<b>Ecofeminism</b>	: A pluralistic, nonhierarchical, relationship oriented philosophy suggests that humans could reconsider their relationship to nature in non-dominating ways
<b>Ecological approach</b>	: It emphasizes on wise and restrained use of natural resources and application of appropriate environmental management programmes, policies and strategies keeping in view certain basic principles of ecology so that already depleted natural resources are replenished, and health and productivity of the nature is restored.
<b>Ecological succession:</b>	The orderly process of change or replacement of some inhabitants or species of the community in an area, through time is known as community development or more traditionally as ecological succession.
<b>Ecosystem</b>	: Any unit that includes all the organisms that function together (the biotic community) in a given area, interacting with the physical environment so that the flow of energy clearly leads to defined biotic structures and cycling of materials between living and non-living parts.
<b>Ecosystem diversity</b>	: The variation between different types of ecosystems.
<b>Emergency preparedness</b>	: A programme of long term development activity whose goal is to strengthen the overall capacity and capability of a country to manage efficiently all types of emergencies and bring about an orderly transition from relief through recovery and back to sustainable development.
<b>Environment</b>	: The sum total of living and non-living components; influences and events surrounding an organism.
<b>Environmental equity:</b>	An ideal of equal treatment and protection for various racial, ethnic and income groups under environmental statutes, regulations and practices are applied in a manner that yields no differential impacts relative to the dominant groups and the conditions so created.
<b>Environmental justice</b>	: The pursuit of equal justice and protection under the law for all environmental statutes and regulations without discrimination based on race, ethnicity and / or socio-economic status.
<b>Environmental racism:</b>	Racial discrimination in environmental policy making, enforcement of regulations and laws and targeting of communities of colour for toxic waste diasporas and setting up of polluting industries.

<b>Estuary</b>	: A coastal region such as inlets or mouths of river where fresh water and saltwater mix
<b>Evaporation</b>	: It is the process by which liquid water changes into vapour at ambient temperature.
<b>Evapotranspiration</b>	: It refers to the loss of water in vapour form from plant leaves.
<b>Flood</b>	: A flood is the discharge of water that exceeds the canal capacity of the river.
<b>Flora</b>	: A collective term for all the plant types that grow in a region
<b>Food chain</b>	: A linear sequence of links of organisms in which an organism becomes food for the next organism.
<b>Food web</b>	: The complex interlocking pattern of food chains in a biotic community
<b>Fuel cells</b>	: These are electrochemical devices that convert the chemical energy of a fuel directly efficiently into electricity and heat, thus doing away with combustion.
<b>Genetic diversity</b>	: Diversity of basic units of hereditary information which are passed down generations found within a species (e.g. different varieties of the same species).
<b>Geothermal energy</b>	: Volcanoes, hot springs, and geysers, and methane under the water in the oceans and seas are sources of geothermal energy. Heat generated from the earth.
<b>Global warming</b>	: Heating of earth's atmosphere due to increasing concentration of carbon dioxide and other green house gases
<b>Green house effects</b>	: The situation is analogous to a greenhouse which traps heat and its glass walls do not allow the heat to go out thereby increasing the inside temperature. Therefore, this effect is called greenhouse effect.
<b>Grit</b>	: Particles of coarse sand
<b>Habitat</b>	: A specific site or place where a plant or animal naturally or normally lives or grow
<b>Hazardous waste</b>	: A waste is considered as hazardous if it has any one of the following characteristics: ignitability, corrosiveness, reactivity, radioactivity and toxicity
<b>Health</b>	: A state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.
<b>Herbivore</b>	: Organism that feeds on plants
<b>Heterotrophs</b>	: Organisms that cannot synthesize its own food and derives its nourishments by feeding on others.
<b>Joint forest</b>	: Partnerships in forest movement involving both the

<b>management</b>	: state forest departments and local communities.
<b>Land degradation</b>	: It refers to the process of deterioration in the quality of land.
<b>Mangrove</b>	: A tidal forest vegetation in saline swampy sea shore areas in the tropics
<b>Most probable number (MPN)</b>	: MPN test both <i>E.coli</i> and coliforms can be detected and statistically enumerated the number of these organisms present in the water body.
<b>Non-renewable resources</b>	: Sources that will run out or will not be replenished in our life times or even in many life times.
<b>Nutrient cycles</b>	: Elements or mineral nutrients are always in circulation moving from non-living to living and then back to the non-living components of the ecosystem in a more or less circular fashion.
<b>Oxymoron</b>	: It is a figure of speech that combines two usually contradictory terms into a compressed paradox (e.g. bitter sweet, pretty ugly).
<b>Ozone hole</b>	: Depletion of ozone or <i>thinning of ozone layer</i> .
<b>Photosynthesis</b>	: The process by which chlorophyll containing cells of plants utilize energy of the sun to synthesise simple carbohydrates from carbon dioxide and water.
<b>Plankton</b>	: Microscopic floating, aquatic plants (phytoplankton) and animals (zooplankton) in marine and fresh water situation which float freely in water.
<b>Pollutant</b>	: The agent that contaminates the environmental component is called the pollutant.
<b>Pollution</b>	: Any undesirable change in the physical, chemical or biological characteristics of environmental components i.e., air, water and soil that adversely affect the life forms and life support systems of the biosphere.
<b>Possibilism</b>	: It indicates that the physical environment is passive and human being is the active agent at liberty to choose between wide ranges of environmental possibilities. Ecological his approach emphasizes on wise.
<b>Prairie</b>	: Wide area of level land with grass but no trees
<b>Precipitation</b>	: It includes all forms in which atmospheric moisture descends to earth: rain, snow, hail, sleet and dew.
<b>Range of tolerance</b>	: The organisms can tolerate changes in environment within a certain range.

<b>Renewable resources:</b>	Some of the resources of the earth are replaced from time to time by natural multiplication.
<b>Savanna</b>	: Grassy plain with few or no trees in tropical and sub-tropical regions
<b>Social carrying capacity</b>	: Social carrying capacity is the sustainable biophysical carrying capacity within a given social organisation, including patterns of consumption and trade.
<b>Social forestry</b>	: The management and protection of forest and afforestation of barren and deforested lands with the purpose of helping environmental, social and rural development.
<b>Social inequity</b>	: This issue addresses the questions of fair treatment: the extent that governing rules, regulations, and evaluation criteria are applied uniformly.
<b>Species diversity</b>	: This means the differences between species (both domesticated and wild).
<b>Steppes</b>	: Level grassy plain devoid of forest
<b>Stewardship</b>	: The job of supervising or taking care of something such as an organisation or property.
<b>Sublimation</b>	: It is the process by which solid water changes directly to vapour phase without passing through the intervening liquid phase.
<b>Sustainability</b>	: It refers to a process which can be continued indefinitely without depleting the resource base on which it depends.
<b>Sustainable Development</b>	: Meeting the need of present generation without compromising the ability of future generation to meet their own needs.
<b>Total dissolved solids (TDS)</b>	: The amount of salts and solids dissolved in water is measured by testing the TDS.
<b>Trophic level</b>	: It refers to a position or a level in a food chain or ecological pyramid. It is occupied by a group of organisms that have a similar feeding mode.
<b>Tsunami</b>	: A tsunami is a wave in the ocean or in a lake that is created by a geological event. They are also known as tidal waves or seismic sea waves
<b>Wasteland</b>	: Land not producing its potential of biomass due to ecological degradation, over exploitation or the absence of a clear management system.
<b>Weathering</b>	: The sum total of natural processes resulting in the disintegration of parent rocks is collectively known as 'weathering', and it involves physical, chemical and biological agencies.

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