TAMIL NADU TEACHERS EDUCATION UNIVERSITY

Chennai-600 097

Course Material for B.Ed (Second Year)

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Course: 11 ENVIRONMENTAL EDUCATION

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Unit I ENVIRONMENTAL EDUCATION

Objectives

After the completion of the unit, the learners will be able to

- awareness of problems related to environment and its development.
- acquire knowledge, values, attitudes and skills need to protect and improve the environment.
- create change in behavior of individuals, students and society etc towards the environment.
- develop concern and awareness among world population about the total environment and its associated problems.

1.1 Introduction

Our mounting concern with the environment is not just for ourselves, but for the entire mankind now existing and the generations to follow. This agreed that children are nation's greatest resource and that the future of civilization depends on them.

There has been sudden increase in the activities for Environmental Education (E.E) during the last two decades. This has resulted in the development of different kinds of curricula, out of school activities and literature. The purpose is to regenerate man's interest in preservation, conservation and improvement of the environment before it is too late and reaches the point of no return. EE has been perceived differently by various Educationalist and thinkers.

They differ in its objectives, the kinds of activities that are used to achieve the objectives and resources to attain these ends. It is the vastness and variety of the area of E.E. that necessitates taking a holistic view of the various aspects of E.E. This will help us to see its strength and weakness and draw conclusions for the future. The purpose is to make a review of the situation in this context and examine different roles Played by E.E. at school level and see how these are achieved. Moreover, it is of interest to see how E.E. is molded in different circumstances such as those present in the wide spectrum of developing and developed countries. It is common to use the term 'environmental education' for different meanings. For the sake of clarity and to avoid ambiguity it is necessary to state, at least in brief, the meanings of EE in our context. This will be done here first.

1.2 Environmental Education (EE)

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

It entails the will to take personal initiatives and social participation to achieve sustainability. It is intended for all types of learners, students, out-of-school youth, community leaders, policy makers and the general public to develop appropriate environmental related skills.

Environmental education is concerned with subjects like the way in which natural environment works, how human beings should behave to manage the ecosystem to sustain the environment. It provides the necessary skills and expertise to handle the associated challenges. The main focus of environmental education is to import knowledge, create awareness, inculcate an attitude of concern and provide necessary skill to handle the environment and environmental challenges. Environmental education gained importance at the global after the Stockholm conference on Human Environment, organised by UNESCO in 1972. Soon after the conference UNESCO launched the International Environmental Education Programme (IEEP)

It is a process to promote the awareness and understanding of the environment, its relationship with man and his activities. It is also aimed at developing responsible actions necessary for preservation, conservation and improvement of the environment and its components.

1.3 The Concept of Environmental Education

Various combinations of words such as Environmental Education (EE). Environmental study (E.S.) and Environmental Approach (E.A.) are being used in the literature in the context of environment and education. Although, according to semantics of the words, E.E., E.S and E.A. have different meanings in the strict sense of the terms, but one finds that these are being used many a time synonymously and interchangeably. We consider here the implications of E.E., E.S and E.A. and see in which context these are relevant and important, and how these are related to teacher training Programmes.

1.4 Encyclopedia of Educational Research (Mifzel 1982)

Defining 'environmental education' is not an easy task. Unlike other curriculum areas, the specific content of E.E. has never been well defined. It is universally agreed, however, that environmental education should be interdisciplinary, drawing from biological, sociological, anthropological, and economic political and human resources.

It is also agreed that a conceptual approach to teaching E.E. is best.

The majority also agrees that E.E. is the process of recognising values and clarifying concept related with environment and its problems in order to develop skills and attitudes

necessary to understand surroundings. It also entails practices in decision making and self-formulating a code of behaviour about issues concerning environmental quality.

The most prevalent opinion is that E.E. can be treated as 'discipline' which heavily banks upon basics of existing subjects such as Physics Chemistry, Mathematics, Zoology and Botany. This opinion supports the training of specialists in E.E. which will be much needed for planning, management, development and taking remedial steps for existing problems. Some courses (Geldorloos 1975, & Levon, 1971) have been formulated on these lines. A typical course of this type has been mentioned by Wuzzelbacher (1976) which has the following components:

1. Man and Environment
2. Population and Urbanization
3. Ecology
4. Government Policy and Citizen
5. Economics and the Environment
6. Urban and Regional Planning
7. Social Resources
8. Tree Resources
9. Water Resources
10. Fisheries Resources
11. Wildlife Resources
12. Air Pollution
13. Outdoor Recreation
14. The Role of Citizens.

1.4.1 At the primary level Sale and Lee (1972) describes the Objectives of E.E. as

- to help the individuals acquire on understanding of the biophysical environment and society,
- to encourage understanding of man as an inseparable part of his environment but with the ability of alter it in important ways through his activities or lack of it and
- to generate understanding of the organizational strategies and social arrangements.

1.5 Definitions of Environmental Education

The definitions of environmental education formulated by various agencies or organizations cited by Sharma given below

a. **The Report of a conference of African Educators, EDC and CREDO held at Nairobi in 1968 says:** "To create awareness and an understanding of the evolving social and physical environment as a whole, its natural, man-made cultural, spiritual resources, together with the rational use and conservation of these resources for development." Environmental education can be regarded as the process of learning, through which participants acquire sufficient knowledge to contribute towards solving environmental problems.

b. **Environmental Education Act, 1970:** "For the purpose of this Act, the term 'Environmental Education' means the educational process dealing with man's relationship with his natural and man-made surroundings and includes the relation of population, Pollution resource allocation and depletion, conservation, transformation, technology and urban and rural planning to the total human environment".

c. **The First Report of the British Royal Commission on Environmental Pollution (1971) says;** "The best insurance for the environment is a commitment on behalf of the public to prevent the deterioration of air, water and land."

d. **The Finnish National Commission in a Seminar held in 1974 has said:** "Environmental education is a way of implementing the goals of environmental protection. Environmental education is rot a separate branch of science subject of study. It should be carried out according to the principle of lifelong integral education."

1.6 The Concept of Environmental Education can be Classified as

- education for the environment
- education about the environment and
- education through the environment.

l. Education for the Environment

Environmental education is a pragmatic response of the defacement of the environment. Environmental education is a kind of education which will seek to make pupils fully aware of the problems connected with their environment so that they will be able to tackle these problems with a sense of responsibility and with the technical skills which will enable them to contribute to their solutions along 'with other members of their community. Agarwal, (1986, P.P. 60-61) has aptly said "This awareness of environmental problems is social awareness." Such problems will be solved through collective action aimed at eradicating the social and economic causes of degradation of human environment.

2. Education about the Environment

Environmental Education includes conservation, outdoor and natural resource education as well as nature study but it also includes everything that relates to man and his environment. E.E. is the study of man and how he shapes his total natural and cultural surroundings for good or ill. Man, not his technology, not the physical or biological world as a separate entity, not the arts or professions operating in segregated spheres, but all of these as they effect the quality of human life, become the pivotal concern. Man cannot be separated from the earth's ecosystem for he 'is the only conscious manipulator of the environment and his manipulation must be directed towards enhancing the quality of environment.

3. Education through the Environment

Environmental education is not a separate subject. It is a multi-disciplinary approach both to education and to the problem of environment. The entire subject in the existing curriculum does have some information pertaining to environment but in their present form the subjects fail to relate to one another. Just as piecemeal attacks on environmental problems are ineffective so is piecemeal education about the environment inadequate because it does not take into account the interdependence of the pieces. E.E... Must, therefore, be of wholes not of parts, if human race is to understand the totality of environments subject areas must collaborate, integrate and coordinate so that E.E. may prove effective in overcoming the environmental crisis. The multidisciplinary approach integrates environmental education into all learning, in all subject in all grades all year long and beyond the formal school years to a lifelong education.

Environmental education should result in the knowledge, desires and ability necessary to direct one's conduct toitsfard improving the quality of life. It should enable the individual to perceive the problems that exist and to devise solutions to them. In order for students to develop an environmental ethics; "Man is a part of this earth rather than careless exploiter of it. If we exploit the nature in unwise manner, it will be difficult to support even a small population. But if we protect the nature, it will continue to meet the needs of all living things and not only for man.

The consideration of environment as natural heritage may be the integral part of environmental education. Only when our life is guided by respect for the earth and all living things. We will be able to live in harmony with our environment." they must now throw off their arrogance and perceive with humility, their place in the earth's ecosystem and their ability to manipulate the environment. Their energies will have shifted from material growth to

environmental protection. In short, the environmental ethic must provide them with a new rationale for their existence, or all the technology and power will not sustain their existence.

1.7 Focal aspects of Environmental Education

[illegible]

a) Focal points of Environmental Education

- [illegible]
- [illegible]
- [illegible]

[illegible]

Goals, Objectives and Aims of Environmental Education

The main goal of environmental education is to develop concern and awareness among world population about the total environment and its associated problems. This requires a commitment to work individually and collectively towards solution of current problems and necessary prevention.

The Goals of Environmental Education

The main goal of environmental education is to develop concern and awareness among world population about the total environment and its associated problems. The specific goals of environmental education are as follows

1. To improve the quality of environment
2. To create awareness among the people on environmental problems and conservation

3. To create an atmosphere so that people participate in decision-making and develop the capabilities to evaluate the developmental programs.

The Objectives of Environmental Education

1. **Awareness:** to help social groups and individuals acquire an awareness of and sensitivity to the total environment and its allied problems.
2. **Knowledge:** to 'help social groups and individuals gain a variety of experiences and acquire a basic understanding of the environment and its associated problems.
3. **Attitudes:** to help social groups and individuals acquire a set of values and feeling of concern for the environment and the motivation for actively participating in environmental improvement and protection.
4. **Skills:** to help social groups and individuals acquire the skills for identifying and solving environmental problems.
5. **Participation:** to provide social groups and individuals with an opportunity to be actively involved at all levels working towards the resolution of environmental problems.

Aims of Environmental Education: EE has two main aims

- The first aim is to provide different groups of people in a variety of professional fields with the knowledge needed to develop a sense of responsibility towards the environment and the rational utilization of its resources. International Journal of Current Research and Modern Education (IJCRME)
- The second aim is to make use of these knowledge and skills to preserve, conserve and utilize the environment in a sustainable manner for the benefit of present and future generations.

Core Themes

Learning Environment

The Learning Environment core theme reflects OHSU's intention of recruiting a more diverse and inclusive community and ensuring that graduates meet industry standards upon completion of their programs. OHSU strives to engage faculty, students and clinicians in ongoing learning by creating a culture that nurtures the quest to discover new knowledge as well as the translation of that knowledge into education and practice.

This core theme was developed by a Learning Environment Core Theme Team comprised of faculty and administrators representing a broad cross section of the university. Three core theme objectives and eleven indicators were identified to measure the impact:

Objective 1.1 Develop student pipeline to meet the health needs of an increasingly diverse Oregon and nation.

Inter-Professional Education

Over the last decade faculty within health professions have recognized the need to change learning and practice conditions. The Institute of Medicine, a non-profit organization that works outside of government to provide unbiased and authoritative advice to decision makers and the public made recommendations for future health care professions. These recommendations included faculty, student and staff learners develop additional skills related to working effectively, developing cultural competency and implementing system-based quality improvements. The goal is for learning to cross and connect organizational boundaries.

A team of faculty and administrators representing a broad cross section of the university developed the Inter-Professional Education core theme. To measure the progress toward implementation of inter-Professional education curriculum, one core theme objective and four indicators were identified:

Objective 2.1 Promote an institutional culture that enhances inter professional practice and education (IPE). Etc…

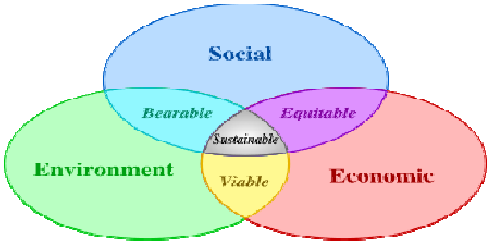
The Scope Environmental Education

Population education has got a board scope with comprehensive subject matter as it is directly related with each and every human activity. Scope of population education varies according to the situation and need of the country. Consequently, its subject matters vary according to social, economic and political condition of country.

`The scope of environment education is also called the content or subject matter of environment education. There are different aspects and components in the environment. Among them, the biological, physical, social and cultural aspects are important.

The scope of environmental education can be divided into biological, physical and sociological aspects. They are described below:

1. **Biological Aspect:** Biological aspects are one of the most important aspects of environmental education. Human being, animals, birds, insects, microorganism, plants are some of the examples of biological aspects.
2. **Physical aspect:** It can be further divided into natural aspects and human- made aspects. Air, water, land, climate etc are included in natural physical aspects. Likewise, Human made physical aspects cover all human made things such as roads, buildings, bridges, houses etc.
3. **Socio- cultural aspect:** Socio- cultural aspects are man-made social practices, rules and laws, and other religious places etc. Human beings have created them with their effort.



Thus, the environmental education is related with science, economics, geography, technology, population and health education, etc. It helps to develop integrated knowledge and feeling of co-operation in the students. As a result environment education becomes practical and contextual. Environment education can be implemented through formal and non-formal educational means. The basic concepts of ecology, natural resources, population environmental health etc are some of the subject matters in this subject. The environment education helps students to develop integrated knowledge and attitude which will be more effective to the society.

1. **Demography:** It is the study of population and deals with the measurement and analysis of birth rate, death rate, migration rate, etc. Birth, death and migration are the major elements of demography. Population change is a biological process. Demography includes birth rate, death rate, sex ratio, dependency ratio, and age- sex pyramid and population growth rate.
2. **Determines of population change:** Population change in a places takes place due to birth, death and migration. It also comprises biological, social and cultural aspects which directly affect the elements of population change. It also analyzes the factors like poverty, practices which influences population change.
3. **Consequences of population growth:** Rapid population grow directly affects economic, social and environmental aspects of a place. The adverse effects of population growth on people's health are important parts of population education. It also deals with analysis of population growth and its consequences in daily life.
4. **Human sexuality and reproductive system:** It includes the fundamental aspects of human sexual and reproduction process like sexual behaviors, development of human reproductive system and associated problems. This scope of population education helps to develop a positive attitude towards reproductive health.
5. **Planning for the future:** It includes various aspects of population management like appropriate age at marriage and first conception birth spacing, family planning, family welfare and use of contraceptives.

Thus, population education is important for us to maintain sustainable environment. Population education helps and enables us to be aware of the process and consequence of population growth on the quality of our lives and the environment. The child gets an opportunity to investigate and explore the interaction between the population and their environments, population characteristics, the meaning, the nature of process. Population education helps to lift up our quality of life.

Conclusion

Environment is a complex but the need of environmental Education is compulsory. Environment is variable from Education and extensive system, protecting the environmental is a hard and ending task. It’s impossible all the existing pollution and environmental problem can be completely solved by environmental education step by step. A wonderful and quality environment mush be achieved by continuous planning, governmental polices efforts with public

participation especially with knowledge of environmental education. Thus environmental education wakes students society about the responsibility of every one to protect our environment protection crating a quality ecological Environment and have a green living together with the help of environment solution.

Questions for Discussion and Reflection

1. Describe the need of environmental education.
2. Explain the term Education through environmental education.
3. Discuss about the goals and objectives of environmental education.
4. Explain briefly about the core themes of environmental education.

UNIT II – NATURAL RESOURCES, PROBLEMS AND SOLUTIONS

Objectives:

At the end of the unit, the student teachers will able to

1. develop an understanding land resources and prevention of soil erosion
2. understand the forest resources and deforestation
3. realize the importance of water resources and prevention of water scarcity
4. list out the mineral resources and food resources
5. identify the importance of energy resources

Introduction

The concept of Environment Education is an important academic discipline. At Present, we are facing grave environmental problems; hence, the concept of environmental education is of vital concern. Human beings are unable to adjust themselves to changes in the environment. There is a very slow adaptation of human beings to the drastic environmental changes that are taking place. We discuss the land resources, water resources and food resources.

Natural Resources

Definition of Natural resources

A Natural resource may be defined as any material given to us by nature, which can be transformed in a way that it becomes more valuable and useful.

Land Resources

Land instead of being one thing, is in fact a complex made up of several components. The nature of each of the components, which make the soil complex, is studied under land resources.

Soil is one of the most important ecological factors, because upon it the plants depend for their nutrients, water supply and anchorage. It is important even for the free-floating aquatic plants, which drive their nutrients dissolved in the water medium around them as a chief storage of all the nutrients, which are made available to the water medium.

It provides support to all plants and animals. Land is connected to atmosphere from where it receives different gases; it is having many water bodies through rain and sufficient underground water to support plant life on earth. Beside, the land receives solar radiation, which is essential for the plants to prepare their food.

Land is also the place where different types of animals are found and different types of ecosystems function. Land, however, is not uniform throughout but marked with great diversity of forms and structure and accordingly the ecosystems differ in their characteristics.

Land is the most important resource of a nation. Soil is a dynamic natural substance over the Earth's crust in which plants strike root and grow. It is composed of mineral and organic materials and living forms.

Prevention of Soil Erosion

1. Forest Management should be given top priority to check illegal felling of trees. Control measures should be taken to check forest soil erosion.

2. Steps should be taken to check shifting cultivation, which is very much seen in our area. People dependent on shifting cultivation should be provided with alternative methods of living. For example, they may be employed to plantation in a massive scale to check soil erosion in hill slopes.

3. Many studies should go before implementation of various developmental activities like urbanization, mining, construction of dams, canals, roads, railways airport, industries etc.

Forest Resources

Forests and wildlife are essential to maintain ecological balance of an area. They are an important renewable natural resource. Forest ecosystem is dominated by tress, their species content varieties in different parts of the world. It is contributes to the economic development of the country because they provide goods and services to the people and industries. It is enhance the quality of environment by influencing the life supporting system.

Forests check air pollution and soil erosion. Thus, they exercise safeguard pollution. It save the hill slopes from landslide. In deserts, trees reduce wind erosion by checking wind velocity. The forests, check strong gates and keep the soil intact beneath the roots of trees and thus check extension of desert. Forests check pollution of air through increasing oxygen content of the air.

By causing condensation of water vapour in clouds, forests attract rains. Floods are controlled because forests dry up rainwater like sponge. They are linked with our culture and civilization. It supply of raw materials. It provides Rs 400 crore per year as revenue to the government and it provides fodder to cattle. Minor forests products are canes, gums, resins, dyes,

flocks, medicines, tannins, lac, fibres, katha etc. it gives employment opportunities and foreign exchange earners.

Deforestation

Deforestation involves the conversion of forested regions to non-forest land for the use of pastures for livestock, logging, companies, industrial gain, urban use, or simply to become a wasteland.

Prevention of Deforestation

a) Use recycled items

To, a consumer can purchase a variety of recycled items, including notebook paper, books, toilet paper and shopping bags. When people use recycled products and make a conscious effort not to waste, the demand for new raw material to replace these items can decrease.

b) Tree Care

When cutting down trees single out full-grown specimens and spare younger varieties. In the event that use must remove a tree for a legitimate reason (for safety issues or poor line interference), make sure that for every tree lost another is planted in its place.

c) Farming Practices

Those who plant crops at a farm can participate in putting a dent in deforestation by rotating crops. It is suggested to place the habit of using different portions of land each year with using the same portion of land to plant different crops. This practice has proven effective in maintaining soil fertility. Farmers may also embrace many another options, such as high-yield hybrid crops and hydroponics, which relies on a method of growing plants using mineral nutrient solutions instead of soil.

d) Cut back on palm oil

In Malaysia and Indonesia, an increasing amount of trees is cut down in order to generate the palm oil used in the production of some breads, chocolates and Shampoos. As a result, the native orangutans are losing their habitat. You can spread awareness and limit your consumption of products containing this type of oil.

e) Coals

As the chill of the winter takes over the autumn season, try using coals instead of firewood in your fireplace. While it only takes a couple of hours to consume a few logs here and there, keep in mind that it takes years for one tree to fully grow.

f) Reforestation

Take a page from the People's Republic of China, where the government has in the past set a requirement that every able-bodied citizen between the ages of eleven and sixty is responsible for planting three to five trees per year or complete an equal amount of work in other areas of forestry. Since 1982, the Government claims that at least one billion trees have been planted in china because of the program.

g) Become an Advocate

Become an advocate of reforestation. Learn how you can spread the world. For instance, a middle school in Washington took to the streets asking people for just one penny. They explained that the money would go towards purchasing acres of Amazonian rainforest. If successful, this move ensures that no deforestation can take place on the bought land. The effort was twofold spreading information and collecting money for a good cause.

h) Arbor day foundation's Rain forest rescue

Support programs, such as this Arbor Day foundation gem, which assist in the prevention of deforestation. Donated money is used to purchase and preserve rainforest space before lumber companies can get a hold of the land. As a result, the Arbor Day Foundation is able to protect the land from Deforestation.

i) Support Conservation Organizations

Lend your support through donations of your time, money, or actions to organizations that run programs concentrating on the prevention of forest habitats, such as Green peas, worldwide fund for nature, community forestry international and Conservation International.

More Points

1. Begin by hugging a tree.
2. Start planting trees.
3. When shopping, move towards buying recycled products mainly.

4. Stop printing and go paperless.
5. When at home, recycle as much as possible.
6. In the kitchen, cut down on your meat intake and eat as many vegetarian meals as possible.
7. Speaking of meat, do not buy meat products sources from land where forests have been cleared.
8. Simply buying organic products instead.
9. Do not buy palm oil at all.
10. Do not use firewood to heat up your fireplaces.
11. Encourage people to live in a way that does not hurt environment.
12. Do not buy anything from large, multinationals that are actively or indirectly involved or responsible for the clearing of forestland.
13. Support companies that produce products by causing minimal harm to the environment.
14. In the process, you also need to practice what you preach
15. Work with NGO's to establish parks to protect rainforests and wildlife.

Water Resources

Water claims to be an important resource. An important use of water in our country is for irrigation. Besides, water is also required in large amounts for industrial and domestic consumption.

Water resources are revealed by the history of human civilization that water supply and civilization are almost synonymous. Several cities and civilization have disappeared due to water shortages originating from climatic changes. Millions of people all over the world, particularly in the developing countries, are losing their every year from waterborne diseases.

An understanding of water chemistry is the basis of knowledge of the multi-dimensional aspects of aquatic environmental chemistry, which involve the sources, composition, reactions and transport of water.

About 97 per cent of the earth's water supply is in the ocean, which is unfit for human consumption and other uses because of its high salt content. Of the remaining 3-2 percent is locked in the polar ice caps and only 1 percent as available as freshwater in rivers, lakes, streams, reservoirs and groundwater that is suitable for human consumption.

Prevention of Water Scarcity

The apparent abundance of water is deceptive and we tend to take it for granted. We tend to abuse and overuse it. This has led to water scarcity.

1. Improve the utilization of created irrigation potential.
2. Optimize agriculture production and productivity from irrigated lands on a sustainable basis.
3. Integrate all functions related to irrigated agriculture through a multi-disciplinary team under an area development authority.
4. Major and medium Irrigation Projects started.
5. Groundwater development, which constitutes bulk of the minor irrigation programme, is essentially a people's programme implemented primarily through individual and cooperative efforts with finance obtained mainly from institutional sources. To encourage use of water-saving devices such as sprinklers, drip system, hydrams, water turbines and hand pumps, the government subsidies are made available to small and marginal farmers for their purchase.
6. National Commission for Integrated Water Resources Development Plan are mainly for development of water resources for drinking, irrigation, industrial, flood control, transfer of surplus water to deficit areas etc.
7. The Central Water Commission's (CWC) work are divided into four functional wings, namely, water planning, design and research, river management and planning and progress
8. Water should not be wasted. Leaky taps must be

Mineral Resources

A '**Mineral Resource**' is a concentration or occurrence of material of intrinsic economic interest in or on the earth's crust in such form, quality and quantity that there are reasonable prospects for eventual economic extraction.

The economic development of a country depends, largely, on the availability of minerals, got as ores from the earth by mining. Coal and iron are the basic minerals, which humans need to develop iron and steel industry. Minerals such as mica, copper, lead and zinc are of vast economic importance. Thorium and uranium are atomic energy minerals.

A mineral is a naturally occurring substance, represent able by a chemical formula, that is usually solid and inorganic, and has a crystal structure.

A mineral is a pure inorganic substance that occurs naturally in the earth's crust. More than two-thousand minerals have been identified and most of these are inorganic, which are formed by the various combinations of elements. However, a small proportion of the earth's crust contains organic materials consist of single elements such as gold, silver, diamond, and sulfur.

Categories of Mineral Resources

Mineral resources can be divided into two major categories.

- Metallic Mineral Resources
- Non-metallic Mineral Resources

Metallic Minerals are metals that are hard substance and conduct heat and electricity with characteristics of lustre or shine. For example Gold, Silver, Tin, Copper, Lead, Zinc, Iron, Nickel, Chromium, and Aluminium.

Characteristics of Metallic Minerals

- Metallic Minerals present a metallic shine in their appearance.
- Contains metals in their chemical composition.
- Potential source of the metal that can be got through mining.
- Metallic minerals contain metal in raw form.

Metallic minerals are further classified into Ferrous and Non-ferrous metallic minerals.

Ferrous Minerals are those minerals that contain iron, for example, Iron ore, manganese, and Chromites.

Non-Ferrous Minerals are those minerals which do not contain iron, for example, gold, silver, copper, and lead.

Nonmetallic minerals are a special group of chemical elements from which no new product can be generated if they are melted. For example sand, gravel, gypsum, halite, Uranium, dimension stone.

Characteristics of Non-metallic Mineral Resources

- Non-metallic minerals are minerals which are either present a non-metallic shine or bluster in their appearance.
- These minerals do not contain extractable metals in their chemical composition.

Use of Minerals

The use of minerals depends upon its deposits. Some countries are rich in mineral deposits, while others have no deposits. The greatest use of minerals depends on its properties. For instance, Aluminum is light, strong and durable in nature, so it is used for aircraft, shipping, and car industries.

Minerals are used in almost all industries. Gold, silver, and platinum are used in the jewelry industry. Copper is used in coin industry and for making pipes and wire. Silicon obtained from quartz is used in the computer industry.

Conservation of Mineral Resources

The total volume of consumable minerals resources is just 1% of all the minerals present in the earth's crust. However, the consumption rate is so high that these mineral resources which are non-renewable will get exhausted very soon. Here are some of the measures to conserve minerals:

- Use of minerals in a planned and sustainable manner.
- Recycling of metals
- Use of alternative renewable substitutes.
- Technology should be improved to use the low-grade ores profitably.

Prevention of Exploitation of Minerals

A National mineral policy has been adopted which encompasses the various policy guidelines which have been issued from time to time. The policy also emphasizes certain new aspects and elements as follows:

1. Development of proper inventory.
2. Proper linkage between the exploitation of minerals and the development of mineral industry.
3. Preference to members of the scheduled Tribes for the development of small deposits in scheduled areas.
4. Production of forest, environment and ecology from the adverse effects of mining.
5. Enforcement of mining plan for adaptation of proper mining methods.
6. Optimum utilizations of minerals, export of minerals in value added form and recycling of metallic scrap and mineral waste.

Under the Constitution, Mineral rights and administration of mining laws are vested in state governments. The Central Government, however, regulates development of minerals under the MMRD Act 1957, and the rules and regulations framed under it. The statute empowers the Central Government to formulate rules for the following:

- The grant of prospecting licenses and mining leases.
- The conservation and development of minerals.
- The modification of old leases.

The MMRD Act, 1957, was amended in 1972 and major amendments were made in February 1987. The Mineral concession Rules, 1960, was also amended in February 1987 and 1988. The Mineral Conservation and Development Rules 1958, was replaced by rules that are more comprehensive in 1988.

The guidelines refer the environmental components to be kept in view during the site selection. For cost benefit analysis, the following has been suggested in the guidelines. The cost for environmental protection and mitigate measures should also be included in the overall estimates.

These should be also including the measure as follows:

1. Compensatory afforestation.
2. Restoration of land in areas under extraction.
3. Control of extracted weed.
4. Control of noise, air and soil pollution caused by the process of extraction and mining.
5. Rehabilitation of project ousters.

GSI (Geological Survey of India)

a) Geological Survey of India (GSI) is the main national organization for locating mineral resources except oil, natural gas and atomic minerals.
b) GSI is responsible for preparation of systematic geological mapping of hard rock area as well as quaternary geological formations.
c) Its functions also encompass fields of marine geosciences, water resources development projects, foundation engineering, land use and environmental projects.
d) GSI is carrying out research, both fundamental and applied, in various fields such as geochronology, stratigraphy, paleontology, petrology, remote sensing and geophysics.

Indian Bureau of Mines (IBM)

1. Indian Bureau of Mines (IBM) is a multi-disciplinary scientific and technical department.

2. It is primarily responsible for the conservations and scientific development of mineral resource other than coal, petroleum, natural gas, atomic minerals and minor minerals.
3. It scrutinizes mining laws before granting approval, undertakes inspection and study of mines and research on beneficiation of low-grade ores and minerals and on special mining problems.
4. It provides technical consultancy service to the mining industry for survey and geological appraisal of mineral resources and preparation of feasibility reports of mining projects including beneficiation plants.
5. It advises Central and state governments on all aspects of mineral industry, trade and legislation.
6. IBM functions as a 'data bank' for mines and minerals and periodically publishes related statistical information.

Food Resources

Food is one of the basic requirements of human being it is the most important material that our body needs for its proper functioning and well-being at all stages of our life. Human diet is not restricted to any special category of food.

Man eats a variety of foods, of plant and animal origin, as no single food provides us with all the nutrients that we need.

Most food has its origin in plants. Some food is obtained directly from plants; but even animals that are used as food sources are raised by feeding them food derived from plants. Cereal grain is a staple food that provides more food energy worldwide than any other type of crop. Corn (maize), Wheat, and rice – in all of their varieties – account for 87% of all grain production worldwide. Most of the grain that is produced worldwide is fed to livestock.

Some foods not from animal or plant sources include various edible fungi, especially mushrooms. Fungi and ambient bacteria are used in the preparation of fermented and pickled foods like leavened bread, alcoholic, cheese, pickles, kombucha, and yogurt. Another example is blue-green algae such as spirulina. Inorganic substances such as salt, baking soda and cream of tartar are used to preserve or chemically alter an ingredient.

Plants

Many plants and plant parts are eaten as food and around 2,000 plant species are cultivated for food. Many of these plant species have several distinct cultivars.

Seeds of plants are a good source of food for animals, including humans, because they contain the nutrients necessary for the plant's initial growth, including many healthful fats, such as omega fats. In fact, the majority of food consumed by human beings is seed-based foods.

Edible seeds include cereals (corn, wheat, rice, et cetera), legumes (beans, peas, lentils, cetera), and nuts. Oilseeds are often pressed to produce rich oils - sunflower, flaxseed, rapeseed (including canola oil), sesame, et cetera.

Seeds are typically high in unsaturated fats and, in moderation, are considered a health food, although not all seeds are edible. Large seeds, such as those from a lemon, pose a choking hazard, while seeds from cherries and apples contain cyanide , which could be poisonous only if consumed in large volumes.

Fruits are the ripened ovaries of plants, including the seeds within. Many plants and animals have coevolved such that the fruits of the former are an attractive food source to the latter, because animals that eat the fruits may excrete the seeds some distance away. Fruits, therefore, make up a significant part of the diets of most cultures. Some botanical fruits, such as tomatoes, pumpkins, and eggplants, are eaten as vegetables. Vegetables are a second type of plant matter that is commonly eaten as food. These include root vegetables (potatoes and carrots),bulbs(onion family),leaf (spinach and lettuce), stem vegetables (bamboo shoots and asparagus), and inflorescence vegetables (globe artichokes and broccoli and other vegetables such as cabbage or cauliflower).

Animals

The products they produce use animals as food either directly or indirectly. Meat is an example of a direct product taken from an animal, which comes from muscle systems or from organs.

Food products produced by animals include milk produced by mammary glands, which in many cultures is drunk or processed into dairy products (cheese, butter, etc.). In addition, birds and other animals lay eggs, which are often eaten, and bees produce honey, a reduced nectar from flowers, which is a popular sweetener in many cultures. Some cultures consume blood, sometimes in the form of blood sausage, as a thickener for sauces, or in a cured, salted form for times of food scarcity, and others use blood in stews such as jugged hare.

Some cultures and people do not consume meat or animal food products for cultural, dietary, health, ethical, or ideological reasons. Vegetarians choose to forgo food from animal sources to varying degrees. Vegans do not consume any foods that are or contain ingredients from an animal source.

Food Crisis and Increasing Food Production

A **food crisis** occurs when rates of hunger and malnutrition rise sharply at local, national, or global levels. This definition distinguishes a **food crisis** from chronic hunger, although **food crises** are far more likely among populations already suffering from prolonged hunger and malnutrition.

The food crisis seen in 2007 and 2008, with a sharp increase in basic food prices highlights the extreme vulnerability of the current agricultural and food model.

A food crisis, which has left after another 925 million hungry, according to the United Nations Food and Agriculture Organization (FAO). As its director-general Jacques Diouf puts it: "the number of people suffering from malnutrition before the rise in the price of food in 2007 was 850 million. In that year alone it increased by 75 million to reach 925 million" A figure that will rise to 1.2 billion hungry in 2017, according to the US Department of Agriculture (ETC Group 2008). However, in fact, the current food crisis is already affecting directly or indirectly half of the population worldwide, more than three billion people (Holt-Giménez, 2008).

In addition, the price of food has not stopped going up. According to the FAO food price index there was an increase of 12% from 2005 to 2006, 24% in 2007, and a rise of about 50% in January and July 2008. Figures from the World Bank point in the same direction: prices have increased 83 % in the last three years. Grains and other staples that are eaten by broad strata of the population especially in the countries of the global South (wheat, soy, vegetable oils, rice and so on) have undergone the most significant increases. The cost of wheat has gone up by 130%, soya by 87%, rice 74% and maize 31% (Holt-Giménez and Peabody, 2008) In spite of the good estimates for cereal production, the FAO estimates that prices will remain high in the coming years, and as a result, the poor countries in the main will continue to suffer the effects of the food crisis.

Taking this data into account, it is not surprising that there have been hunger riots in the countries of the South, as it is precisely the basic commodities that feed the poor which have

experienced the biggest price rises. In such countries as Haiti, Pakistan, Mozambique, Bolivia, Morocco, Mexico, Senegal, Uzbekistan, Bangladesh and Niger people have gone onto the street to say: "Enough" in riots that have left dozens of people dead and wounded. These uprisings remind us of what happened in the 1980s and 1990s in the countries of the South in reaction to structural adjustment policies imposed by the World Bank and International Monetary Fund. The causes, once again, are raising prices for food, transportation and public services that worsen the living conditions of the majority of the peoples of these countries and make their struggle for daily survival more difficult. History repeats itself and neo-liberal policies still leave millions hungry.

But the problem today is not the lack of food, but the inability to gain access to it. In fact, throughout the world cereal production has tripled since the 1960s, while the population on a global scale has only doubled (GRAIN, 2008a). Never in history has there been so much food as today. But for millions of people in the countries of the global South who spend 50-60% of their income to purchase food, a figure that can rise to 80% in the poorest countries, the increase in the price of food has made it impossible to gain access to it .

Short-term causes

There are conjectural reasons which have been given and which partially explain this dramatic increase of prices in recent years: droughts and other meteorological phenomena linked to climate change in producer countries like China, Bangladesh and Australia, that have affected crops and will continue impacting on food production; the increased consumption of meat, especially in the countries of Latin America and Asia, due to a change in eating habits (following the model of Western consumption) and a resulting multiplication of facilities for the fattening of livestock; imports of cereals by countries which were until now self-sufficient like India, Vietnam and China, due to the loss of cultivated land; the fall in grain reserves in national systems that were dismantled in the late 1990s all mean that today countries depend fully on volatile world grain markets (Hernandez Navarro, 2008; Holt-Giménez, 2008). All this helps explain in part the causes that have led us to the crisis but these are partial arguments, which have sometimes been used to divert attention from the underlying causes. Authors such as Jacques Berthelot (2008), Eric Toussaint (2008a) and Alejandro Nadal (2008), among others, have challenged some of these arguments.

From my point of view, there are two short-term causes, which have been determinant in rising food prices and should be highlighted: the increase in the price of oil, which would have had an effect directly or indirectly, and growing speculative investment in raw materials. Both factors have finally unbalanced an agri-food system, which was extremely fragile. Let's go into detail.

The increase in the price of oil, which doubled in 2007 and 2008 and caused a big rise in the price of fertilizers and transport related to the food system, has resulted in increasing investment in the production of alternative fuels such as those of plant origin. Governments in the United States, the European Union, Brazil and others have subsidized production of agro-fuels in response to the scarcity of oil and global warming. However, this green fuel production comes into direct competition with the production of food. To give just one example, in 2007 in the United States 20% of the total cereal harvest was used to produce ethanol and it is calculated in the next decade that this figure will reach 33%. We can imagine the situation in the countries of the South.

In April 2008, the FAO recognized that "in the short term, it is highly likely that the rapid expansion of green fuels worldwide will have a significant impact on Latin American agriculture" (Reuters, 15/04/08)." And the diversion of 5% of world cereal production to the production of agro-fuels leads directly to the increase in the price of grains. To the extent that cereals such as maize, wheat, soy or beet have been diverted to agro-fuels, the supply of cereals on the market has fallen and consequently prices have increased. According to various sources, the impact has been greater or lesser, but always key: the US Department of Agriculture believes that agro-fuels have generated an increase in the price of grains of between 5 and 20%; the International Food Policy Research Institute (IFPRI) considers that the figure is around 30% while a World Bank report says that the production of agro-fuels would have led to an increase of 75% in the price of grains (Holt-Giménez, 2008).

Another conjunctural cause to be taken very much into account as a generator of this rise in prices has been the growing speculative investment in raw materials since the crash in the dotcom and real estate markets. After the collapse of the high-risk mortgage market in the United States, institutional investors (banks, insurance companies, investment funds and so on) and others have sought safer and more cost-effective places to invest their money. To the extent that

food prices have risen, they will direct their capital to the futures market pushing the price of grains upwards and further worsening food price inflation (Holt-Giménez, 2008).

Today it is estimated that a significant part of financial investment in the agricultural sector has a speculative character. According to the most conservative data, this figure would be 55% of the total, a volume which increases as the liberalization of agricultural production deepens. Note, also, the study by Lehman Brothers indicating that from the year 2003 the index of speculation in raw materials (integrated at 30% for agricultural materials) increased by 1,900% (García, 2008a).

Structural causes

Beyond these short-term elements, there are underlying reasons that explain the current deep food crisis. The neoliberal policies applied indiscriminately in the course of the last thirty years on a planetary scale (trade liberalization at all costs, payment of the foreign debt for the countries of the South, privatization of public services and goods and so on) as well as a model of agriculture and food at the service of a capitalist logic bear the primary responsibility for this situation. In fact, we have a deeper systemic problem with a global food model which is extremely vulnerable to economic, ecological and social shocks.

As Eric Holt-Giménez (2008) puts it, the economic "development" policies driven by the countries of the North from the 1960s onwards (the Green Revolution, structural adjustment programmes, regional free trade treaties, the World Trade Organization and agricultural subsidies in the North) have led to the destruction of food systems.

Between the 1960s and 90s, the so-called "green revolution", promoted by various international institutions and agricultural research centre, took place, with the "theoretical" objective of modernizing agriculture in non-industrialized countries. Early results in Mexico and, subsequently, in south-east Asia were spectacular from the point of view of production per hectare, but this increase in land yield did not have a direct impact on the reduction of hunger in the world. Thus, although world agricultural production increased by 11 %, the number of hungry people in the world also rose by 11 per cent, from 536 million to 597 (Reichmann, 2003).

As Rosset, Collins and Moore Lappé (2000) put it: "the increase in production which was at the centre of the green revolution was not enough to relieve hunger because it does not alter the concentration of economic power, access to land or purchasing power… the number of

people who are hungry can be reduced only by redistributing purchasing power and resources among those who are malnourished… if the poor have no money to buy food, increased production will solve nothing".

The Green Revolution had negative collateral consequences for many poor and medium peasants and for long-term food security. Specifically, the process increased the power of agribusiness corporations in the market chain, caused the loss of 90% of agro and bio diversity, massively reduced water levels, increased salinisation and soil erosion, and displaced millions of peasants from the countryside to the slums of the city, while . dismantling traditional agricultural and food systems which guaranteed food security.

In the 1980 and 90s, the systematic application of structural adjustment programmes in the countries of the South by the World Bank and International Monetary Fund, so that they could pay the foreign debt, aggravated further the already difficult living conditions of the greater part of the population in these countries. The programmes had as their main focus the subordination of the economy of the country to the payment of debt by applying the maxim "export more and spend less".

The shock measures imposed by these programmes consisted of forcing the governments of the South to withdraw subsidies to commodities such as bread, rice, milk and sugar and a drastic reduction in public spending on education, health, housing and infrastructure. Devaluation of the national currency was forced, making products cheaper to export, but reducing the purchasing power of the domestic population while interest rates were increased in order to attract foreign capital with high rates of remuneration, generating a speculative spiral. Ultimately, a series of measures which led to the most extreme poverty for the peoples of these countries.

At the trade level, the programmes promoted exports to boost foreign currency reserves, increasing monocultures for export and reducing agriculture for local consumption with a consequent negative impact on food security and dependence on international markets. Thus customs barriers were dismantled, facilitating the entry of highly subsidized products from the United States and Europe which sold below their cost price, at a price lower than local products, destroying local production and agriculture, while economies were fully opened to the investments, products and services of the multinationals. The massive privatization of public

enterprises, mostly to the benefit of Northern multinationals, was widespread. Such policies had a direct impact on local agricultural production and food security, leaving these countries at the mercy of the market, the interests of transnational corporations and the international institutions promoting these policies.

The World Trade Organization (WTO), established in 1995, consolidated the policies of structural adjustment programmes by means of international treaties, subjecting national laws to its designs. Trade agreements administered by the WTO like the General Agreement on Trade and Tariffs (GATT), the General Agreement on Trade in Services (GATS) and the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPs) further consolidated the control of the countries of the North over the economies of the South.

The WTO policies forced developing countries to eliminate tariffs on imports, end protection for and subsidies to small producers and open their borders to the products of transnational corporations while the markets of the North remained highly protected. In the same way, regional treaties like the and North American Free Trade Agreement (NAFTA) Central America Free Trade Agreement (CAFTA) deepened trade liberalization, leading to bankruptcy for the farmers of the South and making them dependent on food imports from the countries of the North.

US and European agricultural subsidies, directed mainly towards the agri-food industry, obliterate the small local producer. This support to agribusiness accounts for a quarter of the value of agricultural production in the US and 40% in the European Union (Holt-Giménez, 2008). In the Spanish state, the main recipients of this aid are the larger holdings: seven producers, including the Duchess of Alba, are the biggest beneficiaries of the European Union's common agricultural policy. It is estimated that 3.2% of major producers in Spain receive 40% of this direct aid (Intermón Oxfam, 2005), while family holdings, supporting rural areas in Europe and millions of farmers in South, have virtually no support and suffer from the unfair competition of these highly subsidized products.

Increasing Food Production

1. Training farmers for new techniques of agriculture, Cultivation and crop rotation.
2. Construction of water storage reservoirs.
3. Improvement in the irrigation system and Canal networking.

4. Adopting water conservation and water harvesting techniques.
5. Adapting Soil reclamation processes.
6. Available land acreage should be properly and judiciously utilized.
7. Soil fertility should be increased through wise use of fertilizers and organic manures.
8. Mixed cropping should be practiced wherever possible.
9. Soil erosion and loss of nutrients should be prevented by maintaining vegetation cover throughout the year.
10. High yield and disease resistant plant varieties should be introduce.
11. Integrated and balance use of available water source (surface and groundwater) should be made.
12. Weeds and pest should be controlled; integrated pest control practices should be prepared over total Reliance on chemical pesticides.
13. Combining use of traditional methods/ equipments with modern methods/ equipments of agriculture.
14. Crop rotation should be done.

Energy Resources

Energy is an important input for development .It aims at human welfare covering household, agriculture, transport and industrial complexes.

Kinds of Energy Resources

1. Renewable Energy Resources:

These resources are mostly biomass based and available in unlimited amount in nature since these can be renewed over relatively short period. These include firewood (or fuel wood) obtained from forests, petro plants, plant biomass (agricultural wastes such as biogases), animal dung, solar energy, wind energy, water energy (hydroelectric and tidal energy), geothermal and dendrothermal energy. These are called renewable energy because they can reproduce themselves in nature and can be harvested continuously through a sustained proper planning and management.

2. Non –Renewable Energy Resources:

These energy resources are available in limited amount and develop over a longer period. Consequent to unlimited use, they are likely to be exhausted one day. These energy resources

include coal, mineral oil, natural gas and nuclear power. Coal, petroleum and natural gas, the common sources of energy are organic (biotic) in their origin. They are also called fossil fuels.

ALTERNATIVE ENERGY RESOURCES

Energy resources are well recognized that the development and utilization of renewable sources of energy along with conventional energy sources is necessary to meet the growing demand for energy in our urban and rural areas. The techno-economic viability of a number of systems and devices based on renewable energy sources has been demonstrated successfully in the domestic, commercial and industrial sectors.

Reasons for use of alternative resources

1. Coal, mineral oil, natural gas and nuclear minerals are non-renewable and are to last one day.
2. The use of conventional resources is invariably associated with environmental pollution problems.
3. Large-scale utilization of wood may lead to deforestation.
4. Centralized system in a conventional source of energy, involves much expenditure on setting up infrastructure and management. There is now a trend towards decentralization which is likely to provide greater initiative to local people who could assess their needs and resources and plan a strategy that suits them best.
5. The energy crisis during the 1970s forced scientists to develop alternative sources of energy that should be renewable and pollution free.
6. Due to the rapid depletion of conventional energy sources, countries all over the world are forced to concentrate over tapping the vast potential of non-conventional energy sources. These sources include dendrothermal, solar, wind, ocean(tidal) geothermal heat, biomass, farm and animal waste including human excreta.

(i) Solar Energy

This sort of energy can be utilized well for the purpose of domestic heating and water supply can be met by this. In Israel, such systems of heating homes and water supply are already in operation.

(ii) Wind Energy

In our country, a great number of areas are quite windy. Average annual wind density of 3kW/m2/day is prevalent at a number of places in peninsular India besides the coastline in Gujarat, the Western Ghats and parts of central India. The wind densities are even more than 101 W/m2/days during winter and wind densities exceeding 4kW/m2/day are available for 5-7 months in a year.

(iii) Wind Wave Energy

The continuous motion of the sea surface in the form of wind waves constitutes a source of energy. They convert nearly 1.5 per cent of the incoming energy from sun to wind energy. Part of this is transferred to the sea surface resulting in the generation of waves. Thereafter, this is carried to coastal lines where it is dissipated as the waves break. Extract of energy from waves is more efficient is concentrated through the interaction of the wind and the free ocean surface. The coastal line of our country extends to about 6,000 km in length. Here the wave energy potential is estimated to be around 60,000 MW. The extraction of wave energy is of great advantage. A multipurpose wave regulator system (WRS) in the form of a long barrier creates a calm pool between the barrier and shore.

(iv) Ocean (Tidal) Energy

Tidal power generation depends on harnessing of rise and fall of sea level due to tidal action:

Position abroad: Small tidal power plants have been constructed in china and USSR. France constructed in 1996 their first major tidal electric plant.

Position in India: In India, prospective sites for exploitation of the tidal energy are the Gulfs of Kutch, Cambay, and Sunderbans.

(v) Geothermal Energy

The heat in the interior of the earth can be utilized for power generation. This is possible in volcanic regions or where hot springs and geysers occur. For developing countries, the over-all projected potential was estimated at 400x10 18 J for geothermal energy with a projected capacity at 2,300 MW in 1990.

(vi) Biomass-based Energy

The term 'biomass' is used for all materials which originate from photosynthesis. In this way, biomass includes all new plant growth, residues and wastes; herbaceous plants; freshwater and marine algae; aquatic plants; agricultural and forest residues such as straw husks, bagasse, corncobs, bark and sawdust.

Besides animal dropping, wastes such as garbage, night soil, sewage and industrial refuse are also included in it. Biodegradable organic effluents from industries such as cannaries, sugar mills, slaughter houses, meat packing plants, breweries and distilleries are also included in this categories. Biomass can also be produced from hydrocarbon plants.oils etc.

Conclusion

"Creating a society of motivated citizens committed to conservation, preservation and protection of the environment and striving towards a life in perfect harmony with nature," is the global mission that could be achieved through nurturance of young minds by developing an awareness of and concern about the environmental and its associated problems.

Questions for discussion and reflection

1. Explain the Land Resources. How would you prevent the Soil Erosion?
2. What is Forest Resources?
3. List out the Mineral Resources
4. Mention the Energy Resources.
5. Describe "The Food Crisis of India".

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UNIT -III INTERNATIONAL EFFORTS FOR ENVIRONMENTAL PROTECTION

Objectives:

After the completion of the unit, the learners will be able to

1. realize the importance of environmental education
2. learn the environmental issues and environmental protection
3. discuss the contributions of conferences held on environmental issues
4. understand about the ideas of the Earth summit and Kyoto Conference

Introduction

Environmental issues may include climate change, pollution, environmental degradation, and resource depletion etc. The conservation movement lobbies for protection of endangered species and protection of any ecologically valuable natural areas, genetically modified foods and global warming.

Environmental issues are harmful effects of human activity on the biophysical environment. Environmental protection is a practice of protecting the natural environment on individual, organizational or governmental levels, for the benefit of both the environment and humans. Environmentalism, a social and environmental movement, addresses environmental issues through advocacy, education and activism.

Environment is polluted in different ways. The carbon dioxide equivalent of greenhouse gases (GHG) in the atmosphere has already exceeded 400 parts per million (NOAA) (with total "long-term" GHG exceeding 455 parts per million) (Intergovernmental Panel on Climate Change Report). This level is considered a tipping point. "The amount of greenhouse gas in the atmosphere is already above the threshold that can potentially cause dangerous climate change. We are already at risk of many areas of pollution. It's not next year or next decade, it's now." The UN Office for the Coordination of Humanitarian Affairs (OCHA) has stated "Climate change is not just a distant future threat. It is the main driver behind rising humanitarian needs and we are seeing its impact. The number of people affected and the damages inflicted by extreme weather have been unprecedented." Further, OCHA has stated

Climate disasters are on the rise. Around 70 percent of disasters are now climate related – up from around 50 percent from two decades ago. These disasters take a heavier human toll and come with a higher price tag. In the last decade, 2.4 billion people were affected by climate related disasters, compared to 1.7 billion in the previous decade. The cost of responding to disasters has risen tenfold between 1992 and 2008.

Destructive sudden heavy rains, intense tropical storms, repeated flooding and droughts are likely to increase, as will the vulnerability of local communities in the absence of strong concerted action.

Environment destruction caused by humans is a global problem, and this is a problem that is on going every day. By year 2050, the global human population is expected to grow by 2 billion people, thereby reaching a level of 9.6 billion people. The human effects on Earth can be seen in many different ways. A main one is the temperature rise, and according to the report ”Our Changing Climate”, the global warming that has been going on for the past 50 years is primarily due to human activities. Since 1895, the U.S. average temperature has increased from 1.3 °F to 1.9 °F, with most of the increase taken place since around year 1970.

Sustainability is the key to prevent or reduce the effect of environmental issues. There is now clear scientific evidence that humanity is living unsustainably, and that an unprecedented collective effort is needed to return human use of natural resources to within sustainable limits. For humans to live sustainably, the Earth's natural resources must be used at a rate at which they can be replenished.

United Nations Conference on the Human Environment (Stockholm Conference)

The United Nations Conference on the Human Environment (also known as the Stockholm Conference) was an international conference convened under United Nations auspices held in Stockholm, Sweden from June 5-16, 1972. It was the UN's first major conference on international environmental issues, and marked a turning point in the development of international environmental politics. When the United Nations General Assembly decided to convene the 1972 Stockholm Conference, at the initiative of the Government of Sweden to host it, UN Secretary-General U Thant invited Maurice Strong to lead it as Secretary-General of the Conference, as the Canadian diplomat (under Pierre Trudeau) had initiated and already worked for over two years on the project.

Sweden first suggested to the United Nations Economic and Social Council ECOSOC in 1968 the idea of having a UN conference to focus on human interactions with the environment. ECOSOC passed resolution 1346 supporting the idea. General Assembly Resolution 2398 in 1969 decided to convene a conference in 1972 and mandated a set of reports from the UN secretary-general suggesting that the conference focus on "stimulating and providing guidelines for action by national government and international organizations" facing environmental issues.

Issues at the Conference

The Soviet Union and other Warsaw Pact nations boycotted the conference due to the lack of inclusion of East Germany, which was not allowed to participate as it was not a full member of the UN. At the conference itself, divisions between developed and developing countries began to emerge. The Chinese delegation proved hostile to the United States at the conference, issuing a 17 point memorandum condemning United States policies in Indochina, as well as around the world. This stance emboldened other developing countries, which made up 70 of the 122 countries attending. Multiple countries including Pakistan, Peru, and Chile issued statements that were anti-colonial in nature, further worrying the United States delegation. So harsh was the criticism that Rogers Morton, at that time secretary of the interior, remarked "I wish the Russians were here", to divert the attention of the Chinese criticisms.

The meeting agreed upon a Declaration containing 26 principles concerning the environment and development an Action Plan with 109 recommendations, and a Resolution.

Principles of the Stockholm Declaration

1. Human rights must be asserted, apartheid and colonialism condemned
2. Natural resources must be safeguarded
3. The Earth's capacity to produce renewable resources must be maintained
4. Wildlife must be safeguarded
5. Non-renewable resources must be shared and not exhausted
6. Pollution must not exceed the environment's capacity to clean itself
7. Damaging oceanic pollution must be prevented
8. Development is needed to improve the environment
9. Developing countries therefore need assistance

10. Developing countries need reasonable prices for exports to carry out environmental management
11. Environment policy must not hamper development
12. Developing countries need money to develop environmental safeguards
13. Integrated development planning is needed
14. Rational planning should resolve conflicts between environment and development
15. Human settlements must be planned to eliminate environmental problems
16. Governments should plan their own appropriate population policies
17. National institutions must plan development of states' natural resources
18. Science and technology must be used to improve the environment
19. Environmental education is essential
20. Environmental research must be promoted, particularly in developing countries
21. States may exploit their resources as they wish but must not endanger others
22. Compensation is due to states thus endangered
23. Each nation must establish its own standards
24. There must be cooperation on international issues
25. International organizations should help to improve the environment
26. Weapons of mass destruction must be eliminated

One of the seminal issues that emerged from the conference is the recognition for poverty alleviation for protecting the environment. The Indian Prime Minister Indira Gandhi in her seminal speech in the conference brought forward the connection between ecological management and poverty alleviation.

Some argue that this conference, and more importantly the scientific conferences preceding it, had a real impact on the environmental policies of the European Community (that later became the European Union). For example, in 1973, the EU created the Environmental and Consumer Protection Directorate, and composed the first Environmental Action Program. Such increased interest and research collaboration arguably paved the way for further understanding of global warming, which has led to such agreements as the Kyoto Protocol and the Paris Agreement, and has given a foundation of modern environmentalism.

Brundtland Commission (1983)

Formerly known as the World Commission on Environment and Development (WCED), the mission of the Brundtland Commission is to unite countries to pursue sustainable development together. The Chairperson of the Commission, Gro Harlem Brundtland, was appointed by United Nations Secretary-General Javier Pérez de Cuéllar in December 1983. At the time, the UN General Assembly realized that there was a heavy deterioration of the human environment and natural resources. To rally countries to work and pursue sustainable development together, the UN decided to establish the Brundtland Commission.

The commission focuses on setting up networks to promote environmental stewardship. Most of these networks make connections between governments and non-government entities. One such network is Bill Clinton's Council on Sustainable Development. In this council government and business leaders come together to share ideas on how to encourage sustainable development. The Brundtland Commission has been the most successful in forming international ties between governments and multinational corporations.

Sustainability Efforts

The three main pillars of sustainable development include economic growth, environmental protection, and social equality. While many people agree that each of these three ideas contribute to the overall idea of sustainability, it is difficult to find evidence of equal levels of initiatives for the three pillars in countries' policies worldwide. With the overwhelming number of countries that put economic growth on the forefront of sustainable development, it is evident that the other two pillars have been suffering, especially with the overall well being of the environment in a dangerously unhealthy state. The Brundtland Commission has put forth a conceptual framework that many nations agree with and want to try to make a difference with in their countries, but it has been difficult to change these concepts about sustainability into concrete actions and programs. Implementing sustainable development globally is still a challenge, but because of the Brundtland Commission's efforts, progress has been made. After releasing their report, **Our Common Future**, the Brundtland Commission called for an international meeting to take place where more concrete initiatives and goals could be mapped out. This meeting was held in Rio de Janeiro, Brazil. A comprehensive plan of action, known as Agenda 21, came out of the meeting. Agenda 21 entailed actions to be taken globally, nationally, and locally in order to make life on Earth more sustainable going into the future.

Economic Growth

Economic Growth is the pillar that most groups focus on when attempting to attain more sustainable efforts and development. In trying to build their economies, many countries focus their efforts on resource extraction, which leads to unsustainable efforts for environmental protection as well as economic growth sustainability. While the Commission was able to help to change the association between economic growth and resource extraction, the total worldwide consumption of resources is projected to increase in the future. So much of the natural world has already been converted into human use that the focus cannot simply remain on economic growth and omit the ever-growing problem of environmental sustainability.

Agenda 21 reinforces the importance of finding ways to generate economic growth without hurting the environment. Through various trade negotiations such as improving access to markets for exports of developing countries, Agenda 21 looks to increase economic growth sustainability in countries that need it most

Environmental Protection

Environmental Protection has become more important to government and businesses over the last 20 years, leading to great improvements in the number of people willing to invest in green technologies. For the second year in a row in 2010, the United States and Europe added more power capacity from renewable sources such as wind and solar. In 2011 the efforts continue with 45 new wind energy projects beginning in 25 different states. The focus on environmental protection has transpired globally as well, including a great deal of investment in renewable energy power capacity. Eco-city development occurring around the world helps to develop and implement water conservation, smart grids with renewable energy sources, LED street lights and energy efficient building. The consumption gap remains, consisting of the fact that "roughly 80 percent of the natural resources used each year are consumed by about 20 percent of the world's population". This level is striking and still needs to be addressed now and throughout the future.

Social Equality

The Social Equality and Equity as pillars of sustainable development focus on the social well-being of people. The growing gap between incomes of rich and poor is evident throughout the world with the incomes of the richer households increasing relative to the incomes of middle - or lower-class households. This is attributed partly to the land distribution patterns in rural

areas where majority live from land. Global inequality has been declining, but the world is still extremely unequal, with the richest 1% of the world's population owning 40% of the world's wealth and the poorest 50% owning around 1%. The Brundtland Commission made a significant impact trying to link environment and development and thus, go away from the idea of environmental protection whereby some scholars saw environment as something of its sake. The Commission has thus reduced the number of people living on less than a dollar a day to just half of what it used to be, as many can approach the environment and use it. These achievements can also be attributed to economic growth in China and India.

Earth Summit or Rio Conference 1992

The United Nations Conference on Environment and Development (UNCED), also known as the Rio de Janeiro Earth Summit, the Rio Summit, the Rio Conference, and the Earth Summit (Portuguese: ECO92), was a major United Nations conference held in Rio de Janeirofrom 3 to 14 June 1992.

Earth Summit was created as a response for Member States to cooperate together internationally on development issues after the Cold War. Due to conflict relating to sustainability being too big for individual member states to handle, Earth Summit was held as a platform for other Member States to collaborate. Since the creation, many others in the field of sustainability show a similar development to the issues discussed in these conferences, including non-governmental organizations (NGOs).

The Issues Addressed Included:

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

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

was to "not to carry out any activities on the lands of indigenous peoples that would cause environmental degradation or that would be culturally inappropriate".

The Convention on Biological Diversity was opened for signature at the Earth Summit, and made a start towards redefinition of measures that did not inherently encourage destruction of natural eco regions and so-called uneconomic growth.

Although President George H.W. Bush signed the Earth Summit's Convention on Climate, his EPA Administrator William K. Reilly acknowledges that U.S. goals at the conference were difficult to negotiate and the agency's international results were mixed, including the U.S. failure to sign the proposed Convention on Biological Diversity.

Twelve cities were also honoured by the Local Government Honours Award for innovative local environmental programs. These included Sudbury in Canada for its ambitious program to rehabilitate environmental damage from the local mining industry, Austin in the United States for its green building strategy, and Kitakyūshū in Japan for incorporating an international education and training component into its municipal pollution control program.

The Summit's message — that nothing less than a transformation of our attitudes and behaviour would bring about the necessary changes — was transmitted by almost 10,000 on-site journalists and heard by millions around the world. The message reflected the complexity of the problems facing us: that poverty as well as excessive consumption by affluent populations place damaging stress on the environment. Governments recognized the need to redirect international and national plans and policies to ensure that all economic decisions fully took into account any environmental impact. And the message has produced results, making eco-efficiency a guiding principle for business and governments alike.

- Patterns of production — particularly the production of toxic components, such as lead in gasoline, or poisonous waste — are being scrutinized in a systematic manner by the UN and Governments alike;

- Alternative sources of energy are being sought to replace the use of fossil fuels which are linked to global climate change;

- New reliance on public transportation systems is being emphasized in order to reduce vehicle emissions, congestion in cities and the health problems caused by polluted air and smog;

- There is much greater awareness of and concern over the growing scarcity of water.

The two-week Earth Summit was the climax of a process, begun in December 1989, of planning, education and negotiations among all Member States of the United Nations, leading to the adoption of Agenda 21, a wide-ranging blueprint for action to achieve sustainable development worldwide. At its close, Maurice Strong, the Conference Secretary-General, called the Summit a "historic moment for humanity". Although Agenda 21 had been weakened by compromise and negotiation, he said, it was still the most comprehensive and, if implemented, effective programme of action ever sanctioned by the international community.

Today, efforts to ensure its proper implementation continue, and they will be reviewed by the UN General Assembly at a special session to be held in June1997.The Earth Summit influenced all subsequent UN conferences, which have examined the relationship between human rights, population, social development, women and human settlements — and the need for environmentally sustainable development. The World Conference on Human Rights, held in Vienna in 1993, for example, underscored the right of people to a healthy environment and the right to development, controversial demands that had met with resistance from some Member States until Rio**.**

KYOTO CONFERENCE 1997

The Kyoto Protocol is an international treaty which extends the 1992 United Nations Framework Convention on Climate Change (UNFCCC) that commits State Parties to reduce greenhouse gas emissions, based on the consensus that (a) global warming is occurring and (b) it is extremely likely that human-made CO_2 emissions have predominantly caused it. The Kyoto Protocol was adopted in Kyoto, Japan, on December 11, 1997 and entered into force on February 16, 2005. There are currently 192 parties (Canada withdrew effective December 2012) to the Protocol.

The Kyoto Protocol implemented the objective of the UNFCCC to fight global warming by reducing greenhouse gas concentrations in the atmosphere to "a level that would prevent dangerous anthropogenic interference with the climate system" (Art. 2). The Protocol is based on the principle of common but differentiated responsibilities: it puts the obligation to reduce current emissions on developed countries on the basis that they are historically responsible for the current levels of greenhouse gases in the atmosphere.

The Protocol's first commitment period started in 2008 and ended in 2012. A second commitment period was agreed on in 2012, known as the Doha Amendment to the protocol, in which 37 countries have binding targets: Australia, the European Union (and its 28 member states), Belarus, Iceland, Kazakhstan, Liechtenstein, Norway, Switzerland, and Ukraine. Belarus, Kazakhstan and Ukraine have stated that they may withdraw from the Protocol or not put into legal force the Amendment with second round targets. Japan, New Zealand and Russia have participated in Kyoto's first-round but have not taken on new targets in the second commitment period. Other developed countries without second-round targets are Canada (which withdrew from the Kyoto Protocol in 2012) and the United States (which has not ratified the Protocol). As of July 2016, 66 states have accepted the Doha Amendment, while entry into force requires the acceptances of 144 states. Of the 37 countries with binding commitments, 7 have ratified.

Negotiations were held in the framework of the yearly UNFCCC Climate Change Conferences on measures to be taken after the second commitment period ends in 2020. This resulted in the 2015 adoption of the Paris Agreement, which is a separate instrument under the UNFCCC rather than an amendment of the Kyoto protocol.

The Main Goal of the Kyoto Protocol

This is to control emissions of the main anthropogenic (i.e., human-emitted) greenhouse gases (GHGs) in ways that reflect underlying national differences in GHG emissions, wealth, and capacity to make the reductions. The treaty follows the main principles agreed in the original 1992 UN Framework Convention. According to the treaty, in 2012, Annex I Parties who have ratified the treaty must have fulfilled their obligations of greenhouse gas emissions limitations established for the Kyoto Protocol's first commitment period (2008–2012). These emissions limitation commitments are listed in Annex B of the Protocol.

The Kyoto Protocol's first round commitments are the first detailed step taken within the UN Framework Convention on Climate Change (Gupta *et al.*, 2007). The Protocol establishes a structure of rolling emission reduction commitment periods. It set a timetable starting in 2006 for negotiations to establish emission reduction commitments for a second commitment period The first period emission reduction commitments expired on December 31, 2012.

The ultimate objective of the UNFCCC is the "stabilization of greenhouse gas concentrations in the atmosphere at a level that would stop dangerous anthropogenic interference with the climate system." Even if Annex I Parties succeed in meeting their first-round

commitments, much greater emission reductions will be required in future to stabilize atmospheric GHG concentrations.

Some of the Principal Concepts of the Kyoto Protocol are

- Binding commitments for the Annex I Parties. The main feature of the Protocol is that it established legally binding commitments to reduce emissions of greenhouse gases for Annex I Parties. The commitments were based on the Berlin Mandate, which was a part of UNFCCC negotiations leading up to the Protocol.
- Implementation. In order to meet the objectives of the Protocol, Annex I Parties are required to prepare policies and measures for the reduction of greenhouse gases in their respective countries. In addition, they are required to increase the absorption of these gases and utilize all mechanisms available, such as joint implementation, the clean development mechanism and emissions trading, in order to be rewarded with credits that would allow more greenhouse gas emissions at home.
- Minimizing Impacts on Developing Countries by establishing an adaptation fund for climate change.
- Accounting, Reporting and Review in order to ensure the integrity of the Protocol.
- Compliance. Establishing a Compliance Committee to enforce compliance with the commitments under the Protocol.

The agreement is a protocol to the United Nations Framework Convention on Climate Change (UNFCCC) adopted at the Earth Summit in Rio de Janeiro in 1992, which did not set any legally binding limitations on emissions or enforcement mechanisms. Only Parties to the UNFCCC can become Parties to the Kyoto Protocol. The Kyoto Protocol was adopted at the third session of the Conference of Parties to the UNFCCC (COP 3) in 1997 in Kyoto, Japan.

National emission targets specified in the Kyoto Protocol exclude international aviation and shipping. Kyoto Parties can use land use, land use change, and forestry (LULUCF) in meeting their targets. LULUCF activities are also called "sink" activities. Changes in sinks and land use can have an effect on the climate, and indeed the Intergovernmental Panel on Climate Change's Special Report on Land Use, Land-Use Change and Forestry estimates that since 1750 a third of global warming has been caused by land use change. Particular criteria apply to the definition of forestry under the Kyoto Protocol.

2009 United Nations Climate Change Conference

The 2009 United Nations Climate Change Conference, commonly known as the Copenhagen Summit, was held at the Bella Centre in Copenhagen, Denmark, between 7 and 18 December. The conference included the 15th Conference of the Parties (COP 15) to the United Nations Framework Convention on Climate Change (UNFCCC) and the 5th Meeting of the Parties (MOP 5) to the Kyoto Protocol. According to the Bali Road Map, a framework for climate change mitigation beyond 2012 was to be agreed there.

The Copenhagen Accord was drafted by the United States, China, India, Brazil and South Africa on 18 December, and judged a "meaningful agreement" by the United States government. It was "taken note of", but not "adopted", in a debate of all the participating countries the next day, and it was not passed unanimously. The document recognised that climate change is one of the greatest challenges of the pre

damage", an agreement in principle that richer nations could be financially responsible to other nations for their failure to reduce carbon emissions.

The United Nations Climate Change Conferences are annual multi-lateral meetings of governments held in different locations around the world under the sponsorship of the United Nations that serve as a forum for countries to discuss climate change matters. The conferences seek to address the threat of global warming caused by greenhouse gas emissions like carbon dioxide. Between 2000–2011 carbon dioxide growth in the atmosphere was 20% of the total concentration growth since prehistoric level (391,57 ppm in 2011 and 369,52 ppm in 2000) The concentration of carbon dioxide in Earth's atmosphere has reached 391 ppm (parts per million) as of October 2012 versus the pre-industrial concentration was 280 ppm which the consensus of world climate scientists agree is unsustainable.

The conferences are attended by dignitaries and sometimes heads of state from most countries and generally draw significant activity by various environmental advocacy groups. Consequently, the conferences are generally well covered by the world media agencies. The 2012 conference is held at the Qatar National Convention Centre in Doha, and with a projected attendance of 17,000 participants it is expected to be the largest conference to have ever been held in Qatar. The conference is casually called the COP18 /CMP 8 conference but these are technically different but closely related and sometimes integrated conferences. In 2012, the UNFCCC conference serves as an umbrella for seven concurrent and interrelated meeting groups collectively called the Doha 2012 UNFCCC conference. The main conference is also preceded by several topical pre-sessions.

The Conference focused on five aspects of climate change

- Adaptation – social and other changes that must be undertaken to successfully adapt to climate change. Adaptation might encompass, but is not limited to, changes in agriculture and urban planning.
- Finance – how countries will finance adaptation to and mitigation of climate change, whether from public or private sources.
- Mitigation – steps and actions that the countries of the world can take to mitigate the effects of climate change.
- Technology – the technologies that are needed to adapt or mitigate climate change and ways in which developed countries can support developing countries in adopting them.

- Loss and damage – first articulated at the 2012 conference and in part based on the agreement that was signed at the 2010 United Nations Climate Change Conference in Cancun. It introduces the principle that countries vulnerable to the effects of climate change may be financially compensated in future by countries that fail to curb their carbon emissions.

Conclusion

This unit addresses what are the issues that speak about environmental climate change, pollution and environmental degradation, and resource depletion etc. the conservation movement lobbies for protection of endangered species and natural areas. It also speaks about the effect of green gas house and the conferences which are organized in connection with environmental issues.

Questions for Discussion and Reflection

1. Write an essay on "Environmental issues and Global community"
2. Describe in detail about Earth summit Rio Conference 1992
3. Discuss about "Kyoto Conference and Copenhagen UN climate change conference"
4. Write a note on Brundtland Commission

Unit IV Management and Protection of Environmental

Objectives

After the completion of the unit, the learners will be able to

1. develop understanding about the impact of human activities on environment.
2. realize the importance of International NGO'S and Environment protection.
3. discuss the importance of International initiatives to protect Environment.
4. understand the significance of International union for Conservation of Nature

Introduction

Environmental management involves the management of all components of the bio-physical environment, both living (biotic) and non-living (abiotic). This is due to the interconnected and network of relationships amongst all living species and their habitats. The environment also involves the relationships of the human environment, such as the social, cultural and economic environment with the bio-physical environment. Our very survival in this planet Earth depends on the proper management of environment. Every living species in this plant require air, water for survival. All living beings are interdependent directly or indirectly. The survival of trees and forests will bring good rainfall and good agriculture. Every living body need clean air, water and soil for survival and healthy life. Due to enormous increase in population and stress on environmental factors like air, water and soil, it is now urgently needed to frame guidelines and rules for the management of environment in a proper way. A good management of environment can only bring a sustainable life to all in this planet earth.

Effect of Human Activities on the Environment

Humans impact the environment in several ways. Common effects include decreased water quality, increased pollution and greenhouse gas emissions, depletion of natural resources and contribution to global climate change.

Water Pollution

One of the biggest impacts humans have on aquatic systems is excess nutrient inputs. Nutrients, like nitrogen and phosphorus, are essential to the health and survival of aquatic plants and animals. However, humans introduce large quantities of nutrients, primarily through overuse

of fertilizers. Too many nutrients can rapidly reduce water quality by causing overgrowth of certain bacteria and algae that use the oxygen necessary for other species to survive.

Air Pollution

The majority of air pollution is the result of human activities. For example, increased fossil fuel combustion from motor vehicles, industrial factories and power plants all pump large quantities of air pollutants, such as carbon monoxide, ozone and nitrous oxides, into the atmosphere. Other air pollutants, such as lead-based compounds, can lead to serious health effects like cancer, or other types of reproductive effects and birth defects.

Climate Change

Human activities are largely responsible for an increase in temperature around the globe, primarily due to carbon dioxide and other greenhouse gas emissions. This increase in temperature is leading to changes in where crops can grow and where certain fish or animals can be found, all vital for feeding an increasing human population. The rise in global temperatures is also causing glaciers to melt, releasing water that causes sea levels to rise and threaten coastal communities and economies that rely on coastal resources.

Effects of Agriculture Activities on Environment

The effects of agriculture on the environment can be broadly classified into three groups, viz. local, regional and global:

i. Local Changes: These occur at or near the site of farming. These changes/effects include soil erosion and increase in sedimentation downstream in local rivers. Fertilizers carried by sediments can cause eutrophication of local water bodies. Polluted sediments can also transport toxins and destroy local fisheries.

ii. Regional Changes: They generally result from the combined effects of farming practices in the same large region. Regional effects include deforestation, desertification, large scale pollution, increases in sedimentation in major rivers.

iii. Global Changes: These include climatic changes as well as initially extensive changes in chemical cycles.

- **Deforestation**: The slash and burn of trees in forests to clear the land for cultivation and frequent shifting result in loss of forest cover.
- **Soil Erosion:** Clearing of forest cover exposes the soil to wind, rain and storms, thereby resulting in loss of top fertile layer of soil.
- **Depletion of Nutrients:** During slash and burn the organic matter in the soil gets destroyed and most of the nutrients are taken up by the crops within a short period, thus making the soil nutrient poor which forces the cultivators shift to another area.

Eutrophication

Excessive use of N and P fertilizers in the agricultural fields leads to another problem, which is not related to the soil, but relates to water bodies like lakes. A large proportion of nitrogen and phosphorus used in crop fields is washed off and along with runoff water reach the water bodies causing over nourishment of the lakes, a process known as Eutrophication

Pesticides Related Problems

A pesticide is any substance or mixture of substances intended for preventing, destroying, repelling or mitigating any pest. A pesticide may be a chemical substance, biological agent (such as a virus or bacterium), antimicrobial, disinfectant or device used against any pest. Pests include insects, plant pathogens, weeds, molluscs, birds, mammals, fish, nematodes (roundworms), and microbes that destroy property.

Water Logging

Over irrigation of croplands by farmers for good growth of their crop usually leads to water logging. Inadequate drainage causes excess water to accumulate underground and gradually forms a continuous column with the water table.

Salinity

Salinity refers to increased concentration of soluble salts in the soil. It results due to intensive agricultural practices. Due to poor drainage of irrigation and flood waters, the dissolved ill o in these waters accumulates on the soil surface.

Effects of Housing Activities on Environment

Housing characteristics includes home decorations pet keeping and other environmental factors have significant impact on the health of the residents.

- The poor housing can have profound, directly measurable effects on physical and mental health of the residents.
- The air-tight sealing of modern buildings has helped in reducing spiralling energy costs but it has contributed significantly to the health problems arisen due to indoor air pollution.
- Several building materials continue to affect the indoor air quality. These materials used as solvents, finishes and cleansers for maintenance and protection of building materials can cause 'sick building syndrome'.

Production of plastics is also associated with generation of the greenhouse gas namely carbon dioxide (CO2), volatile organic compounds (VOCs) and polyvinyl chloride (PVC), which are harmful because of global warming potential of CO2 and health related problems of the latter two. Disposal of PVCs is a major problem.

- The indoor air pollution is a major source of public exposure to air pollutants having potential to cause chronic health problems.
- The sources of formaldehyde in modem buildings include building materials, smoking, household products, and the use of un-vented, fuel-burning appliances, like gas stoves or kerosene space heaters.
- In the houses, offices or workplaces, the most significant sources of formaldehyde are likely to be pressed wood products made using adhesives that contain urea-formaldehyde (UF) resins.
- Formaldehyde is also present in tobacco smoke, natural gas and kerosene.
- Benzene is a solvent used in petrol, ink, oil, paint, plastic and rubber.
- Trichloroethylene is used in metal degreasers, dry cleaning solvents, inks, paints, lacquers, varnishes and adhesives.
- Ozone from copying machines.
- Fumes from cleaning solvents.
- Even our kitchen trash-bin contributes a huge volume of illness-causing bacteria and unpleasant odour to indoor air. Cockroach droppings trigger allergic asthma.

Role of Non-Governmental Organizations (NGO) in Environment Protection

Non-Governmental Organization is a broad term, which includes charity organizations, advisory committees and various other professional organizations. NGOs in India are spread across the country and they have close contacts with communities. They are involved in the whole spectrum of developmental activities from creating environmental awareness to undertaking watershed development: from disaster management to sustainable livelihoods; from joint forest management to giving inputs to policies. They range from clubs, which encourage nature camping to agencies, which undertake research and monitoring.

There are large number of NGOs in India and other countries that are exclusively working for environmental, protection, conservation, and awareness. The number of these non-governmental organizations which are actively involved in environmental protection in our country is, in fact, more than in any of the developing country. Increasingly, the government is viewing NGOs not only as agencies that will help them to implement their programs, but also as partners shaping policy and programs.

NGOs are now playing an important role in framing the environmental policy, mobilizing public support for environmental conservation, and protecting the endangered species of forests and animals. Environmental organizations such as Earth watch and Sea Shepherd Conservation Society have been successful in creating awareness about the environmental dangers in using drift nets in the commercial fishing industry.

Some of the international environmental organizations are Greenpeace, Worldwide Fund for Nature' (WWF), Earth First, etc. Let us now have a detailed discussion on some of the environmental organizations and their efforts in protecting environment.

Greenpeace

Greenpeace is an environment-friendly international organization, which aims at promoting environmental awareness. It is an independent, campaigning organization, addressing the environmental abuse through direct, non-violent confrontations with governments and companies. It exposes the global environmental problems and provides solutions for a healthy environment.

Greenpeace focuses on the most crucial worldwide threats to our planets biodiversity and environment.

It campaigns to:

1. Stop Climate Change

The extensive use of oil, gas, fuel, and other energy resources leads to climatic changes, which results in global warming. In order to stop climate change, Greenpeace is campaigning on various fronts. It has been researching to stop climate change and to promote clean energy solutions.

2. Protect Ancient Forests

Many forests of the world are in crisis. The plants and animals are facing the threat of extinction. People living in forests and depending on them for their livelihood are also under threat. Greenpeace takes up the responsibility to save the forests and provides solutions for the same.

3. Save the Oceans

Greenpeace's save the oceans campaign currently focuses on four major threats to the world's oceans: overfishing, pirate fishing, whaling, and intensive shrimp aquaculture.

4. Stop Whaling

Commercial Whaling has resulted in the decline of the world's whale population. In order to stop commercial whaling, Greenpeace is working on many fronts. Through political work public outreach and by adopting non-violent direct, action against the whalers at sea. Greenpeace is fighting against commercial whaling.

5. Say No to Genetic Engineering

Genetic engineering enables creation of plants, animals and micro-organisms through the manipulation of genes. The organisms, which are produced through genetic engineering when interbred with the natural organisms lead to new environments, which are uncontrolled.

6. Stop the Nuclear Threat

Greenpeace campaigns against the use of nuclear power as its use has never been peaceful. It leads to accidents, deaths, and disasters. Radiation released into the environment through the nuclear tests has led to the contamination of soil, air, rivers, and oceans, causing cancer and other diseases in people.

7. Eliminate Toxic Chemicals

Greenpeace also campaigns against toxic chemicals, as they prove to be a global threat to the health and environment.

8. Encourage Sustainable Trade

Greenpeace opposes the current form of globalization that is increasing corporate power. It demands that the World Trade Organization (WTO) adopt a policy of trade, which works for all and that preserves and restores the environment. Governments must work toward achieving sustainable development.

Worldwide Fund for Nature (WWF)—India:

WWF is an international organization for wildlife conservation with its focus on protecting particular species of wildlife fauna. As its range of activities broadened, the international organization believed that its name no longer reflected the scope of its activities and became the Worldwide Fund for Nature in 1986. But the affiliated groups in the United States and Canada retained the original name. The organization is now simply, referred to as WWF.

WWF-India is committed to protecting and saving the already degraded and threatened natural bounties in the country. The organization is today dedicated to the conservation of natural habitats and ecosystems in India.

WWF-India was established as a Charitable Trust in 1969. With its network of State/Divisional and Field Offices spread across the country to implement its programs, WWF-India is the largest and one of the most experienced conservation organizations in the country.

The Secretariat of the organization functions from New Delhi. The organization is part of the WWF family with 27 independent national organizations. The coordinating body, the WWF International, is located at Gland in Switzerland.

In order to suit India's specific ecological and socio-cultural situation, WWF-India articulated its mission in 1987 as follows: "The promotion of nature conservation and environmental protection as the basis for sustainable and equitable development."

The WWF-India Mission has the following program components

1. Promoting India's ecological security; restoring the ecological balance.
2. Conserving biological diversity.
3. Ensuring sustainable use of the natural resource base.
4. Minimizing pollution and wasteful consumption, promoting sustainable lifestyles.

WWF-India implements its conservation programs through Field Programs, Public Policy, Education, Communications, NGO Networking, and Resource Mobilization.

International Union for Conservation of Nature

The **International Union for Conservation of Nature** (**IUCN** officially **International Union for Conservation of Nature and Natural Resources**) is an international organization working in the field of nature conservation and sustainable use of natural resources. It is involved in data gathering and analysis, research, field projects, advocacy, and education. IUCN's mission is to "influence, encourage and assist societies throughout the world to conserve nature and to ensure that any use of natural resources is equitable and ecologically sustainable".

IUCN was established in 1948. It was previously called the **International Union for the Protection of Nature** (1948–1956) and the **World Conservation Union** (1990–2008).Over the past decades, IUCN has widened its focus beyond conservation ecology and now incorporates issues related to sustainable development in its projects. Unlike many other international environmental organisations, IUCN does not itself aim to mobilize the public in support of nature conservation. It tries to influence the actions of governments, business and other stakeholders by providing information and advice, and through building partnerships. The organization is best known to the wider public for compiling and publishing the IUCN Red List of Threatened Species, which assesses the conservation status of species worldwide.

IUCN has a membership of over 1400 governmental and non-governmental organizations. Some 16,000 scientists and experts participate in the work of IUCN commissions on a voluntary basis. It employs approximately 1000 full-time staff in more than 50 countries. Its headquarters are in Gland, Switzerland.

IUCN has observer and consultative status at the United Nations, and plays a role in the implementation of several international conventions on nature conservation and biodiversity. It was involved in establishing the World Wide Fund for Nature and the World Conservation Monitoring Centre.

Environmental Protection strategies

Studies carried out on the state of environment in the country indicate a dangerous situation which might reach disastrous proportions. The reasons for such an impending calamity are not difficult to assess. A burgeoning population having crossed the billion mark coupled with large scale rural – urban migration has put unbearable strain on the already over – stretched infrastructure of towns and cities. The civic agencies cannot cope up with the increasing demands for water and power supply, sanitation, sewage and waste management, etc.,

Depleted water availability, shortage of power, non-availability of land for garbage disposal, increase in the number of vehicles, non-effective controls on emissions, absence of water conservation schemes, depletion of tree cover due to mushrooming commercial and housing complexes, add up to the complexities which urban areas face. Lowering of water table, selected cultivation of cash crops which are water intensive, destruction of trees for wood as construction material, extensive degradation and salination of agricultural land are some aspects which need to be addressed and ameliorative mitigation actions taken. Environmental protection is an integral part of the development process and cannot be considered in isolation from it. This involves a holistic approach and understanding of issues which are best handled with the participation of all concerned. It also involves changing of attitudes and lifestyles, such that we minimise and reduce the impacts on environment.

National Green Tribunal Act

National Green Tribunal Act, 2010 (NGT) is an Act of the Parliament of India which enables creation of a special tribunal to handle the expeditious disposal of the cases pertaining to environmental issues. It draws inspiration from the India's constitutional provision of Article 21, which assures the citizens of India the right to a healthy environment.

Definition

The legislate Act of Parliament defines the National Green Tribunal Act, 2010 as follows,"An Act to provide for the establishment of a National Green Tribunal for the effective

and expeditious disposal of cases relating to environmental protection and conservation of forests and other natural resources including enforcement of any legal right relating to environment and giving relief and compensation for damages to persons and property and for matters connected therewith or incidental thereto".[4]

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 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 is mandated to make and endeavour for disposal of applications or appeals finally within 6 months of filing of the same.Initially, the NGT is proposed to be set up at five places of sittings and will follow circuit procedure for making itself more accessible; New Delhi is the Principal Place of Sitting of the Tribunal and Bhopal, Pune, Kolkata, Allahabad and Chennai shall be the other place of sitting of the Tribunal.[7]

Also Tribunal is competent to hear cases for several acts such as Forest (Conservation) Act, Biological Diversity Act, Environment (Protection) Act, Water & Air (Prevention & control of Pollution) Acts etc. and also have appellate jurisdiction related to above acts after establishment of Tribunal within a period of 30 days of award or order received by aggrieved party. The Bill says that decision taken by majority of members shall be binding and every order of Tribunal shall be final. Any person aggrieved by an award, decision, or order of the Tribunal may appeal to the Supreme Court within 90 days of commencement of award but Supreme Court can entertain appeal even after 90 days if appellant satisfied SC by giving sufficient reasons.

Functions of Central Pollution Control Board

The mandate of the Central Pollution Control Board is to set environmental standards in India, lay down ambient standards and coordinate the activities of State Pollution Control Boards.

According to section 16 of the Water (Prevention and Control of Pollution) Act, 1974, the Central Board has been assigned to discharge the functions as follows

(a) Advise the Central Government The Central Pollution Control Board can advise the Central Government on any matter concerning the prevention and control of water pollution.

(b) Co-Ordination with State Board Central Pollution Control Board is to Co-ordinate the activities of the State Boards and resolve dispute among them.

(c) Technical Assistance/Guidance to State Boards Central Pollution Control Board is to provide technical assistance and guidance to the State Boards, carry out and sponsor investigations and research relating to problem of water pollution and prevention, control or abatement of water pollution.

(d) Training Programme Central Pollution Control Board is to plan and organize the training of persons engaged or to be engaged in programmes for the prevention, control or abatement of water pollution.

(e) Organising Comprehensive Programme Central Pollution Control Board is to organise through mass media a comprehensive programme regarding the prevention and control of water pollution.

(f) Functions as State Board By the Amending Act, 1988, the Central Board can perform such of the functions of any State Board as may be specified in an order made under section 18(2) of the Water (Prevention and Control of Pollution) Act, 1974 i.e., "power to give directions"-"every State Board shall be bound by such directions in writing as the Central Government or the State Government may give to it.

(g) Publication of Statistical/Technical Data Central Pollution Control Board is to Collect, compile and publish technical and statistical relating to water pollution and the measures devised for its effective prevention and control and prepare manuals, codes or guides relating to treatment and disposal of sewage and trade effluents and disseminate information connected therewith.

(h) Laying Down Standard for A Stream/Well Central Pollution Control Board is to lay down, modify or annul, in consultation with the State Government concerned the standards for a stream or well.

(i) Execution of Programme at National Level Central Pollution Control Board is to plan and cause to be executed by a nationwide programme for the prevention, control or abatement of water pollution.

Functions of State Pollution Control Boards

In terms of section 17 of the Water (Prevention and Control of Pollution) Act, 1974, the State Board has to perform the following functions:

(a) Planning Comprehensive Programme the State Pollution Control Board is to plan a comprehensive programme for the prevention, control or abatement of pollution of streams and wells in the state and to secure the execution thereof.

(b) Advisory functions The State Pollution Control Board is to advise the state government on any matter concerning the prevention, control or abatement of water pollution.

(c) Dissemination of Information the State Pollution Control Board is to collect and disseminate information relating to water pollution and the prevention, control or abatement thereof.

(d) Investigation and research The State Pollution Control Board is to encourage, conduct and participate in investigation and research relating to problems of water pollution and prevention, control or abatement of water pollution.

(e) Organising training programme The State Pollution Control Board is to collaborate with the Central Board in organising the training of persons engaged in programmes relating to prevention, control or abatement of water pollution and to organise mass education programmes relating thereto.

(f) Inspection of sewage/trade effluents plants The State Pollution Control Board is to inspect sewage or trade effluents works and plants for the treatment of sewage and trade effluents, and to review plans, specifications or other data relating to plants setup for the treatment of water, works for the purification thereof and the system of the disposal of sewage or trade effluents or in connection with the grant of any consent as required by the Water (Prevention and Control of Pollution) Act, 1974.

(g) Lay down Standards for Causing Discharge of Water The State Pollution Control Board is to lay down, modify or annul effluents standards for the sewage and trade effluents and for the quality of receiving waters resulting from the discharge of effluents and to classify water of the state.

(h) Economical Methods of Treatment of Sewage the State Pollution Control Board is to evolve economical and reliable methods of treatment of sewage and trade effluents, having regard to the peculiar conditions of soil, climate and water resources in different regions.

(i) Methods Regarding Utilization of Sewage the State Pollution Control Board is to evolve methods of utilization of sewage and suitable trade effluents in agriculture.

(j) Methods of Disposal of Sewage The State Pollution Control Board is to evolve efficient methods of disposal of sewage and trade effluents on land, as are necessary on account of the

predominant conditions of scant stream flows that do not provide for major part of the year, the minimum degree of dilution.

(k) Laying Down Standards for Treatment of Sewage The State Pollution Control Board is to lay down the standards of treatment of sewage and trade effluents to be discharged into any particular stream taking into account the minimum fair weather dilution available in that stream and the tolerance limits of pollution permissible in the water of the streams after the discharge of suit effluents.

(l) Advisory Functions the State Pollution Control Board is to advise the state government about the location of any industry the carrying out of which is likely to pollute a stream or well

Besides the aforesaid statutory functions, the State Board is also to perform functions as may be prescribed from time to time, or may be entrusted to it by the Central Pollution Control Board or the State Government.

Conclusion

Environmental management is the management of the impact and interaction of human societies on the environment. Environmental Management is the practice of keeping soil, air and water safe for humans and wildlife. An environmental management system addresses the environmental impact of an organization's activities and establishes goals and procedures that will improve the impact it has on the environment and human health.

Questions for Discussion and Reflection

1. Explain the need and dimensions of environment.
2. What are the impacts of Human Activities on Environment?
3. Write an essay on International NGO'S and Environmental protection.
4. Discuss Environmental protection strategies initiated

UNIT V ENVIRONMENTAL EDUCATION IN SCHOOL CURRICULUM

Objectives

After the completion of the unit, the learners will be able to

1. Describe the environmental education in school curriculum.
2. Explain the different stages of environmental education.
3. Identify the innovative methods of teaching environmental education.
4. Discuss the problems faced in teaching environmental education.

Status of Environmental Education in School Curriculum

Environmental Education has been introduced in school curriculum at pre-school level, Elementary level and higher secondary level both in state board (Tamil Nadu) schools and in Central Board (CBSE). Both syllabuses are prepared in accordance with the National Policy of Education in 1986.

Environmental Education is inter-disciplinary in nature. It involves subject matter from natural science and social science. NCERT has developed national curriculum for all stages of education specially emphasizing the aspects of general awareness, land resources and their uses, food and nutrition, conservation, pollution, health and hygiene and man in nature of Environmental Education.

Pre-school Level

At pre-school level, a general awareness about the personal hygiene and environmental cleanliness are introduced in a simplified version through a number of colourful diagrammatic illustrations. Rhymes related to nature are also introduced. The Government of Tamil Nadu has introduced *scientific Tamil (Ariviyal Tamil)* also various levels in school curriculum, environmental education is one of the components included in the text book of Scientific Tamil. This book is published by the Tamil Nadu Text Book Society, Chennai-6.

Elementary Level

At Elementary level, the focus is stressed towards the environmental cleanliness. The concept of "ENVIRONMENT" is introduced. The relationship between the child and the environment is emphasized. The child understands that he/she is surrounded by land, water, air, plants and animals. The role of environment is brought out through storytelling and singing

songs. But less emphasis is given to various practical activities in connection with environmental education.

Secondary Level

The concepts of environmental education have been provided in the text books of science and social science in state of Tamil Nadu. The course materials are built on fundamental understanding of ecological and bio-geographical principles. The important objectives are to understand the ecological principles and issues, and to know about the conservation. At the 6th standard level, the environmental hygiene is explained in scientific Tamil Text Books.

In *sixth* standard level

- Primary Energy
- Water Harvest(through song)
- Environmental hygiene
- Medicinal plant
- Life without disease

Similarly, in 7th standard of scientific Tamil the following concepts related to environmental education are introduced:

- Protection of soil, tree(through songs)
- Electricity from clouds
- A search for plants
- Noise pollution
- Chemicals in our daily life
- Food as medicine
- Biosphere
- Green house effect
- Ozone layer depletion
- Wind power
- Use of fertilizers and pesticides
- Environmental laws and acts
- Environmental concepts also extend to subject areas like Language and Social Science, which reinforce learning and Internalization of all such concepts.

Higher Secondary Level

In general, at higher secondary level, only those students selecting science subjects like Mathematics, Physics, Chemistry and Biology are exposed to environmental education. Majority of the concepts are found in the text books of Biology, Chemistry and Geography, which are optional subjects. Students opting for any one of these subjects would accordingly benefit in different aspects of environmental education.

The coverage of environmental education concepts in the text books of various subjects includes:

- Environment and sustainable development
- Atmospheric pollution-Global Warming
- Acid rain
- Water pollutions-International Standards of Drinking water
- Land pollution-pesticides
- Ecology

Some of the activities pertaining to Environmental Education from primary, elementary, secondary and higher secondary level.

Environmental Education At Different Levels Of Education

Environmental Education is a process that allows individuals to explore environmental issues engages in problem solving and take action to improve the environment. As a result, individuals develop a deeper understanding of environmental issues and have the skill to make informed and responsible decisions.

Meaning of Environmental Education

Environmental Education is one that helps individuals to become more knowledgeable about their environment and to develop the responsible environmental behaviour and skills so that they can improve the qualities of the environment.

Definition of Environmental Education

Environmental Education is aimed at introducing a citizenry that is knowledgeable concerning the biophysical environment and its associated problems, aware of how to help solve

these problems and motivated to work towards their solution.

-Stapp.W.B.,et al(1969)

Environmental Education at Different Stages

Primary Stage

The world of the child begins with an awareness of its own body and gradually expands, in ever-widening circles to an exploration of the immediate surroundings-family and home, neighbourhood, school and beyond.

Valuable learning takes place through interaction with the immediate environment. Everyday Children experience the natural environment-Seasons, Heat, Rain, Cold, The sky, The sun and Moon, Different aspects of water, Plants and Animals. Children, especially young have a natural desire to learn and make sense of the world around them.

The National Curriculum Framework *2005 (NCF)* recognizes that "Learning in early years must hence be directed by the child's interest and priorities, and should be contextualised by their experiences rather than being structured formally. An enabling environment for children would be i.e., rich in stimulation and experiences, that allow children to explore, experiment and freely express themselves and one that is embedded in social relations that give them a sense of warmth, security and trust".

Secondary Stage

Students at the secondary level, as intermediate between primary school and University College, are in a varying age group according to the school system. Secondary school involves young people of both sexes. The so called generation gap is directly related to the education crisis. Students have antagonistic feelings towards school and teachers.

Students should clearly see why they should be concerned with the environment. Youths are "now individuals". It is necessary to relate ecological-environmental long term aims to short term interests of individuals. By predicting future problems and hardships, students might respond with an implicit, "so what" attitude.

Teacher should explore the environment with students, both intellectually and by experience, in order to obtain factual knowledge and the motivating concerns regarding man's relationship and responsibility within human ecosystem.

Higher Secondary Stage

The concepts of Environmental Education have been provided in the text books of Science and social science, in the states of Rajasthan and Madhya Pradesh. In Orissa, there are textbooks, namely Science part-1 (physical science), science part-2 (Biological science) and geography. The Environmental concepts both are at *concrete* and *abstract levels*. The concepts covered are:

- Biosphere
- Green House Effect
- Ozone Layer Depletion
- Use of fertilizers and pesticides
- Wild life protection
- Soil chemistry
- Management of domestic and Industrial Waste
- Ecosystem
- Radiation Hazards

College Stage

This is the stage of diversification. Students opt for either the academic stream or the vocational stream. The treatment of concepts become deeper and more discipline oriented since the content caters to demand the concerned subject, as an independent discipline a comprehensive view about Environmental Education is not available in the textbooks.

The coverage of Environmental Education concepts:

- Environment and sustainable development
- Global Warming
- Green House Effects
- Water pollution
- Bio-chemical oxygen demand
- Chemical oxygen demand
- Pesticides
- Ecology

Innovative Methods of Teaching Environmental Education

Discussion Method

A discussion is an open forum in which learners can express their opinions as well as review factual materials. In addition, discussion is a natural opportunity for students to exercise their command of the processed of communication, inference and conclusion (wonfinger, 1984). In the discussion method the teacher gives a brief introduction of the topic for discussion. The references are given by the teachers.

Whenever, the discussion method is followed by the teacher should keep in view the following points which are highlighted by Sharma (1996) :

- The topic for discussion should be chosen with due care and thought. It should commonly be of general nature –neither very simple nor very technical but which involves some thinking Interpretation on the part of the pupil.
- Teacher has to be very careful that discussion is not stretched away from the topic but is relevant. Time should not be wasted for irrelevant discussion.
- Class discipline should not be disturbed
- Any controversial point should be settled by the teacher at the proper time.
- The points left out by a particular group should be supplemented by the teacher.

Objectives of Discussion Method

The objectives of discussion method are listed hereunder;

- To share information
- To clarify ideas
- To inspire interest
- To promote co-operative learning
- To identify the different views on a problem
- To get conceptual clarity
- To develop the skill of expression
- To evaluate progress
- To locate and define a problem
- To allocate responsibilities to find ways of solving the problems

Types of Discussion

There are two types of discussion which are as follows;

1. Open discussion
2. Planned discussion.

Open Discussion

Open discussion is one in which the learner determines the topic and the role of the teacher is to ask questions that will lead the learner to consider the various ideas. There can be no planning because the open discussion is spontaneous by definition. It can be extremely effective in getting learner to make inference and draw conclusion.

Planned Discussion

In a planned discussion the teacher determines the content of the discussion plans the questions and guides the learners towards some predetermined goals. It is a way of introducing and teaching content to the learners in a way that will involve them cognitively.

Hence, discussion is a natural opportunity for students to share their ideas freely with others in order to get conceptual clarity.

Seminar

The term "seminar" is generally used to refer to a structured group discussion. Individual students also prepare a paper or report and presents before a group of peers, as in the case of seminar paper presentation.

Preparation for Seminar

The teacher should take the initiative in acquiring the students with objectives and purpose of the seminar. Seminar requires much planning in terms of referring to literature on related aspects of seminar topics, organising the collected data in a sequential manner and presenting the paper through effective reporting. During the presentation of papers at seminar varies from topic-to-topic and discipline-to-discipline. Generally 30-45 minutes are permitted for presentation followed by discussion for 10-15 minutes. Adequate time should be given to students or other participants to clear their doubts and probe the major aspects of the topic.

Observation by individual students appointed by the teachers, along with the teacher can be carried out in order to give a feedback to the presenter on his presentation.

Advantages of Seminar

- The ability to detect and derive the principle from the context is developed.
- Understanding power and questioning ability in a relevant situation are strengthened.
- Self-reliance, self-confidence, sense of co-operation and responsibility are developed.

Workshop

Workshop is a get-together for some creative educational activity. While discussion demands must talk, workshop is a "shop for work". It is an activity-oriented technique. The group consisting of teacher, students, administrators, may initiate the workshop in general session and frame guidelines for the conduct for the workshop. It involves directly the skills of both cognitive and psycho-motor domains. Preparing reports, syllabi, manuals and critical reviews, visiting places, making teaching-learning aids, and planning instructional designs, instructional materials and modules are examples of activities of a workshop session.

Advantages of Workshop

The following are the advantages of workshop:-

- It is an activity-oriented technique.
- The workshop is based on the principles of learning by doing.
- It is co-operative work which promotes the work culture.
- It involves the skill of cognitive, affective and psycho-motor.

Field Trips

Field trips are very much educative and they create great curiosity in students and also bring out their creativity.

Keown (1984) states that

- those concepts that are integral part of the students' environment are best learned in the outdoor environment.

- The concepts have a better chance of being understood and retained, if parts of concept can be related to students' environment.
- Critical thinking is enhanced in the outdoor environment.

Field Survey

Field survey is an analysis of the present status about a particular area. Through a field survey, one can get a correct picture of the status of a particular event. It is a natural observation that Rousseau emphasized this natural observation is the best method of teaching as compared with classroom teaching-learning and studying book. Through the field survey in environmental education, the learner gets first hand information about the environmental problems.

The outdoor studies also require a detailed planning like field trips, but those studies may be limited to the local environments.

Types of Field Survey

Based on the objective, the field survey can be classified into many types. Some of these are listed below,

- Local field survey
- Regional field survey
- Geographical survey
- Historical survey
- Industrial survey
- Field survey of natural vegetation
- Field survey of animals
- Survey of soil and fauna
- Field survey of community.

Objectives of Field Survey in Environmental Education:

The following are the objectives of field survey:-

To promote awareness about learner's environment.

- To develop the tendency to survey it and utilize it for understanding.
- To develop the ability for interpreting the learners' own experience and observation.

- To promote the skill of observation and interpretation.
- To develop the ability of co-operation and group-work.
- To identify the qualities of the environment.

Steps Involved in Field Survey

The environment field survey has the following steps:-

Step-1	Writing objectives
Step-2	Planning
Step-3	Identification of tool and techniques
Step-4	Execution collecting information
Step-5	Evaluation
Step-6	Follow- up activities.

Thus, field survey provides a vivid picture about a particular area. It is a scientific way of investigating the status of environment.

Projects

A project is a problematic act carried to completion in its natural setting. The project method consists of building a comprehensive unit around an activity which may carried on in the school or outside. "*Learning by doing*" and "*Learning by living"* are the two cardinal principles of this method.

The teacher acts as a guide and helps the students to find the facts and principles themselves. The role of teacher is not of a dictator but a friend, guide and work partner in the project method. Students have to take up certain projects. Each students or small group of students is given a work for which the students taken responsibility of completing it successfully.

Steps in Project Method

Steps involved in project method are as follows:-

- Sensing a problem
- Defining a problem

- Selection of appropriate methodology
- Data collection
- Process of analysis
- Drawing conclusion
- Evaluation
- The cording.

Characteristics of a Good Project

The following are the characteristics of good projects:-

- Projects should allow the active participation of both learners and teachers.
- It should be useful and purposeful.
- It should have definite educational values.
- It should be practicable.
- It should not be expensive.

Merits of Project Method

The following are the merits of project method:

1) This method is based upon the laws of learning.
    a) Law of readiness
    b) Law of exercise
    c) Law of effect
2) It promotes co-operative activity and group interaction.
3) It is a democratic way of learning. The children choose, plan and execute the projects themselves.
4) It sets up a challenge to solve a problem and this stimulus constructive and creative thinking.

Demerits of Project Method

The following are the demerits of project method:-

- It absorbs a lot of time.
- It involves much more work on the part of the teacher.
- Text books and materials written on these are not available.

- It is expensive in the sense that a well- equipped library and laboratory are required.

Exhibition

Exhibition in environmental education means presentation to view a display or showing of the material relevant to the environmental studies.

Exhibition or exhibitions can be arranged to show the project work of the students or to get suitable remedies. It is essential to form a committee to organize the exhibition. It should be distributed among the various committees drawn for the purpose.

The leadership should be gradually passed from teacher to students. The teacher should supervise entire procedures.

Advantages of Exhibition:

- Exhibition is based on the principles of learning
- The learners can observe analyze, criticize, and apply the scientific laws.
- They get chance of picking up skills by means of participation in the exhibition.
- Exhibition promotes scientific attitude among the learners.
- It helps the learners to use science in life situations.
- It promotes exploration and creative spirit among the learners .
- It propagates scientific information.

Important Methods of Instruction in Environmental Education

Videos

- The educator team uses videos produced by native for kids (NFK) in collaboration with UNITE for the environment, the Max plank institute for evolutionary anthropology (MPI) and the kassisi project.
- As videos form a valuable medium which help learners to understand the abstract concept and interact freely with the teacher when they watch a particular programme in the video-show.

- These videos are relevant and meaningful to rural Ugandan audiences, as local communities were closely consulted on their content. They address three key environment threats of snaking, bush meat and habitat loss.
- Covering topic such as waste management, grassland maintenance, human wildlife conflict and deforestation raise awareness of the dangers in all of them.
- Sometimes it is very difficult to bring all the learners in the field of investigating the environmental problems. Hence teacher can arrange a video-show about the problems like Narmadha controversy and so on, by which the learner can easily understand the problems.
- Documentary film can also emphasis ecological problem that happened in the past. For instance the issues in Japan (march 1973) about the "chisso corporation's aceto-aldehyde plant" which brought varied health issues to people.
- These help to bring out the courses of environmental problems, sharing of experiences from the other countries but most importantly what school children and communities can do to address these challenges.

Television

- As television has a great influence on young generation and easy access to the people, it helps for man education through satellite about the environment.
- Through film, documentaries, animation, debates and social programmes, the learners gain immense knowledge about the issues of environment and solution for the problems.
- From experienced film makers and aspiring Vloggers tells environmental stories to learners creates the awareness about the eco-system.

- The educational television (ETV) is the system that present learning content in various subject areas through programmes prepared by a central agency.
- The following are the ETV programmes in India
- Delhi Agricultural Television (DATV) project.
- Satellite Instructional Television Experiment (SITE)
- Secondary School Television Project
- Port-SITE Project
- Higher Education Television Project (HETV) of UGC.

Advantages of Television Programmes

- The educational authorities can produce TV lessons made to their own requirement for special local needs.
- Creates genuine interest in the topic or the subject that is being taught.
- To provide a wide variety of experiences, those are quite different from the routine classroom instruction.
- T.V has the advantage of the audio as well as the video aids.
- Stimulate less passive slow learners by developing more critical approach in them.
- Learning process with T.V reduces the dependency on teachers.

Limitations of Television Programmes

- The screen is small and the focused screens are not clear enough for the large size classrooms.
- The lesson timings are inflexible and sometimes inconvenient.
- The class teacher has no control over the pace of development of a TV lesson.
- The learners are the passive observers and are nor active participants, as one way communication.
- Interruptions and distractions at the receiving end can seriously impair the effectiveness of the lesson.

- Teaching and learning through TV in an individualized method and thus co-operation, adjustment, cardinal relationship etc, are not developed in viewers.
- The effectiveness of any transmitted aid is limited to the range of the transmitter.

Other Methods

1. Stimulation and Games

Stimulation and games can be used to acquire the learner's attention on both attitudes and content. The advantages of games and stimulation, according to Altman (1972) is that they have intrinsic potential, presence of mind for motivation.

2. Debates

On arranging debates over the topics of environmental issues, brings discussion about the awareness of environmental issues necessary feasible solutions.

Many cotemporary environmental issues could be debated in the classroom in order to gain solution for them.

3. Readings

A teacher can ask the students to get further information through additional readings. This will help to grow individually.

Reading leads to self- learning and develops one's skill over reading comprehensive.

4. Inquiry

On finding a problem over any occasion, the students can take up an inquiry to probe into it.

The teacher should develop inquiry guides for the benefit of the students.

This will develop their critical analyzing skill and critical thinking.

5. Guest Lectures

Guest lecturers tend to provide further information about the content and provide many activities.

Guest lecturers given by eminent personalities will motivate the students and make them participate in such activities.

Environmental Education Programmes to be undertaken in Educational Institutions

- Mere knowledge about environmental problems does not develop the necessary behaviour in any individual to conserve his environment and its quality (Lucas 1980).
- Following are some of the important ways suggested to develop the important values and feeling of concern for the environment, motivation for actively participating in environmental protection and development.

Arranging for Video-Clips

- Video-clip over environmental related factors like waterfalls, mountains, dense forest, deep seas and other natural resources could be prepared as video albums and made available in the school "Educational Technology Laboratory" , for students to love and enjoy the eco-system.
- It helps to increase student's interest and enhance their learning experiences and learning resources for further cohorts to use.
- Copies of photographs taken by students during their school excursion could also add on an album to project.

Establishing Environmental Club

Alike the subject clubs, in the school 'Environmental Club' is the one which has the active members who are interested in protecting and conserving the environment.

Talking of Oath

- The oath over the environment is committed to reducing its environmental impacts.
- Continually improving environmental performance.
- Promoting positive behaviour throughout the operation.

- Every member in that club should take the oath with others in the class like “I, all through my life will not indulge in any activity that affect or injure the environment”.

Field Trips

- Field trips are a time-honoured tradition in most schools. Students often love them because field- trips give them a chance to get out of the classroom and experience something new.
- Such field trips tend to develop the followings.
- New learning environment
- Team building
- Planning
- Liability
- Develops the visual literacy

Celebrating the World Environmental Day

5th June of every year is celebrating as the “World Environment Day” by planting a sapling in the institutional campus and distributing tree sapling freely to interested people.

It is the United Nations principle vehicle for encouraging worldwide awareness and action for the Protection of our environment.

Creating an Environmental Corner

- In some environmental challenging schools, they set up “Environmental Corner” in which a display board, contains various information about the issues and programs are maintained.
- Teacher also encourages the students to write or stick any news related to the environment in the display board like “In Chennai an old man planted more than 1000 trees on roadside and watering them regularly”.
- The ECS aims to inculcate good environment and social values among the students by increasing awareness of local environmental issues that affect their community.

Tree Planting

- Everyone is to be encouraged to plant a sapling either in the school or at home on their birthday gift.
- Similarly pupils are to be urged to present a plant or tree- sapple as birthday gift.

Conducting Environmental Festival

- Alike the common culture festivals, environmental festival can be conducted by school children every year near the villages.
- They arranged various cultural programmes, debates, dramas, and other art forms on themes related to environmental problems.
- The purpose of environmental festival is for students to meet professionals who work in the environmental sciences every day; thereby gaining an understanding how the science concepts can apply to real life.

Conducting Competitions in Environmental Awareness

- According to Wilson-smith "The competition is structured to encourage competition from the entire cross-section of students because it facilitates individual capability while empowering them to practice various academics and social skills".
- Annual competitions could be arranged for school children in environmental awareness.
- Students are encouraged to participate in competitions like "poster making, drawing cartoons, essay writing, composing poem, elocution, group discussion and debates".

Long Walk to Promote Environmental Awareness

- Students could encourage to undertake "paadhayatra" (long walk), cycle rally or peace march to promote environmental awareness on the eve of "World Earth Day" and " World Forest Day" and so on.
- Students carry boards with awareness slogans like "You Smoke, I Cough", "and Say No to Cigarettes", "Each One and Plant One" and so on.

Programmers on Hygiene and Sanitation

Personal hygiene

- Washing the body often if possible everybody should have a slower or a bath every day.
- Cleaning the teeth at least once a day. Brushing the teeth after each meal is the best way of making sure that gum disease and tooth decay are avoided. It is very important to clean teeth after breakfast and immediately before going bed.
- Changing into clean clothes. Dirty clothes should be washed with laundry soap before wearing them again.
- Hanging clothes in the sun to dry. The sun rays will kill some disease causing germs and parasites.
- Turning away from other people and covering the nose and mouth with a tissue or the hand when coughing and sneezing.
- Washing hands before preparing foods helps keep germs out of our bodies.
- Keeping the teeth, mouth, nails, limb, ears, hair and the body clean and neat by daily washing and brushing.

Public Hygiene

- Protected drinking water facilities are provided to public in order to maintain public hygiene.
- If the drinking water is contaminated. It leads to causes of water borne diseases.
- Use the public toilet properly one of the most important practice to maintain public hygiene is use of public toilet facilities.
- When you go the public places such as Bus stand, Railway park and beach etc., Don't use the open toilet for urination or defecation. After using the toilets pour water to clean them.
- Eat only the food in the protected environment. After cooking the food. It should be kept in the closed environment. So that to avoid flies and other insects do sit on the food.
- Treat skin infections in time. If ignored it tend to aggravate and spread all over the body and it may spread to other also.
- Wash your socks. This is important not only for your personal health best. It is also in general public interest. As you move around your socks accumulate a lot of dust and bacteria.

Sanitation

- The term sanitation is connected with various descriptors or adjectives to signify certain types of sanitation systems which may deal only with human excreta management or with the entire sanitation system. That is also grey water strong water and solid waste management.
- Sanitation system aim to protect human health by p0roviding a clean environment. That will stop the transformation of disease.
- Diarrhoea, Malnutrition and stunted growth in children can be reduced to sanitation.
- These are many other diseases which are easily transmitted in communities that have low levels of sanitation. Disease such as cholera, hepatitis, polio and trachoma.
- The Human Right to water and sanitation was recognized by the United Nations general assembly in 2010. Sanitation is a global development priority and subject of sustainable development to goal.
- Lack of axis to sanitation as an impact not only on public health, but also on human dignity and personal safety.

Problems Faced in Teaching Environmental Education

Some of the major problems facing environmental education in the country can be described as follows;

Resource Constrains

Lack of resources is one of the major problems that is being encountered in the promotion of environment education in the country. This is true of other developing countries too. It is fact that any environmental education programme requires adequate resources bath in terms of money and personal, it is to be implemented successfully.

High Dropout Rate

Because of the high dropout rate in our education system teachers are left with no option but to begin the environmental education component from the primary classes to ensure that they students even if they drop out later one sensitized to the environmental problems.

Social Constrains

Sometimes conclusions drawn from the study of environmental thinking. This clash in thinking may load to undesirable confrontation environmental education has no meaning purpose if it is not accompanied by action. Ensuring this action is not easy.

Difficulty in Assessment

Assessment of the work done as part of environmental education is difficulty as many a time it is difficult to think of a common hard stick to evaluate the work done under different projects.

In Effect Formal Environmental Education Faces The Following Difficulties

- A shortage of supporting staff and office equipments of the national environmental education centre.
- Shortage of environmental education national for teacher and students.
- Weak monitoring system.
- Lack of government priorities or political will for environment policy
- Lack of appropriate legislative from work enforcement and institutional support
- Government control of Mass media
- Lack of commitment and involvement on the part of the people concerned.

United Nations Environment Programme (UNEP)

- United nations environment programme is an international environmental agency operation across the world with the support of United Nations Organisation
- It coordinates its activities, assisting developing countries in implementing environmentally sound policies and practices.
- It was founded Maurice strong its first director, as a result of the United NATIONS CONFERRENCE ON Human Environment (Stockholm conference) in June 1972 has its headquarters in Girir neighbourhood of Nairobi and Kenya.
- But International talks on specialized issues such as climate change or combating decertification.

- The world meteorological organizations and Un Environmental established the Intergovernmental panel on climate change in 1988
- There is a 300.100 staff of them professionals in a variety of fields and with a five year fund of more than 1200 millions.

Executive Director

UNEP'S current executive director Erik Solheim succeeded the previous director A Steiner in 2016. As a media friendly approach often uses the term UN environment

The position was held for 17 years (1975-1992) by bringing environmental considerations to the forefront of global thinking and action.

Structure

UNEP structure includes seven substantive divisions;

- Early warning and assessment (DEWA)
- Environmental policy implementation (DEPI)
- Technology industry and economics (DTIE)
- Regional cooperation (DRC)
- Environmental law and conventions (DELG)
- Communications and public (DCPI)
- Global environment facility coordination (DGEF)

Activities

UNEP main activities are related to climate change, disasters and conflicts, ecosystem management, environmental governance, environment under review, harmful substances, and Resource efficiency.

In June 2010, a report from UN environment declared that a global shift towards a vegan diet was needed to save the world from hunger shortage and climate change.

Centre for Environment Education

The centre for environment education (CEE) in India was established in august 1984. As a centre of excellence supported by the Ministry of Environment and forests. The Organisation works towards developing programmes and materials to increase awareness about the

environment and sustainable development. The head office is located in Ahmadabad. The centre has 41 offices across India including regional cells in Bangalore(SOUTH), Guwahati(Northeast), Lucknow (north), Ahmadabad (west), and pune (central), state offices in Delhi, Hyderabad, Rajpur, Goa, Coimbatore and several field offices. It has international offices in Australia and Srilanka Government of India Mr. Karthikeya Sarabhai is the Director of CEE.

CEE has inherited the rich multi disciplinary resource base and varied experience of Nehru foundation for development its parent organization which has been promoting educational efforts since 1966 in the areas of science, nature study health development and environments.

At the time it began its activities, CEE the only organization actively engaged in environment education in the country while carrying out programme in different parts of the country. It was located only Ahmadabad. Within five years of activities, it was realized that for a country as vast and diverse and India, physical presence was important for effective implementation.

Based on this, the first regional office was opened southern in 1988-99 since then it has been a conscious effort to have office or presence of the geographical area of work.

It mainly aimed at creating environmental awareness in communities, conducting widespread environmental education and training programme through a very cast network. It has a vast range of publications, books, posters, educational packages, bibliographies and directories. There is also a large computerized database the environmental education bank which has a collection so more than 300 environment concepts about 2500 environment related activities and hundreds of cases studies.

After complementing a decade of activities in 1994, it was decided to move more for environmental education to environmental action. This was an outcome of the earnings and experience in the first ten years. CEE organization more pilot, field level and demonstration projects towards sustainable development which could be scaled up and replication. Within the next ten years, these projects formed a major chunk of centre activities.

Today CEE works for a wide range of sectors target groups and geographical areas. CEE sees a major opportunity in the UN decade of Education for sustainable development to further contribute towards sustainable development CSE is the nodal agency for implementation of

DESD activities in India under the ministry of human resources development, Government of India.

CEE's programmes in the decade will focus on training and capacity building, Internships and youth programmes, consultancy services knowledge centre for ESD and journal on education for sustainable development.

CEE's work is organized around thrust areas, As an organizing principles

- Education for children
- EE in higher education
- Examination system for EE
- Education system for youth.
- Communicating environment through the media
- Experiencing nature
-

NCERT Approach for Environment Education NCERT Lays Emphasis Upon the Following Aspects

- Population
- Land its uses
- Different types of resources and their uses
- Food and nutrition
- Pollution
- Man and nature relationship

Role of Teachers in Environmental Education

The objective of environmental education is to learn the skills of gathering information developing desirable attitudes, values and habits hence the teacher has to act as a guide and stimulate the children to use their abilities to acquire information

The teacher may structure the learning experiences and activities and prepare the points and enquiry. The students can be divided into small groups to conduct the investigations. The group may exchange their experiences in the general class and enter into discussing functions of the teacher may be summarized as follows

- To discuss the approach to problems or topics
- To organize working groups and to provide with the help of work cards for the lines of enquiry.
- To discuss the approach to problems or topics
- To arrange visits
- To provide reference materials for children's use.
- To provide reference materials for children use
- To arrange for visiting speakers.
- To initiate and develop discussion and debate and
- To provide facilities and for displays and exhibitions of the work carried out.

Education acts as a powerful tool in the socio economic transformation of a society, community and nation. It sharpens the eye of knowledge, develops awareness and makes mind logical. Teacher being the agent of social change, play an active role in shaping the behaviour of

children to promote desire for environmental awareness. Teachers adopt age level specific strategies to impart environmental education

Apart from usual classroom teaching, Teacher plays their significant roles as

- Providing opportunity to observe local environment features, problems and phenomena and changes in community.
- Allowing children to classify living and nonliving things on the basis of criteria chosen by children themselves.
- Helping them to draw obvious inference from their observation and such classification.
- Organizing out of class activities based on learning on immediate environment.
- Co relating the environmental issues while teaching the curriculum subject.
- Encouraging students to acquiring social values through active. Participation in environmental protection activities.
- Creating awareness on renewal and nonrenewal resources
- Enabling students to acquire basic knowledge and understanding of the total environment, its problem and role of Human Being.
- Providing ample knowledge and skill regarding Gandhian concept of development

Apart from these the teacher should tell students the fundamental duties of Indian citizen with regard to environmental duties of India citizen with regard to environment as incorporated in part IV-A of India. constitution to protect and improve and the natural environment including forest, lakes, rivers and have compassion for leaving creatures.

Conclusion

In this materials and approaches of imparting environmental education at different stages of formal education. Some important instructional methods followed in environmental education and their relative's merits, United Nations environmental programme centre for environment education have been discussed.

Questions for Discussion and Reflection:

1. Describe the environmental education in school curriculum.
2. Explain the different stages of environmental education.
3. Examine the problems faced in teaching environmental education.
4. Explain the role of teachers in environmental education.