Multidisciplinary nature of environmental studies: Environmental studies deals with every issue thataffects an organism. It is essentially a multidisciplinary approach that brings about an appreciation of our natural world and human impacts on its integrity. It is an applied science as its seeks practical answers to making human civilization sustainable on the earth's finite resources. Its components include biology, geology, chemistry, physics, engineering, sociology, health, anthropology, economics, statistics, computers and philosophy. `The industrial development and intensive agriculture that provides the goods for our increasingly consumer oriented society uses up large amounts of natural resources such as water, minerals, petroleum products, wood, etc.

Nonrenewable resources, such as minerals and oil are those which will be exhausted in the future if we continue to extract these without a thought for subsequent generations. **Renewable resources**, such as timber and water, are those which can be used but can be regenerated by natural processes such as re-growth or rainfall. But these too will be depleted if we continue to use them faster than nature can replace them. For example, if the removal of timber and firewood from a forest is faster than the re-growth and regeneration of trees, it cannot replenish the supply. And loss of forest covers not only depletes the forest of its resources, such as timber and other non-wood products, but affects our water resources because an intact natural forest acts like a sponge which holds water and releases it slowly. Deforestation leads to floods in the monsoon and dry rivers once the rains are over.

Need for public awareness: As the earth's natural resources are dwindling and our environment is being increasingly degraded by human activities, it is evident that something needs to be done. This can only be made possible through mass public awareness. Mass media such as newspapers, radio, television, strongly influence public opinion. However, someone has to bring this about. 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. There have been several Government and Nongovernment organizations that have led to environmental protection in our country. They led to a growing interest in environmental protection and conservation of nature and natural resources. They are : 1. Bombay Natural History Society (BNHS),Mumbai: began in 1883 2. CPR Environmental Education Centre, Madras: set up in 1988. 3. World Wide Fund for Nature (WWF-I), New Delhi in 1969. 4. Centre for Environment Education (CEE), Ahmadabad in 1989.

Biotic /abiotic: Our environment provides us with a variety of goods and services necessary for our day to day lives. These natural resources include, air, water, soil, minerals, along with the climate and

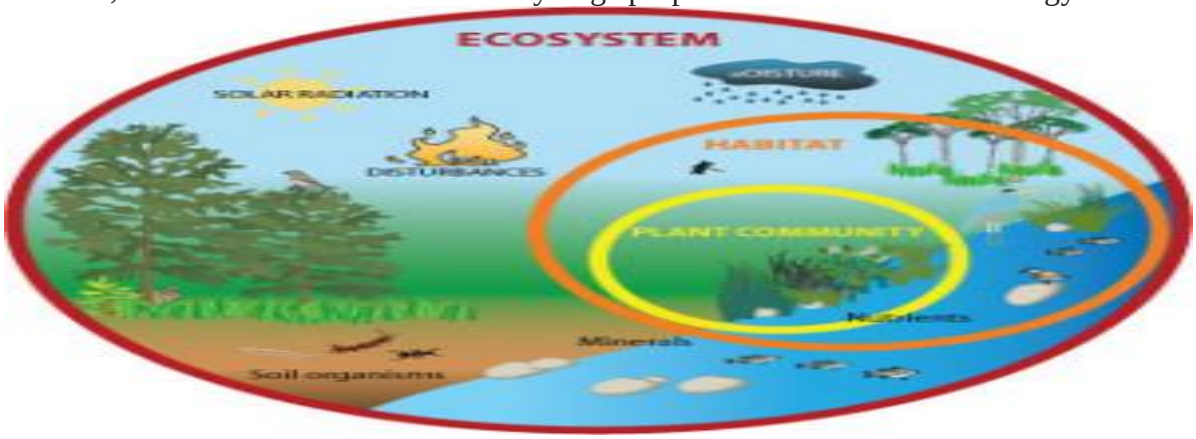
solar energy, which form the non-living or 'abiotic' part of nature. The 'biotic' or living parts of nature consists of plants and animals, including microbes. Plants and animals can only survive as communities of different organisms, all closely linked to each in their own habitat, and requiring specific abiotic conditions. Thus, forests, grasslands, deserts, mountains, rivers, lakes and the marine environment all form habitats for specialised communities of plants and animals to live in. Interactions between the abiotic aspects of nature and specific living organisms together form ecosystems of various types.

Many of these living organisms are used as our food resources. Others are linked to our food less directly, such as pollinators and dispersers of plants, soil animals like worms, which recycle nutrients for plant growth, and fungi and termites that break up dead plant material so that micro-organisms can act on the detritus to reform soil nutrients. **FOREST FUNCTIONS :** Watershed protection: • Reduce the rate of surface run-off of water. • Prevent flash floods and soil erosion. • Produces prolonged gradual run-off and thus prevent effects of drought. Atmospheric regulation: • Absorption of solar heat during evapo-transpiration. • Maintaining carbon dioxide levels for plant growth. • Maintaining the local climatic conditions. Erosion control: • Holding soil (by preventing

rain from directly washing soil away). Land bank: • Maintenance of soil nutrients and structure. Local use - Consumption of forest produce by local people who collect it for subsistence – (Consumptive use). • Food - gathering plants, fishing, hunting from the forest. (In the past when wildlife was plentiful, people could hunt and kill animals for food. Now that populations of most wildlife species have diminished, continued hunting would lead to extinction.) • Fodder - for cattle.
• Fuel wood and charcoal for cooking, heating. • Poles - building homes especially in rural and wilderness areas. – household articles and construction. • Fiber - weaving of baskets, ropes, nets, string, etc. • Sericulture – for silk. • Apiculture - bees for honey, forest bees also pollinate crops. • Medicinal plants - traditionally used medicines, investigating them as potential source for new modern drugs.

Water resources: The water cycle, through evaporation and precipitation, maintains hydrological systems which form rivers and lakes and support in a variety of aquatic ecosystems. Wetlands are intermediate forms between terrestrial and aquatic ecosystems and contain species of plants and animals that are highly moisture dependent. All aquatic ecosystems are used by a large number of people for their daily needs such as drinking water, washing, cooking, watering animals, and irrigating fields. The world depends on a limited quantity of fresh water. Water covers 70% of the earth's surface but only 3% of this is fresh water. Of this, 2% is in polar ice caps and only 1% is usable water in rivers, lakes and subsoil
aquifers. • Timber.

Eco System: An 'Ecosystem' is a region with a specific and recognizable landscape form such as forest, grassland, desert, wetland or coastal area. The nature of the ecosystem is based on its geographical features such as hills, mountains, plains, rivers, lakes, coastal areas or islands. It is also controlled by climatic conditions such as the amount of sunlight, the temperature and the rainfall in the region. The geographical, climatic and soil characteristics form its non-living (abiotic) component. These features create conditions that support a community of plants and animals that evolution has produced to live in these specific conditions. The living part of the ecosystem is referred to as its biotic component. Ecosystems are however frequently disrupted by human actions which lead to the extinction of species of plants and animals that can live only in the different natural ecosystems. Some species if eliminated seriously affect the ecosystem. These are called 'keystone' species. Extinction occurs due to changes in land use. Forests are deforested for timber, wetlands are drained to create more agricultural land and semi arid grasslands that are used as pastures are changed into irrigated fields. Pollution from industry and waste from urban settings can also lead to extinction of several species. The reason for the depletion of natural resources is twofold – our rapidly exploding population that needs to sustain itself on resources, and the growth of affluent societies, which consume and waste a very large proportion of resources and energy.



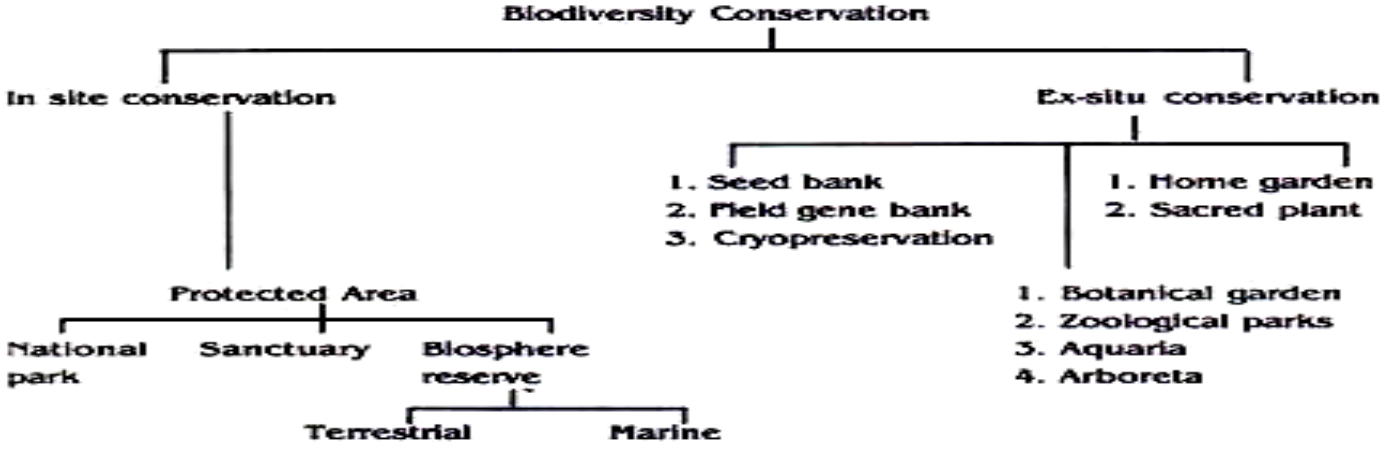
Types are : a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries). **Biodiversity and its conservation**: The term biodiversity was coined as a contraction of biological diversity by E.O. Wilson in 1985. Biodiversity may be defined as the variety and variability of living organisms and the ecological complexes in which they exist. In other words, biodiversity is the occurrence of different types of ecosystems, different species of organisms with the whole range of their variants and genes adapted to different climates, environments along with their interactions and processes.

Biodiversity includes the genetic variability (for which different varieties of spices have appeared in the course of evolution) and diversity of life forms such as plants, animal microbes, etc. living in a wide range of ecosystems.

Types: There are **three interrelated** hierarchical levels of biodiversity namely, genetic diversity, species diversity and community or ecosystem diversity.1. Genetic diversity 2. Species diversity 3. Ecosystem diversity. Biodiversity of India:

As per available data, the varieties of species living on the earth are 1753739. Out of the above species, 134781 are residing in India although surface area of India is 2% of the earth's surface. Wild life Institute of India has divided it into ten biogeographical regions and twenty five biotic provinces. The regions are:

(i) Trans Himalayas, (ii) Gangetic plain, (iii) Desert, (iv) Semiarid zone; (v) Western Ghats; (vi) Deccan peninsula, (vii) North eastern zone, (viii) Coastal lands (ix) Himalayas, (x) Islands .India is one of the twelve mega diversity nations of the world. **Importance of Biodiversity**: The living organisms on earth are of great diversity, living in diverse habitats and possessing diverse qualities and are vital to human existence providing food, shelter, clothing's, medicines etc. **Threats**: Biodiversity is considered as a reservoir of resources to be used for the manufacture of food, medicine, industrial products, etc. But with an increased demand of rapid population growth, biodiversity is gradually depleting. A number of plants" and ani-mal species have already become extinct and many are endangered.



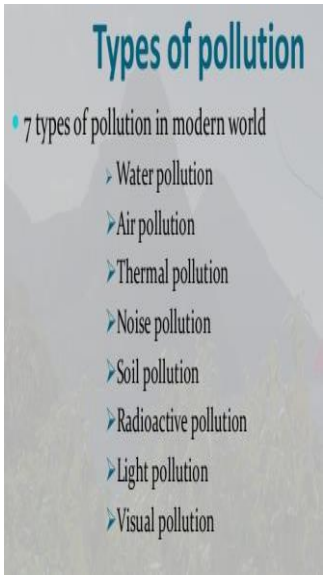
Pollution : It is an undesirable change in the environment. Most of the abiotic components like water, air, soil are polluted day-by-day thereby polluting the environment. **Water pollution:** Water is an essential natural resource. Water exists in different resources like ponds, lakes, rivers, seas, oceans etc. Pollution of water resources shows effects on the environment as well as the living organisms. Pollution of water makes it undesirable for usage. Different causes for water polluion are dumping of untreated sewage, dumping of toxic industrial wastes, dumping of agricultural wastes, oil spills caused by ships travelling in ocean etc. **Air pollution:** Air is an abiotic factor which is essential

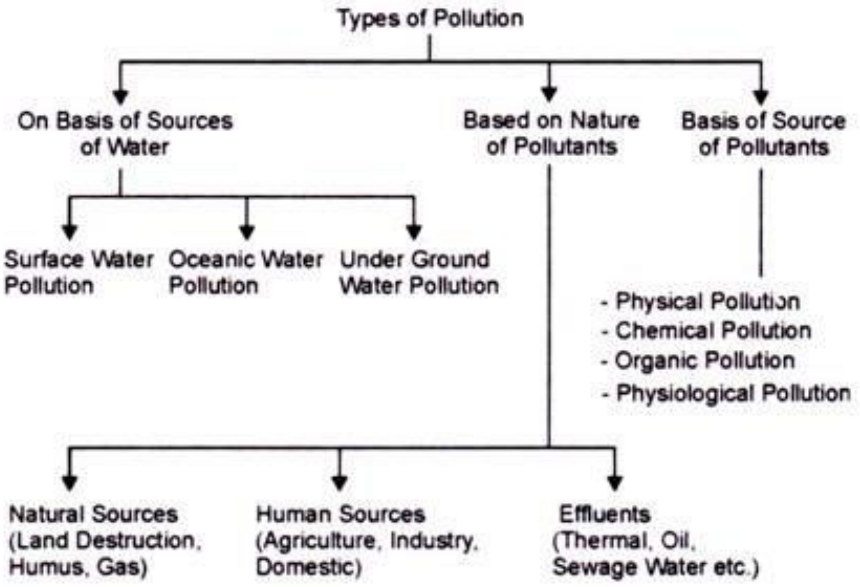
for all the living organisms in the process of respiration. Oxygen in air is essential for combustion. Nitrogen in air is utilized by plants with help of some bacteria. Carbon dioxide is essential for the plants which synthesize the food for them and other living organisms. Air is polluted by different factors like smoke released by automobiles and industries, dust released by industries and mining wells, different chemicals (CFCs, ferns) used in refrigerators and air conditioners etc. Gases released by automobiles and industries are poisonous sometimes and may include SO2, NO2, Methane, Carbon monoxide, Carbon dioxide, other green house gases etc. Fuels used in rockets also release lot of pollutants into the atmosphere. Air is also polluted by pollen from some plants. Some microbes which cause diseases also exist in air.

Soil pollution: Soil is the top most cover on the surface of the earth. It is polluted by dumps caused by domestic wastes, industrial wastes etc. Some toxic chemicals from the industrial wastes percolate into the soil and cause ill- effects. Plastic is another major pollutant of the soil. It is a non-biodegradable resource that gets burried in the soil and takes several years for decomposition. The usage of chemical fertilizers and pesticides also has an effect on the soil during a course of time.

Noise pollution: Noise is the unwanted unbearable sound in the environment. Noise pollution is also harmful for the living organisms. It shows adverse effects on them. Airplanes, helicopters, automobiles cause noise pollution. Constructions of buildings also cause noise pollution. Industries also cause noise pollution.

Thermal pollution: This is an increase in the temperature of the environment due to certain natural and man-made causes. Release of carbon dioxide by burning fossil fuels like coal, petroleum is also a cause for thermal pollution. Increase in temperature beyond certain level is called as global warming. Global warming leads to melting up of polar ice-caps which in turn results in submerging of low-lying areas **Tamil Nadu Pollution Control Board** is the governing body to monitor and control air, noise, and water pollution in the state of Tamil Nadu. The Central Pollution Control Board (CPCB) of India is a statutory organization under the Ministry of Environment, Forest and Climate Change. It was established in 1974 under the Water (Prevention and Control of Pollution) Act, 1974. CPCB is also entrusted with the powers and functions under the Air. **Global warming:** It is the phenomenon of increasing average air temperatures near the surface of Earth over the past one to two centuries. Climate scientists have since the mid-20th century gathered detailed observations of various weather phenomena (such as temperatures, precipitation, and storms) and of related influences on climate (such as ocean currents and the atmosphere's chemical composition). These data indicate that Earth's climate has changed over almost every conceivable timescale since the beginning of geologic time and that the influence of human activities since at least the beginning of the Industrial Revolution has been deeply woven into the very fabric of climate change. **Acid Rain :** Acid rain is a result of air pollution. When any type of fuel is burnt, lots of different chemicals are produced. The smoke that comes from a fire or the fumes that come out of a car exhaust don't just contain the sooty grey particles that you can see - they also contains lots of invisible gases that can be even more harmful to our environment





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Power stations, factories and cars all burn fuels and therefore they all produce polluting gases. Some of these gases (especially nitrogen oxides and sulphur dioxide) react with the tiny droplets of water in clouds to form sulphuric and nitric acids. The rain from these clouds then falls as very weak acid - which is why it is known as "acid rain". Acid rain can be carried great distances in the atmosphere, not just between countries but also from continent to continent. The acid can also take the form of snow, mists and dry dusts. The rain sometimes falls many miles from the source of pollution but wherever it falls it can have a serious effect on soil, trees, buildings and water.

Forests all over the world are dying, fish are dying. In Scandinavia there are dead lakes, which are crystal clear and contain no living creatures or plant life. Many of Britain's freshwater fish are threatened; there have been reports of deformed fish being hatched. This leads to fish-eating birds and animals being affected also. Scientists have been doing a lot of research into how acid rain affects the environment. **Environmental Impact Assessment**. **(EIA)** is a process of evaluating the likely environmental impacts of a proposed project or development, taking into account inter-related socio-economic, cultural and human-health impacts, both beneficial and adverse.

Environmental conservation : It includes activities such as managing our landscapes, habitats, species and access to our countryside. It is all about protecting the world's natural environment. It is not about profits but helps address some of our big challenges, such as climate change, and contributes to biodiversity and health and social inclusion. The Earth's natural resources include air, water, soil, minerals, fuels, plants, and animals. Conservation is the practice of caring for these resources so all living things can benefit from them now and in the future. **Forest conservation :** Forests provide habitats for animals and plants. They store carbon, helping reduce global warming. They protect soil by reducing runoff. They add nutrients to the soil through leaf litter. They provide people with lumber and firewood. **Deforestation** is the process of clearing away forests by cutting them down or burning them. People clear forests to use the wood, or to make way for farming or development. Each year, the Earth loses about 14.6 million hectares (36 million acres) of forest to deforestation—an area about the size of the U.S. state of New York. Deforestation destroys wildlife habitats and increases soil erosion. It also releases greenhouse gases into the atmosphere, contributing to global warming. Deforestation accounts for 15 percent of the world's greenhouse gas emissions. Deforestation also harms the people who rely on forests for their survival, hunting and gathering, harvesting forest products, or using the timber for firewood. **The Wildlife**

Protection Act, 1972 is an Act of the Parliament of India enacted for protection of plants and animal species. Before 1972, India only had five designated national parks. **Soil conservation :**Soil is vital to food production. We need high-quality soil to grow the crops that we eat and feed to livestock. Soil is also important to plants that grow in the wild. Many other types of conservation efforts, such as plant conservation and animal conservation, depend on soil conservation. Harvesting all the trees from a large area, a practice called clear cutting, increases the chances of losing productive topsoil to wind and water erosion. Selective harvesting—the practice of removing individual trees or small groups of trees—leaves other trees standing to anchor the soil. **Water conservation :** Water is a renewable resource. We will not run out of water the way we might run out of fossil fuels. The amount of water on Earth always remains the same. However, most of the planet's water is unavailable for human use. While more than 70 percent of the Earth's surface is covered by water, only 2.5 percent of it is freshwater. Out of that freshwater, almost 70 percent is permanently frozen in the ice caps covering Antarctica and Greenland. Only about 1 percent of the freshwater on Earth is available for people to use for drinking, bathing, and irrigating crops.

THE GREEN CYCLES

Environmental Crisis: The Dam Projects: The various advantages and disadvantages of multi-purpose river projects can be compared as given in the table below.

S.N.	Advantages	Disadvantages
1.	Irrigation of crops	Natural flow of river is affected causing poor flow of sediments also.
2.	Electricity generation	Excessive sedimentation of the reservoir.
3.	Water supply tor industrial and domestic purposes	Stream beds become rockier, affecting marine life.
4.	Flood control	Dam fragments a river thus making it difficult for aquatic fauna to migrate and spawn.
5.	Inland navigation	Reservoirs submerge the existing vegetation and soil leading to its decomposition over time.
6.	Fish breeding	Deforestation and displacement of local people.

The Narmada Valley Development Project is the single largest river development scheme in India. It is one of the largest hydroelectric projects in the world and will displace approximately 1.5 million people from their land in three states (Gujarat, Maharashtra, and Madhya Pradesh).The environmental costs of such a project, which involves the construction of more than 3,000 large and small dams, are immense. The project will devastate human lives and biodiversity by inundating thousands of acres of forests and agricultural land. The State(India) wants to build these dams on the Narmada River in the name of National Development. Each monsoon season thousands of people are told by the Indian government that they will have to be relocated as their ancestral lands are flooded out. The people whose lives were going to be devastated were neither informed nor consulted nor

heard. A disproportionate number of those being displaced are tribal people: Adivasis and Dalits. Damming the Narmada River will degrade the fertile agricultural soils due to continuous irrigation (rather the seasonal irrigation which is dependent on the monsoon), and salinization, making the soil toxic to many plant species. The largest of the dams under construction is the Sardar Sarovar, which, if completed, will flood more than 37,000 hectares of forest and agricultural land, displacing more than half a million people and destroying some of India's most fertile land. With activist Medha Patkar to lead them, the **Narmada Bachao Andolan** began mobilizing massive marches and rallies against the Narmada Valley Development Project, and especially the largest, the Sardar Sarovar, in 1985. Although the protests were peaceful, Patkar and others were often beaten and arrested by police. In 1990, thousands of villagers made their way by boat and foot to a small town in Madhya Pradesh in defense of their pledge to drown in the reservoir waters rather than move from their homes. The demonstrations, protests, rallies, hunger strikes, blockades, and written representations by Narmada Bachao Andolan have all made an impact on the direction of the movement to stop the building of large and small dams along the Narmada.

The protection and preservation of the environment is one of the most important issues facing humankind today. The centrality of this issue was demonstrated when the Nobel Peace Prize for 2007 was awarded to AL Gore and the Inter Governmental Panel on Climate Change for their efforts to build up and disseminate greater knowledge about man-made climate change. There is an international movement today, cutting across the north-south divide, to protect and preserve the environment. International law forms a major part of this development. Within this body of international law, dealing with protection of the environment, there exists a current of thought which argues that right to a clean or healthy or satisfactory or good environment has attained the status of a human right. The logical corollary follows those human rights mechanism can be used to prevent the degradation of the environment.

Consumerism and waste products : Consumerism is related to the constant purchasing of new goods, with little attention to their true need, durability, product origin, or the environmental consequences of their manufacture and disposal. Consumerism interferes with the sustainable use of resources in a society by replacing the normal common sense desire for an adequate supply of life's necessities, with an insatiable quest for things that are purchased by larger and larger incomes to buy them. Especially in developed countries, landfills are being rapidly filled with cheap discarded products that fail to work within short time and cannot be repaired. In many cases, consumer products are made psychologically obsolete by advertising industry long before they actually wear out. The inordinate amount of waste that is generated by consumer-oriented societies around the world is now a serious environmental issue. Most human activities are related to production and consumption cycle which produce excessive amounts of waste in the form of solid, liquid and gaseous waste products. With the advent of and industrial civilization, the highly complex technological processes for production of goods have rapidly increased problems due to inadequate waste disposal. With the rapid increase in population, the amount of waste in terms of quantity and quality has increased waste management pressure many-fold in recent years. Our health will be affected by dangerous industrial effluents, and be will be smothered by clouds of smoke and unhealthy gases. Therefore, the reuse of goods and waste utilization should become a part of the production-consumption cycle. For example, it is estimated that the per capita production of domestic waste is many times higher in a developed country hence compared to a developing country.