

Shiksha Mandal's

G. S. College of Commerce, Wardha

Department of B. Com. Computer Application

BCCA Part-II (SEM-III)

Environmental Studies

Unit –I

Syllabus

UNIT - I

Environment, Environment Studies, Need for public Awareness, Environmental Degradation, Shelter Security, Economic Security, Social Security, Effects of Housing on Environment, Effects of Industry on Environment. Natural Resources- Introduction, Types of Natural Resource, Forest Resources, Water Resources, mineral Resources, Energy resources, Land Resources, Conservation of Natural Resources, Sustainable Lifestyles, Biogeochemical Cycle.

Environment

The term environment means surroundings and is generally used as an abstract concept. The surroundings may be natural, man-made, physical, chemical or biotic. The environment is thus, a complex of many things encompassing an organism that interact not only with the organisms but also among themselves. As a result of this it is difficult to isolate or alter any one of them without affecting the other components.

The term environment originated from the French word ***environner*** or ***environs*** meaning 'to surround'. From this understanding, environment means the things or events that surround something else. In other words, environment means the area in which something exists or lives.

Definition

Environment is defined as the social, cultural and physical conditions that surround, affect and influence the survival, growth and development of people, animals or plants. Environment includes everything around us, It encompasses both the living (biotic) and nonliving (abiotic) components of the earth.

Four Segments of Environment

The environment consists of four segments. These are briefly discussed below:

► ***Atmosphere***

The atmosphere implies the protective blanket of gases, surrounding the earth:

- It sustains life on the earth.
- It saves it from the hostile environment of outer space.
- It absorbs most of the cosmic rays from outer space and a major portion of the electromagnetic radiation from the sun.
- The atmosphere is composed of nitrogen and oxygen.

Hydrosphere

The Hydrosphere comprises all types of water resources oceans, seas, lakes, rivers, streams, reservoir, polar icecaps, glaciers, and ground water.

- Nature 97% of the earth's water supply is in the oceans,
- About 2% of the water resources is locked in the polar icecaps and glaciers.
- Only about 1% is available as fresh surface water-rivers, lakes streams, and ground water fit to be used for human consumption and other uses.

► **Lithosphere**

Lithosphere is the outer mantle (layer) of the solid earth. It consists of minerals occurring in the earth's crusts (coating) and the soil e.g. minerals, organic matter, air and water

► **Biosphere**

It is composed of all living organisms and their interactions with the environment. The biosphere is the earth's zone of air, soil, and water that is capable of supporting life. It is a thin outer crust of the earth which includes all the living organisms and their environment.

It extends from the lowest sea level to about 24 km of the atmosphere. Life supporting resources are available from the biosphere. It is that part of earth where living(biotic) organism exist and interact with each other and also with non-living (abiotic) components.

Components of the Environment

Physical, biological and cultural environments are the three distinct dimensions of the environment. The study of cultural environment (i.e. social environment, economic environment and political environment) has been allocated to sociologists, economists and managers. Biologists and doctors are in charge of studying our biological environment which comprises plants (flora), animals (fauna) and microorganisms. Environmentalists take care of the physical environment (lithosphere, hydrosphere, and atmosphere).

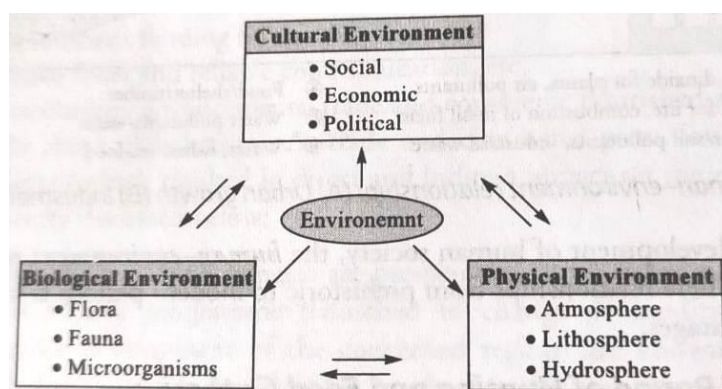


Fig. Various types of environments and interactions between their elements

The components of the environment are classified in terms of biotic and abiotic components based upon living components and nonliving components respectively. It is from this component system that the study of the structure of ecosystems was evolved.

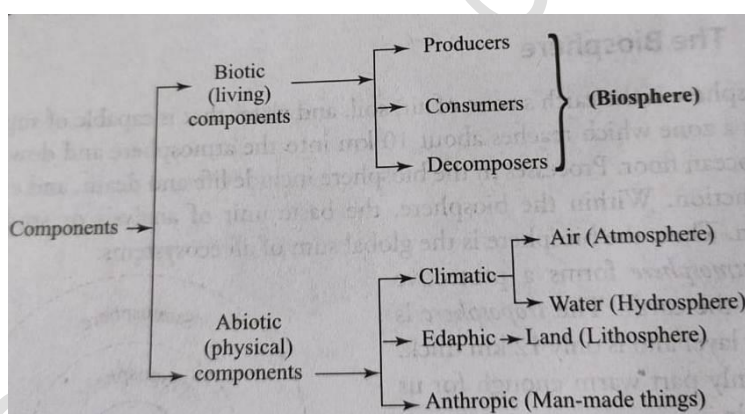


Fig. Components of Environment

Environmental Studies

Environmental education refers to organized efforts to teach how natural environment functions and, particularly, how human beings can manage their behavior and ecosystems in order to live sustainably.

Environmental study is the academic field which systematically studies every issue that affects an organism.

Environmental science is the systematic study of the scientific principles, economic influences and political action, and inter-relationship among living organisms (biotic components) and nonliving things (abiotic components) which affect the environment.

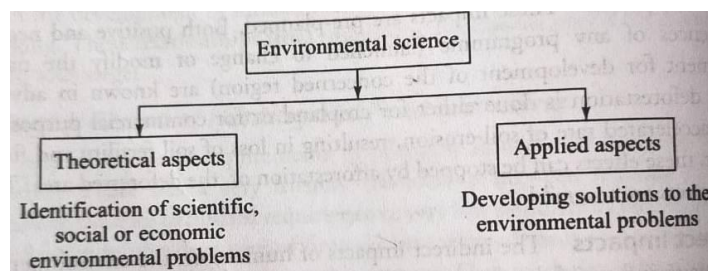


Fig. Aspects of Environmental Science

- Both theoretical and applied aspects of human impact on the world are studied in environmental science.
- The *theoretical aspects* of environmental science identify threats to our survival and our future generations.
- The *applied aspects* of environmental science suggest solutions to the identified environmental problems.

Multidisciplinary Nature of Environmental Studies

The environment is everybody's concern as we all live on the same planet. An understanding of the working of the environment requires the knowledge of various fields. Air pollution is one of the important topics in environmental studies. Following table shows a list of topics commonly studied in air pollution and the related traditional fields of knowledge illustrating the interdisciplinary nature of the subject.

<i>Environmental issue</i>	<i>Knowledge of subject required</i>
(i) History of air pollution and air pollution accidents	(i) History
(ii) Economic impacts of air pollution	(ii) Economics, demography
(iii) Nature and reactions of air pollutants	(iii) Chemistry and chemical engineering
(iv) Air-pollution control devices	(iv) Physics, chemistry and various branches of engineering
(v) Effects of air pollutants on human beings, animals, plants and materials	(v) Zoology, botany, physics, chemistry
(vi) Sociological impacts of air pollution	(vi) Sociology
(vii) Conservation of resources and pollution control	(vii) Various branches of physical and political sciences
(viii) Alternative fuels	(viii) Various branches of physical sciences
(ix) Ozone hole and global warming	(ix) Pure as well as social sciences
(x) Effect of climate on air pollution	(x) Mathematical modelling, meteorology, thermodynamics, geography, etc.

Table : Interdisciplinary nature of environmental studies-air pollution

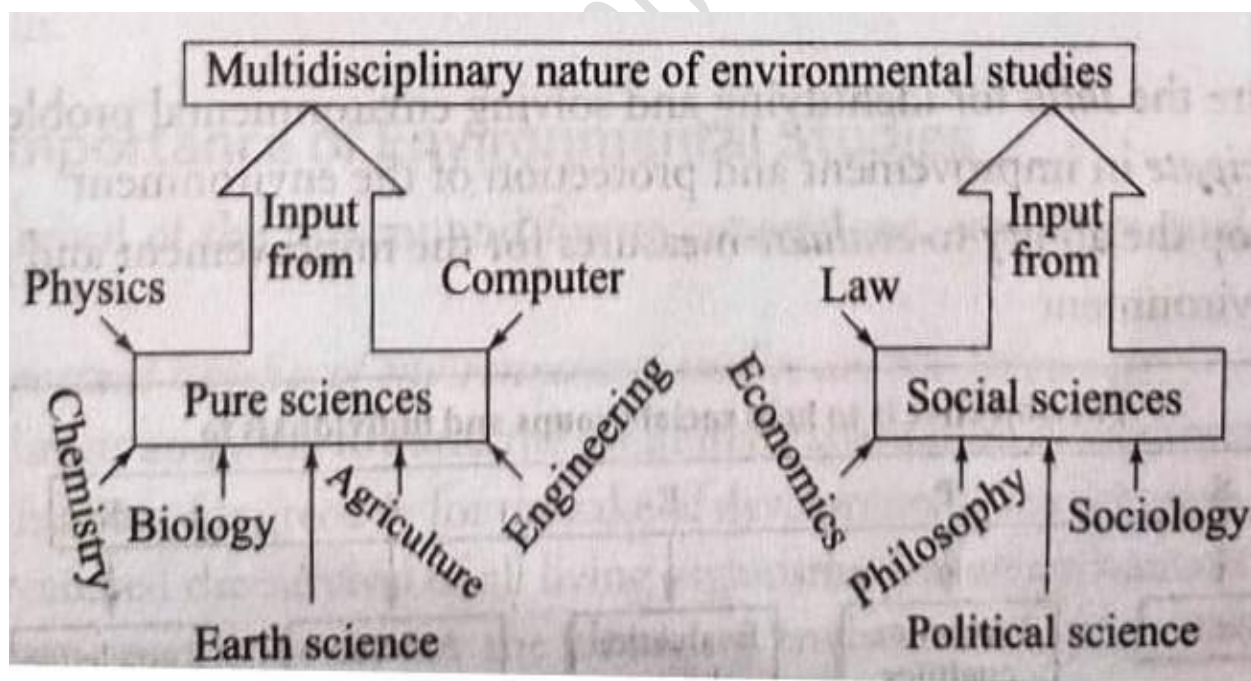


Fig. Multidisciplinary Nature of Environmental Studies

In summary, environmental science incorporates the principles of pure science (like physics, chemistry, biology, earth science, agriculture, engineering, computer science, etc.) with input from the social sciences (such as political science, law, philosophy, sociology and economics), thus creating a new interdisciplinary field.

Scope of Environmental Studies

The scope of environmental studies is so wide that it is related to every science and scientific aspects in general and biology in particular.

The scope of environmental studies in numerous fields is given below:

- (i) *Conservation and management of natural resources* (like forest resources, water resources etc.)
- (ii) *Conservation of biodiversity* (like conservation of genetic diversity, species diversity etc.)
- (iii) *Control of environmental pollutions* (like air pollution, water pollution, soil pollution, noise pollution etc.)
- (iv) *Control of human population*

Objectives of Environmental Studies

The objective of environmental studies is to help social groups and individuals acquire an awareness of the environment as a whole and its related problems. They should

- (i) acquire the skills for identifying and solving environmental problems
- (ii) participate in improvement and protection of the environment
- (iii) develop the ability to evaluate measures for the improvement and protection of environment
- (iv) acquire an attitude of concern for the environment
- (v) gain a variety of experiences and acquire a basic understanding and knowledge about the environment and its allied problems.

To sum up, the objective of environmental studies is to develop a world in which persons are aware of and concerned about the environment and the problems

associated with it, and committed to work individually as well as collectively towards solutions of current problems and prevention of future problems

Importance of Environmental Studies

For the survival of the present and future generations, environmental education is necessary. The important benefits of environmental studies are the following

- It directs attention towards the unlimited exploitation of environment (nature) by humans for greed or for the sake of development. Exploitation of nature has threatened the survival of all living organisms, including humans.
- It generates concern for the changing environment, population explosion and throws light on the methods or solution.
- It helps to understand different food chains and to find ways and means to maintain ecological balance
- It helps in the maintenance of healthy life.
- It imparts knowledge about conservation of energy and reducing material dependence
 - by refusing to purchase things which are harming our environment
 - by reusing a product number of times
 - by motivating recycling of recyclable products
- It helps in developing social responsibility towards protection of environment and control of environmental pollution.
- It helps in appreciating and enjoying nature and working towards sustainable development.

Necessity for Environmental Awareness and Education

It has now been globally identified that to maintain the quality of life, there is an urgent need to protect the environment. This is initiated by creating awareness among the people so that it becomes a part of their life style.

As the Earth's natural resources are rapidly declining and our environment is being increasingly degraded by human activities, it is evident that something needs to be done. It is the prevention of environmental degradation that must become a part

of all our lives. Protecting our environment is economically more viable than cleaning it up once it is damaged. Individually, we can play a major role in environment management. We can reduce wastage of natural resources and we can act as watchdogs that inform the government about sources that lead to pollution and degradation of the environment.

This can only be made possible through public awareness. Mass media such as newspapers, radio and television strongly influence public opinion. If each of us feels strongly about the environment, the press and media will add to our efforts. Politicians in a democracy always respond positively to a strong publicly-supported movement. We are living on spaceship earth with a limited supply of resources. Each of us is responsible for spreading this message to as many people as possible.

Economic security

Economic security as the ability of individuals, households or communities to cover their essential needs sustainably and with dignity. This can vary according to an individual's physical needs, the environment and prevailing cultural standards. Food, basic shelter, clothing and hygiene qualify as essential needs, as does the related expenditure; the essential assets needed to earn a living, and the costs associated with health care and education also qualify.

Social security

Social security is the protection that a society provides to individuals and households to ensure access to health care and to guarantee income security, particularly in cases of old age, unemployment, sickness, invalidity, work injury, maternity or loss of a breadwinner.

Shelter Security

With increasing population, there is also increasing pressure on finite land resources for housing. Shelter for humans or habitat development on this earth has largely taken place within about 5% of land area, which supports more than half of global population. Both overcrowded unplanned urban settlements and unhygienic, underdeveloped rural settlements pose big challenges for the present and future generations.

Need of Shelter Security: Shelter security is an issue of great concern, since the number of homeless people worldwide has grown considerably in recent years.

Factors Responsible for Homelessness:

- Illness / Poverty.
- Job Loss: No income to pay rent.
- Lack of Affordable Housing: The lack of affordable housing has lead to high rent burdens, overcrowding, and substandard housing.
- Mental Illness: Approximately 20-25% of the single adult homeless population suffer from some form of severe and persistent mental illness.
- Natural Disaster/Fire: Situations where due to chance a fire, tornado, flood or hurricane renders housing inhabitable.
- Physical Disabilities: Disabled individuals may be unable to work or find appropriate employment.

Effects of Housing on Environment

Traditionally, home is considered as haven, where humans are protected and nurtured. However, house is a health hazard when factors such as poor design, environmental contamination and poverty combine to cause or worsen disease.

Housing and Health:

Housing is an environmental health issue because of various socio-economic conditions as illustrated below:

- Lead based paints were used for renovation and painting the homes. They are major causes of childhood lead poisoning.
- Poorly constructed houses lead to stress and children stay inside with increasing exposure to pollutants resulting is childhood asthma.
- Substandard housing contributes to asthma incidence.

Housing and Environment:

The quality of environment is determined by following factors:

- Maintenance and arrangement of houses.
- The presence, quality and accessibility of facilities.
- Security.
- Street cleanliness in the residential area etc.

Strategies for Improvement of Environment:

- Reduce the natural resource depletion regarding material use.
- Reduce global warming via efficient energy and material use.
- Reduce air, noise and water pollution by eco-designing of houses.
- Reduce the environmental impact of housing through innovations in design, like green housing, zero emission housing, etc.

Effects of industries on environment

Industrialization contributes major part for the economic development and prosperity of a country. On one hand it provides employment opportunities and wealth generation while on other hand it leads to following environmental deterioration:

- It leads to the depletion of natural resources.
- It leads to air pollution, water pollution and soil pollution.
- Global warming, climatic changes are the major consequences of industrialization.
- It causes acid rain.
- It leads to the degradation of land quality.
- It leads to the generation of hazardous waste whose safe disposal become a big problem.
- These industries are responsible for the adverse diseases and ill effect like silicosis and pneumoconiosis, tuberculosis, skin diseases and deafness.

ILL Effects of Industries:

- Metallic contaminant like Cadmium (Cd), Zinc (Zn), Mercury (Hg) etc., destroy bacteria and beneficial micro-organisms in the soil.
- Industrial wastes including toxins enter in the food chain causes number of undesirable effects to living beings and animals.
- Industrial waste damages the natural biological purification mechanism of sewage treatment causing several soil and water borne diseases.
- Radioactive industrial pollutant causes undesirable disease when food containing radio-nuclides is consumed by man.

NATURAL RESOURCES

Any material which is required or used to sustain life or livelihood is termed as a resource. In other words, the term 'resource' means anything natural or human or cultural, which satisfies human needs.

Natural Resources:

Natural resources are defined as a form of energy or matter which is essential for functioning of organism, population and ecosystems. In other words, Natural resources include all natural forces or factors, such as air, water, soils, landforms, minerals, forest etc. which serve human needs.

Natural resources can be divided into two main categories –

- i. Renewable resources
- ii. Non-renewable resources

Renewable resources: The resources that can be replenished through rapid natural cycles are known as renewable resources, e.g. Water, Air, Soil, Solar energy, Forest.

Non-renewable resources: The resources that can't be replenished through natural processes are called non-renewable resources. These are available in limited

amount and which once used exhaust forever. e.g. Fossil, petrol, coal, metals, iron, copper, gold, silver etc.

Non-renewable resources can be further divided into two types

a) Recyclable and b) non-Recyclable.

- The resources which can be collected after they are used and can be recycled are called recyclable resources, e.g. Copper, Aluminum, Phosphate and Potassium Mineral etc.
- The resources which cannot be collected after they are used and recycled in any way are known as non-recyclable resources, eg. Coal, Petroleum, Uranium etc.

Forest resource:

Forest is important resource in two ways i.e. ecologically and economically.

Ecological Uses:

- Forests help in balancing oxygen and carbon dioxide level in atmosphere, regulating earth temperature and hydrological cycle.
- Forests check the rain bearing winds and cause rainfall. Further they increase the amount of moisture in the atmosphere, thus preventing drought situation.
- They minimize the extreme variations in climatic conditions and make the climate bearable.
- They control floods during heavy rains by impeding the velocity of run-off on soil surface, check soil erosion, silting and landslides.
- They act as wind breaks and protect the adjoining farmlands against strong winds.
- They increase the fertility of the soil. The trees and plants collect nitrogen from the atmosphere, fix it into the soil and thereby increase the fertility of the soil. The decomposed leaves and other organic matter help fertility of the soil.
- They provide shelter to wild animals and birds. They offer hunting grounds.

- They provide fresh air and beautiful scenery and become recreational centers.

Economic uses:

- They provide grasses for feeding, thatching, paper industry etc. Forests provide timber for house building, ship building, railway carriages, log bodies, carts, furniture, tool handles etc.
- They supply fire wood and charcoal in homes and in industries.
- Forests provide raw materials for various forest-based industries, i.e., pulp and paper, rayon, matches, soaps, paints, rubber etc.
- Products like bamboos, resins, gums, canes, dye stuffs, oils (Sandal) fibers, medicine, Kattha, lac etc. are also obtained from the forests.
- They provide honey for food and medicines, bee wax for candles etc.

Over exploitation of forests-

Rapid increase of population, industrialization, urbanization and mining has direct effect on forests. The forest areas at global, regional and local level have so markedly decreased due to our exploitation that several serious environmental problems have been created. Many of the developing countries of the tropical and subtropical regions have lost substantial portions of their forest covers due to conversion of forest land into agricultural land to feed the millions.

Many plant species have been extinct due to irreversible change in forest ecosystem by human interference.

Deforestation:

"The temporary or permanent removal of forests cover from a forest land is known as deforestation." The term deforestation refers to the destruction of original forest and wood lands. It does not include the removal of industrial forests such as plantations. Deforestation is one of the out-come of various developmental activities. As the population increased more forests were cleared for various uses. Apart from this the commercial exploitation of forests is the main cause of deforestation. There was a time when 70% of the land area was covered with forests. Now the total forest cover has reduced to as less as 16% only at global level.

Effect of deforestation:

Deforestation gives rise to several problems:

- Soil erosion,
- Increase in the sediment load of the rivers,
- Increase in the frequency and dimension of floods and droughts.
- Change in the pattern of distribution of precipitation.
- Intensification of greenhouse effects.
- Increase in the destructive force of the storms.
- Economic loss through damages of agricultural crops and low yield.
- Decrease in the supply of raw materials and timber.
- Marked decrease as fodder to animals.
- Extinction of species.
- Alteration in the carbon and water cycles.

Dams have been constructed for supply of water to cropland and other purposes. In modern days big dams are constructed for multipurpose, e.g. to provide irrigation, generating hydropower, in land navigation, etc.

Such large dams affect the native to a great extent. The forest is being cleared for dam construction. The processes of filling the reservoirs sink large tracts of forest, displace the tribal and other people and affect wild life.

Water Resources:

Water is essential to all life. Water is essential not only for the sustenance of human life but also for the 'quality of life as well. It is the essence of life on earth and totally

dominates the chemical composition of all organisms. It provides both food and drink and has been used for recreation, transport, cooling, power generation and waste disposal. The various forms of water are found in every section of the ecosphere, atmosphere, the lithosphere and the hydrosphere.

However, in spite of enormous quantity of the substance that exists, only a small proportion of it is actually usable by human beings.

Surface Water Resources

As a rough estimate, the annual rainfall in India would be equivalent to about 3700 billion cubic meters. Of this around 1250 cubic meters is lost by evapotranspiration, and another 790 billion cubic meters by seepage into the soil, thus leaving 1660 cubic meters as surface flow into the rivers. Fourteen major river system share 83 percent of all drainage basins, accounting for 85 percent of the surface flow and serve 80 percent of the total population of the country. There are other 44 medium and 55 minor rivers which are mostly seasonal in nature. However, all the river water flow cannot be utilized because of the numerous limitations imposed by topography, climate, soil conditions etc. It has been estimated that only about 666 billion cubic meters of water can be utilized from various rivers without large inter basin water transfers. Moreover, because of the uneven distribution of rainfall over the years, it becomes necessary to store up the flows in the monsoon period for regulated release during the non-monsoon months.

Ground Water Resources

It has been estimated that out of about 790 billion cubic meters of water that seeps into the soil, about 430 billion cubic meters remain in the top soil layers and produces soil moisture which is essential for growth of vegetation. The remaining 360 billion cubic meters percolates into the porous strata and represents the actual enrichment of underground water.

Hydro Electric Energy:

Although energy generation for hydroelectric stations avoids polluting effects of fossil fuel or nuclear plants, it has a number of indirect effects, many of which are undesirable and categorized into physico-chemical, biological and social. Similarly, we can differentiate the effects on the area surrounding the reservoir from those

that affect downstream areas all the way up to estuaries and deltas. Siltation decreases the capacity of reservoirs and greatly reduces their lifetime. The observed rates are always greater than expected. It is feared that Bhakra Nangal Dam may lose its entire storage -capacity in the next 35 years.

Mineral Recourses:

"A naturally occurring element or compound formed by inorganic processes is called mineral. It has a definite chemical composition or range of compositions, properties and atomic structure".

Minerals are derived from the earth. "The extraction of minerals from the earth is called mining". Like agriculture, mining is a primary occupation of man. Man is using mineral from the beginning of civilization. There are more than 3,000 mineral types. Mineral resources are fixed in quantity and they are exhaustible. For this reason, mining is said to be 'robbery industry and extractive industry. Therefore, mining economy is temporary in nature.

Energy Resources:

Energy resources are found on our planet in a variety of forms or source. Firewood and fossil fuel are being used for supply of energy since time immemorial and are known as conventional energy sources. Wind, hydropower, solar energy and atomic energy are the new and non-conventional sources of energy. Fossil fuels being limited in supply may be termed as exhaustible source while others like solar, hydro, wind and atomic energy that would be available to man for infinite period are regarded as inexhaustible sources.

Non-Conventional Energy Sources:

Solar Energy: Sun is the primary energy source in our lives. Solar energy can be directly used through various natural processes that provides us with food, water, fuel and shelter. Sun rays induce the growth of plants, which form our food material

and help in breathing. Energy from the sun evaporates water from river to form clouds that turn into rain.

Electrical energy comes from hydro-power based on the cycle that is powered by the sun energy that supports evaporation or from thermal power stations powered by fossil fuels. Nuclear energy is held in the nucleus of an atom and is now harnessed to develop electrical energy.

Energy is used for household, agriculture, and production of goods and for running transport. Modern agriculture uses chemical fertilizers, which require large amount of energy during their manufacture. Industry uses energy to power manufacturing units and the urban complexes that supports it.

Non-Renewable Energy: This consist of the mineral based hydrocarbon fuels, coal, oil and natural gas that were formed from ancient forests. These are called fuels and are formed after plant life is fossilized. When the fossil fuels are burnt, they produce waste products which are released, into the atmosphere as gases such as CO₂, oxides of Sulphur, nitrogen and carbon monoxide. All of this cause air pollution. It has also affected buildings like Taj Mahal.

Renewable Energy

Renewable energy systems use resources that are constantly replaced and are usually less polluting. Examples include hydropower, solar, wind and geothermal (energy from the heat inside the earth). Renewable energy is also obtained from bio-fuels. Renewable energy technologies will improve the efficiency and cost of energy systems.

Bio Energy

Plants and trees depend on sunlight for growth and hence biomass energy is a form of stored solar energy. Although wood is the largest source of biomass energy, agricultural waste, sugarcane wastes and other farm byproducts are also used for getting energy. Biomass can be burnt to produce heat and electricity, changed to gas such as methane changed to a liquid fuel. Liquid fuels called bio-fuels include two forms of alcohol, ethanol and methanol.

Biogas is produced from plant material, animal waste, garbage, waste from households and some other types of wastes, such as fish processing, dairies and sewage treatment plants. It is a mixture of gases which includes methane, CO, H₂S and water vapor. Biogas plants have become increasingly popular in India in the rural sector. The Biogas plants use cow dung, which is converted into a gas which reduces smoke, and dung usage have increased in thousands of homes.

Wind energy: Wind was the earliest energy source used in transportation by sailing ships. In Tamil Nadu, there are large wind farms producing 550 Megawatts of electricity. At present, India is the third largest wind energy producer in the world.

Wind power has little environmental impact, as there are virtually no air or water emissions, radiation or solid waste production. The principal problems are bird kills, noise, and effects on TV reception and aesthetic issues.

Wind depends on the geographic distributors of wind. Wind therefore cannot be used as the sole resource for electricity and requires some other back up or stand by electricity sources.

Tidal and Wave energy: Tidal power is generated by forcing the tidal flow to pass through turbines. Tidal power stations bring about major ecological changes in the sensitive ecosystem of coastal regions and can destroy the habitats and nesting places of water birds and interfere with fish rise.

Wave power converts the motion of waves into electrical or mechanical energy. Here an energy extraction device is used to drive turbo generators.

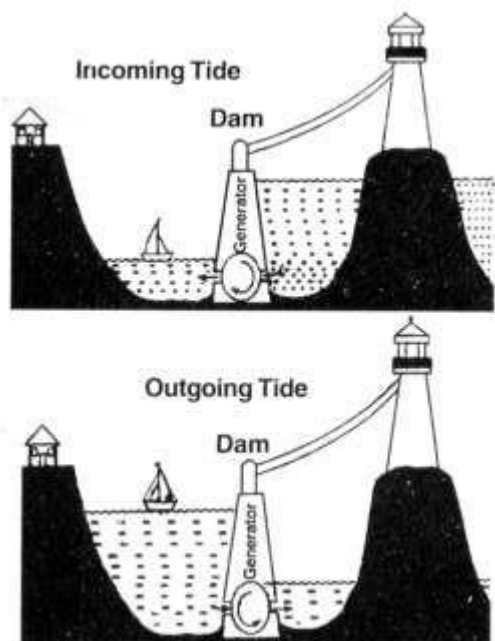


Fig. Diagrammatic representation of Tidal Power Station

Geothermal Energy: It is the energy stored within the earth. Geothermal energy starts with hot molten rock (Magma) deep inside the earth, which surfaces at some parts of the earth's crust. In the 20th century geothermal energy was harnessed on a large scale for heating. It is used for electricity production especially in Iceland, Japan and New Zealand. Geothermal energy is nearly as cheap as hydropower and will thus be utilized in

future. Geothermal fluids are a problem, which must be treated before disposal.

Nuclear Power: When the nucleus of the uranium atom is split, some mass gets converted to energy. India has 10 nuclear reactors at 5 nuclear power stations that produce 2% of India's electricity. These are located in Maharashtra, Rajasthan, Uttar Pradesh, Gujarat and Tamil Nadu.

The heat energy produced in the chain reaction of Uranium-235 (U^{235}) is used to heat turbines that produce steam, which drives turbines that produce electricity. The reaction releases very hot wastewater that damages aquatic ecosystems even though it is cooled by water system before it is released.

The disposal of nuclear waste is becoming an increasingly serious issue.

Food Resources

Food may be defined as anything which is able to satisfy appetite and to meet physiological needs for growth, to maintain all body processes and to supply essential energy required for maintaining body temperature and activity. Food is a mixture of many different chemical components. The six major components of food are carbohydrates, proteins, fats, minerals, vitamins and water. To maintain good health, ingesting a diet containing these nutrients in correct amounts is essential.

In ancient times, human beings were hunt gatherers of food. This type of food provided essential nutrients but limited the number of people that could be adequately supported on a given land area.

Water Logging

This takes place both by natural and man-made conditions. The natural conditions responsible for water logging are as follows:

- Deep percolation after rain.
- The land remaining submerged under floods.
- Poor natural drainage of the subsoil under unfavorable geology like existence of hard pan or rock outcrops near the soil surface.

The artificial conditions responsible for water logging are as Follows:

- No maintenance of natural drainages.
- Blocking of natural drainage channels by roads and railways.
- Irrigated fields enclosed with embankments choking up natural drainage.
- Heavy seepage from unlined canals.
- High intensity of irrigated agriculture irrespective of the soil and subsoil.

Salinity

The term "Salinity" refers to the amount of dissolved salt that is present in water. Sodium and chloride are predominant ions in seawater, and the concentrations of magnesium, calcium, and sulfate ions are also substantial. Naturally occurring waters vary in salinity from the almost pure water, devoid of salts, to the saturated solutions in salt lakes such as the Dead Sea. Salinity in the oceans is constant but is more variable along the coast where seawater is diluted with freshwater from runoff of rivers. This brackish water forms a barrier separating marine and freshwater organisms.

Land Resources

Land is regarded as a natural resource because it is essential for the functioning of organisms, populations and ecosystems. Along with sunlight, air and water, land supports all living beings i.e. plants and animals. All terrestrial plants have their roots in soil from which they absorb water and nutrients. Man, and all land animals, in turn, depend on these plants for food, directly or indirectly.

Although land appears to be an unlimited resource, its exploitation would limit its availability. Thus, land is not a limitless commodity. Increasing population and industrial expansion has generated urban stretch, with thousands of square Km of open space being taken over annually for housing and business. As a result, congestion and wide spread pollution, along with depletion of water and mineral resources and destruction of wilderness and wild habitats, has become increasingly severe.

Land Degradation

The area of land surface that is potentially available for agricultural use declines from year to year. Vast cultivated areas have already become practically unusable by erosion. In the tropical and subtropical zones in particular, agricultural production has been endangered by erosion and impoverishment of the soil. One of the main causes of deterioration of the land is deforestation by fires. The burning of forests removes practically the entire nitrogen supply for vegetation. The other nutrients (calcium, potassium, phosphorus, etc.) are still available in soluble form within the resulting ash and so can still be used by the plants.

Apart from the loss of nutrients there will also be a drop in the water supply and a change in the microclimate. The absorptive effect of the forest land, which previously served to even out the fluctuations between the dry season and periods of rainfall, will no longer exist. Consequently, in periods of rainfall there will be flooding and in the dry season, drought.

The second main cause of deterioration of the land is wind erosion. This, mostly takes place in dry regions with strong winds, it is normally held in check by the fact that the land is protected by a thick covering of plants and is consolidated by the root growth. In this way the removal by wind (and water) of the valuable upper humus layer is prevented. The wind erosion can be kept within limits when the cultivated plants are sown in mixed cultivations or when the fields are small and the ground is also covered with organic material. On the other hand, the weathering process can be accelerated by alternating effects once the wind erosion has already begun.

Water erosion arises especially in areas of high precipitation. Water erosion takes place in particular when the protective plant covering on the ground is destroyed on steep slopes (as by the clearance of woodland or by road construction), so that the water running away in the rainy season can wash the ground surface. Often all that is left is a bare cliff, on which vegetation is hardly possible.

Desertification

It refers to the degradation in low rainfall and seasonally dry areas of the Earth. It can be viewed as both a process and the resulting condition. Desertification involves the impoverishment of vegetation and soil resources. Key characteristics include the degradation of natural vegetation cover and undesirable changes in the composition of foliage species, deterioration in soil quality, decreasing water availability, and increase in soil erosion from wind and water. Desertification is a global problem.

Causes and Consequences of desertification

Although some authorities believe that climate change may be a causal factor, it is generally agreed that human activities, particularly excessive resource use and abusive land use practices, are the primary cause of desertification. Specific

activities leading to desertification include clearing and cultivation of low rainfall areas where such cultivation is not sustainable, overgrazing of rangelands, clearing of woody plant species for fuel wood and building materials.

Drought is often cited as a basic cause of desertification; however, it merely accelerates or accentuates land degradation processes already under way.

Consequences of desertification include reduced biological productivity, reduction of biodiversity, a gradual loss of agricultural potential and resource value, loss of food security, reduced carrying capacity for humans and livestock, increased risks from drought and flooding, and in extreme cases, barren lands that are beyond restoration.

Conservation of Natural Resources

Methods of Conservation

The challenge of conservation is to understand the complex connections among natural resources and balanced resource use with protection to ensure an adequate supply for future generations. In order to accomplish this goal, a variety of conservation methods are used. These include reducing consumption of resources; protecting them from contamination or pollution; reusing or recycling resources when possible; and fully protecting, or preserving resources.

Consumption of natural resources rises dramatically every year as the human population increases and standards of living rise. Between 1950 and 1990 the world population doubled to 5.3 trillion, with nearly 80 percent living in developing, or poor nations. The larger, developed nations, however, are responsible for the greatest consumption of natural resource because of their high standards of living.

Conservation education and the thoughtful use of resources is necessary in the developed countries to reduce natural resources consumption. For example, reducing the high demand for tropical hardwoods such as teak and mahogany in the United States and Japan would slow the rate of tropical forest destruction.

Natural resources can be protected by prohibiting or limiting the use of pesticides and other toxic chemicals, limiting wastewater and airborne pollutants, venting the production of radioactive materials, and regulating drilling and

transportation of petroleum products. Failure to do so results in contamination of air, soil, rivers, plants and animals.

In many cases it is possible to reuse or recycle resources to reduce waste and resource consumption and conserve the energy needed to produce consumer products. For example, paper, glass, aluminum, metal scrap, and motor oil can all be recycled.

Biodiversity Conservation

Biodiversity or biological diversity denotes the number and variety of different organisms and ecosystems in a certain area. Preserving biodiversity is essential for ecosystems to respond flexibly to damage or change. For example, a single species of corn crop may be quickly destroyed by a certain insect or disease, but if several different species of corn are planted in the field, some of them may resist the insect or disease and survive. The same principle is applied to natural areas, which adapt to natural environmental changes such as wildfire, drought, or disease because of the biodiversity that has evolved in the area over thousands, or even millions of years.

Forest Conservation

Forests provide many social, economic, and environmental benefits. In addition to timber and paper products, forests provide wildlife habitat and recreational opportunities, prevent soil erosion and flooding, help provide clean air and water, and show tremendous biodiversity. These forests are rapidly disappearing. The tropical rain forests of the Brazilian Amazon River basin were cut down at an estimated rate of 14 million hectares (35 million acres), each year. The countries with the most tropical forests tend to be developing and overpopulated nations in the southern hemisphere. Due to poor economies, people resort to cleaning the forest and planting crops in order to survive. While there have been effective efforts to stop deforestation directly for exploitative logging, the most effective conservation policies in these countries have been efforts to relieve poverty and expand access to education and health care.

Soil Conservation

Soil, a mixture of mineral, plant, and animal materials, is essential for most plant growth and is the basic resource for agricultural production.

Soil conservation involves reforming agricultural soil management methods. Some of the most effective methods include strip roping, alternating strips of crop and uncultivated land to minimize erosion and water runoff. Terracing, which also reduces erosion and runoff on slopes, growing legumes, such as clover or soybeans, to restore essential nitrogen in the soil; and minimizing tillage, or ploughing, to reduce erosion.

Water Conservation

Clean freshwater resources are essential for drinking, bathing, cooking, irrigation, industry, and for plant and animal survival. Freshwater conservation therefore requires a reduction in wasteful practices like inefficient irrigation, reforms in agriculture and industry, and strict pollution controls worldwide.

Water can be conserved by holding maximum amount of rain water mainly in hilly tracts which serve as catchment areas. This is usually done by allowing the vegetation to grow on slopes of hills. Hence, afforestation is important by which plants can bind the soil and the soil in turn can hold water.

Energy Conservation

There is a global need to increase energy conservation and the use of renewable energy resources. Renewable alternatives such as waterpower (using the energy of moving water, such as rivers), solar energy (using the energy from the sun), wind energy (using the energy of the wind or air currents), and geothermal energy (using energy contained in hot-water deposits within the Earth's crust) are efficient and practical but largely underutilized because of the ready availability of inexpensive, nonrenewable fossil fuels in industrial countries.

In addition to using alternative energy resources such as solar and wind power, energy conservation measures include improving energy efficiency. Encouraging the expansion and use of public transportation systems and carpooling dramatically increases energy efficiency. In the household, energy can be conserved by turning down thermostats, switching off unnecessary lights, insulating homes, and using less hot water.

Mineral Conservation

Until recently little attention was paid to conservation of mineral resources because it was assumed that nothing could be done to save them anyway. But now these assumptions have proved wrong and it is believed that severe shortages would develop tomorrow. The conservation of minerals, therefore, has become a serious concern for conservationist all over the world. The future needs can be met by expanding reserves, finding substitutes, recycling and conservation.

Role of an Individual in Conservation of Natural Resources

Natural resources like forests, water, soil, food, minerals and energy resources play an important role in the economy and development of a nation. Humans can play important role in conservation of natural resources. A little effort by individuals can help to conserve these resources which are a gift of nature to the mankind. Brief description of role of individual to conserve different types of natural resources is given below:

Roles to conserve water

- To minimize the evaporation losses irrigate the crops, the plants and the lawns in the evening, because water application during day time will lead to more loss of water due to higher rate of evapo-transpiration.
- Improve water efficiency by using optimum amount of water in washing machine, dishwashers and other domestic appliances, etc.
- Install water saving toilets which use less water per flush.
- Check for water leaks in pipes and toilets and repair them promptly.
- Don't keep water taps running while they are not in use.
- Recycle water of washing of cloths for gardening.
- Installing rainwater harvesting structure to conserve water for future use.

Energy conservation for future use

- Turn off all electric appliances such as lights, fans, televisions, computers, etc. when not in use.
- Clean all the lighting sources regularly because dust on lighting sources decreases lighting levels up to 20-30%
- Try to harvest energy from natural resources to obtain heat for example drying the cloths in sun and avoid drying in washing machine.
- Save liquid petroleum gas (LPG) by using solar cookers for cooking.
- Design the house with provision for sunspace to keep the house warm and to provide more lighting.
- Avoid misuse of vehicles for transportation and if possible, share car journey to minimize use of petrol/diesel. For small distances walk down or just use bicycles.
- Minimize the use air conditioner to save energy

Protect soil health

- Use organic manure/compost to maintain soil fertility
- To avoid soil erosion does not irrigate the plants by using fast flow of water.
- Use sprinkler irrigation to conserve the soil.
- Design landscape of lawn in large area which will help to bind soil to avoid erosion.
- Provide vegetation cover by growing of ornamental plant, herbs and trees in your garden.
- Use vegetable waste to prepare compost to use in kitchen gardening.

Promote sustainable agriculture

- Diversify the existing cropping pattern for sustainability of agriculture
- Cultivate need based crop
- Maintain soil fertility
- Make optimum use of fertilizers, pesticides and other chemicals for production and processing of agriculture products
- Save grains in storage to minimize the losses

- Improve indigenous breeds of milch animals for sustainable dairy production systems.
- Adopt post-harvest technologies for value addition

Sustainable Life Style

In last 50 years, the consumption of resource in the society has increased many folds. There is a big gap in the consumers lifestyle between developed and developing countries. Urbanization has changed the life style of middle-class population in developing countries creating more stress on the use of natural resources. It has been estimated that More Developed Countries (MDC) of the world constitute only 22% of world's population but they use 88% of natural resources. These countries use 73% of energy resources and command 85% of income and in turn they contribute very big proportion of pollution. On the other hand, less developed countries (LDCs) have moderate industrial growth and constitute 78% of world's population and use only 12% of natural resources, 27% of energy and have only 15% of global income.

There is a huge gap between rich and poor. This has led to unsustainable growth. There is an increasing global concern about the management of natural resources. The solution to this problem is to have more equitable distribution of resources and income. Two major causes of unsustainability are over population in poor countries and over consumption of resources by rich countries.

For equitable use of natural resources more developed countries/rich people have to lower down their level of consumption to bare minimum so that these resources can be shared by poor people to satisfy their needs.