

SYLLABUS

B.COM IV Sem. (Hons.)

Subject – ENVIRONMENTAL STUDIES

Unit-I	Problem of natural resources
Unit – II	<p>Bio-diversity and its protection-</p> <p>(a) Value of bio-diversity – Consumable use: Productive use, Social, alternative, moral aesthetic and values.</p> <p>(b) India as a nation of bio-diversity and multi-diversity at global, national and local levels.</p> <p>(c) Threats to bio-diversity - Loss of habitat, poaching of wildlife, man wildlife conflicts.</p>
Unit – III	<p>Human Population and Environment</p> <p>(a) Population growth, disparities between countries</p> <p>(b) Population explosion, family welfare p\Programme.</p> <p>(c) Environment and human health</p>
Unit – IV	<p>Multidisciplinary nature of environmental studies:</p> <p>(a) Natural resources</p> <p>(b) Social problems and the environment</p> <p>(c) Eco system.</p>
Unit – V	<p>Environment Wealth :</p> <p>(a) Rivers, ponds, fields and hills.</p> <p>(b) Rural, Industrial, Agricultural fields.</p> <p>(c) Study of common plants, insects and birds.</p>

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PROBLEMS OF NATURAL RESOURCES

Water resources are sources of water that are useful or potentially useful to humans. Uses of water include agricultural, industrial, household, recreational and environmental activities. Virtually all of these human uses require fresh water.

97% of the water on the Earth is salt water, and only 3% is fresh water of which slightly over two thirds is frozen in glaciers and polar ice caps. The remaining unfrozen freshwater is mainly found as groundwater, with only a small fraction present above ground or in the air.

Fresh water is a renewable resource, yet the world's supply of clean, fresh water is steadily decreasing. Water demand already exceeds supply in many parts of the world and as the world population continues to rise, so too does the water demand. Awareness of the global importance of preserving water for ecosystem services has only recently emerged as, during the 20th century, more than half the world's wetlands have been lost along with their valuable environmental services. Biodiversity-rich freshwater ecosystems are currently declining faster than marine or land ecosystems. The framework for allocating water resources to water users (where such a framework exists) is known as water rights.

CONFLICTS OVER WATER

Indispensability of water and its unequal distribution has often led to inter-state or international disputes. Issues related to sharing of river water have been largely affecting our farmers and also shaking our governments. Some major water conflicts are discussed here.

1. Water conflict in the Middle East: Three river basins, namely the Jordan, the Tigris-Euphrates and the Nile are the shared water resources for Middle East countries. Ethiopia controls the head waters of 80% of Nile's flow and plans to increase it Natural Resources.

Sudan too is trying to divert more water. This would badly affect Egypt, which is a desert, except for a thin strip of irrigated cropland along the river Nile and its delta.

2. The Indus Water Treaty: The Indus, one of the mightiest rivers is dying a slow death due to dams and barrages that have been built higher up on the river. The Sukkur barrage (1932), Ghulam Mohamad Barrage at Kotri (1958) and Tarbela and Chasma Dams on Jhelum, a tributary of Indus have resulted in severe shrinking of the Indus delta. In 1960, the Indus water treaty was established vide which Indus, the Jhelum and the Chenab were allocated to Pakistan and the Satluj, the Ravi and the Beas were allocated to India. Being the riparian state, India has pre-emptive right to construct barrages across all these rivers in Indian territory. However, the treaty requires that the three rivers allocated to Pakistan may be used for non-consumptive purposes by India i.e. without changing its flow and quality. With improving political relations between the two countries it is desirable to work out techno-economic details and go for an integrated development of the river basin in a sustainable manner.

3. The Cauvery water dispute: Out of India's 18 major rivers, 17 are shared between different states. In all these cases, there are intense conflicts over these resources which hardly seem to resolve. The Cauvery river water is a bone of contention between Tamilnadu and Karnataka and the fighting is almost hundred years old. Tamilnadu, occupying the downstream region of the river wants water-use regulated in the upstream. Whereas, the upstream state Karnataka refuses to do so and claims its primacy over the river as upstream user. The river water is almost fully utilized and both the states have increasing demands for agriculture and industry. The consumption is more in Tamilnadu than Karnataka where the catchment area is more rocky. On June 2, 1990, the Cauvery Water Dispute Tribunal was set up which through an interim award directed Karnataka to ensure that 205 TMCF

of water was made available in Tamil Nadu's Mettur dam every year, till a settlement was reached. In 1991-92 due to good monsoon, there was no dispute due to good stock of water in Mettur, but in 1995, the situation turned into a crisis due to delayed rains and an expert.

What is flood ?

The term "flood" is a general or temporary condition of partial or complete inundation of normally dry land areas from overflow of inland or tidal waters or from the unusual and rapid accumulation or runoff of surface waters from any source.

What causes Flood ?

Heavy down pore in the form of rain, brings down more water than can be disposed off by combined factors natural and man made systems causes flooding. The rivers overflow embankments may be breached. Generally rains following storm and hurricane are heavy and bring unmanageable amount of water causing floods.

When it comes to hurricanes, wind speeds do not tell the whole story. Hurricanes produce storm surges, tornadoes, and often the most deadly of all - inland flooding. Inland flooding can be a major threat to communities hundreds of miles from the coast as intense rain falls from these huge tropical air masses.

Flood and health factors

The large amount of pooled water remaining after the flood leads to an increase in mosquito populations. Mosquitoes are most active at sunrise and sunset. People are exposed to malaria, dengue etc.

Regardless of ones ability to swim. Swiftly moving shallow water can be deadly, and even shallow standing water can be dangerous for small children. Cars or other vehicles do not provide adequate protection from flood waters. Cars can be swept away or may break down in moving water.

Many wild animals are forced from their natural habitats by flooding, and many domestic animals are also without homes after the flood. General public is exposed to rabies. Animals are disoriented and displaced, too.

Rats may be a problem during and after a flood. Take care to secure all food supplies, and remove any animal carcasses in the vicinity by contacting MCD

Flood waters may can bury or moved hazardous chemical containers of solvents or other industrial chemicals from their normal storage places. Car batteries, even those in flood water, may still contain an electrical charge and should be removed with extreme caution by using insulated gloves. The dead animal if not removed in time further pollute the atmosphere.

The displaced people would have lost every thing and needs to be provided with proper food shelter and financial support.

DROUGHTS

There are about 80 countries in the world, lying in the arid and semi- arid regions that experience frequent spells of droughts, very often extending up to year long duration. When annual rainfall is below normal and less than evaporation, drought conditions are created. Ironically, these drought-hit areas are often having a high population growth which leads to poor land use and makes the situation worse.

Anthropogenic causes: Drought is a meteorological phenomenon, but due to several anthropogenic causes like over grazing, deforestation, mining etc. there is spreading of the deserts tending to convert more areas to drought affected areas. In the last twenty years, India has experienced more and more desertification, thereby increasing the vulnerability of larger parts of the country to droughts.

Erroneous and intensive cropping pattern and increased exploitation of scarce water resources through well or canal irrigation to get high productivity has converted drought - prone areas into

desertified ones. In Maharashtra there has been no recovery from drought for the last 30 years due to over-exploitation of water by sugarcane crop which has high water demands.

Remedial measures: Indigenous knowledge in control of drought and desertification can be very useful for dealing with the problem. Carefully selected mixed cropping help optimize production and minimize the risks of crop failures. Social Forestry and Wasteland development can prove quite effective to fight the problem, but it should be based on proper understanding of ecological requirements and natural process.

Deforestation is the removal of a forest or stand of trees where the land is thereafter converted to a nonforest use. Examples of deforestation include conversion of forestland to farms, ranches, or urban use.

The term *deforestation* is often misused to describe any activity where all trees in an area are removed. However in temperate mesic climates, the removal of all trees in an area—in conformance with sustainable forestry practices—is correctly described as *regeneration harvest*. In temperate mesic climates, natural regeneration of forest stands often will not occur in the absence of disturbance, whether natural or anthropogenic. Furthermore, biodiversity after regeneration harvest often mimics that found after natural disturbance, including biodiversity loss after naturally occurring rainforest destruction.

Deforestation occurs for many reasons: trees or derived charcoal are used as, or sold, for fuel or as timber, while cleared land is used as pasture for livestock, plantations of commodities, and settlements. The removal of trees without sufficient reforestation has resulted in damage to habitat, biodiversity loss and aridity. It has adverse impacts on biosequestration of atmospheric carbon dioxide. Deforested regions typically incur significant adverse soil erosion and frequently degrade into wasteland.

Disregard or ignorance of intrinsic value, lack of ascribed value, lax forest management and deficient environmental laws are some of the factors that allow deforestation to occur on a large scale. In many countries, deforestation, both naturally occurring and human induced, is an ongoing issue. Deforestation causes extinction, changes to climatic conditions, desertification, and displacement of populations as observed by current conditions and in the past through the fossil record.

Causes

There are many causes of contemporary deforestation, including corruption of government institutions, the inequitable distribution of wealth and power, population growth and overpopulation, and urbanization. Globalization is often viewed as another root cause of deforestation, though there are cases in which the impacts of globalization (new flows of labor, capital, commodities, and ideas) have promoted localized forest recovery.

Major Causes of Deforestation

(i) Shifting cultivation: There are an estimated 300 million people living as shifting cultivators who practice slash and burn agriculture and are supposed to clear more than 5 lakh ha of forests for shifting cultivation annually. In India, we have this practice in North-East and to some extent in Andhra Pradesh, Bihar and M.P which contribute to nearly half of the forest clearing annually.

(ii) Fuel requirements: Increasing demands for fuel wood by the growing population in India alone has shot up to 300-500 million tons in 2001 as compared to just 65 million tons during independence, thereby increasing the pressure on forests.

(iii) Raw materials for industrial use: Wood for making boxes, furniture, railway-sleepers, plywood, match-boxes, pulp for paper industry etc. have exerted tremendous pressure on forests. Plywood is in great demand for packing tea for Tea industry of Assam while fir tree wood is exploited greatly for packing apples in J&K.

(iv) Development projects: Massive destruction of forests occur for various development projects like hydroelectric projects, big dams, road construction, mining etc.

(v) Growing food needs: In developing countries this is the main reason for deforestation. To meet the demands of rapidly growing population, agricultural lands and settlements are created permanently by clearing forests.

(vi) Overgrazing: The poor in the tropics mainly rely on wood as a source of fuel leading to loss of tree cover and the cleared lands are turned into the grazing lands. Overgrazing by the cattle leads to further degradation of these lands.

Control

Reducing emissions

Reducing emissions from deforestation and forest degradation.

Farming

New methods are being developed to farm more intensively, such as high-yield hybrid crops, greenhouse, autonomous building gardens, and hydroponics. These methods are often dependent on chemical inputs to maintain necessary yields. In cyclic agriculture, cattle are grazed on farm land that is resting and rejuvenating. Cyclic agriculture actually increases the fertility of the soil. Intensive farming can also decrease soil nutrients by consuming at an accelerated rate the trace minerals needed for crop growth.

The most promising approach, however, is the concept of food forests in permaculture, which consists of agroforestry systems carefully designed to mimic natural forests, with an emphasis on plant and animal species of interest for food, timber and other uses. These systems have low dependence on fossil fuels and agro-chemicals, are highly self-maintaining, highly productive, and with strong positive impact on soil and water quality, and biodiversity.

Monitoring Deforestation

Reducing and monitoring deforestation is a new chapter of this dense keywords lifetime. There are multiple methods that are appropriate and reliable for monitoring deforestation. One method is the "visual interpretation of aerial photos or satellite imagery that is labor-intensive but does not require high-level training in computer image processing or extensive computational resources".

Another method includes hot-spot analysis (that is, locations of rapid change) using expert opinion or coarse resolution satellite data to identify locations for detailed digital analysis with high resolution satellite images.

Deforestation is typically assessed by quantifying the amount of area deforested, measured at the present time. Monitoring deforestation is a very complicated process, which becomes even more complicated with the increasing needs for resources.

Forest management

Efforts to stop or slow deforestation have been attempted for many centuries because it has long been known that deforestation can cause environmental damage sufficient in some cases to cause societies to collapse. **EXAMPLE** :In Tonga, paramount rulers developed policies designed to prevent conflicts between short-term gains from converting forest to farmland and long-term problems forest loss would cause, while during the 17th and 18th centuries in Tokugawa, Japan, the shoguns developed a highly sophisticated system of long-term planning to stop and even reverse deforestation of the preceding centuries through substituting timber by other products and more efficient use of land that had been farmed for many centuries. In 16th century Germany landowners also developed silviculture to deal with the problem of deforestation. However, these policies tend to be limited to environments with *good rainfall, no dry season and very young soils* (through volcanism or glaciation). This is because on older and less fertile soils trees grow too slowly for silviculture to be economic, whilst in areas with a strong dry season there is always a risk of forest fires destroying a tree crop before it matures.

In the areas where "slash-and-burn" is practiced, switching to "slash-and-char" would prevent the rapid deforestation and subsequent degradation of soils. The biochar thus created, given back to the soil, is not only a durable carbon sequestration method, but it also is an extremely beneficial amendment to the soil. Mixed with biomass it brings the creation of terra preta, one of the richest soils on the planet and the only one known to regenerate itself.

Sustainable practices

Certification, as provided by global certification systems such as PEFC and FSC, contributes to tackling deforestation by creating market demand for timber from sustainably managed forests. According to the United Nations Food and Agriculture Organization (FAO), "A major condition for the adoption of sustainable forest management is a demand for products that are produced sustainably and consumer willingness to pay for the higher costs entailed. Certification represents a shift from regulatory approaches to market incentives to promote sustainable forest management. By promoting the positive attributes of forest products from sustainably managed forests, certification focuses on the demand side of environmental conservation." Some nations have taken steps to help increase the amount of trees on Earth. In 1981, China created National Tree Planting Day and forest coverage had now reached 16.55% of China's land mass, as against only 12% two decades ago.

Forest plantations

To meet the world's demand for wood, it has been suggested by forestry writers Botkins and Sedjo that high-yielding forest plantations are suitable. It has been calculated that plantations yielding 10 cubic meters per hectare annually could supply all the timber required for international trade on 5% of the world's existing forestland. By contrast, natural forests produce about 1-2 cubic meters per hectare; therefore, 5-10 times more forestland would be required to meet demand. Forester Chad Oliver has suggested a forest mosaic with high-yield forest lands interspersed with conservation land.

One analysis of FAO data suggests that afforestation and reforestation projects "could reverse the global decline in woodlands within 30 years."

Reforestation through tree planting could take advantage of changing precipitation patterns due to climate change. This would be done by studying where precipitation is projected to increase and setting up reforestation projects in these locations. Areas such as Niger, Sierra Leone and Liberia are especially important candidates because they also suffer from an expanding desert (the Sahara) and decreasing biodiversity (while being important biodiversity hotspots).

Military context

American Sherman tanks knocked out by Japanese artillery on Okinawa.

While the preponderance of deforestation is due to demands for agricultural and urban use for the human population, there are some examples of military causes. One example of deliberate deforestation is that which took place in the U.S. zone of occupation in Germany after World War II. Before the onset of the Cold War Germany was still considered a potential future threat rather than potential future ally. To address this threat, attempts were made to lower German industrial potential, of which forests were deemed an element. Sources in the U.S. government admitted that the purpose of this was that the "ultimate destruction of the war potential of German forests." As a consequence of the practice of clear-felling, deforestation resulted which could "be replaced only by long forestry development over perhaps a century."

War can also be a cause of deforestation, either deliberately such as through the use of Agent Orange during the Vietnam War where, together with bombs and bulldozers, it contributed to the destruction of 44% of the forest cover, or inadvertently such as in the 1945 Battle of Okinawa where bombardment and other combat operations reduced the lush tropical landscape into "a vast field of mud, lead, decay and maggots".

Environmental impact of reservoirs(DAMS)

Upstream impacts :-

Upstream problems:

- Displacement of tribal people
- Loss of forests, flora and fauna
- Changes in fisheries and the spawning grounds
- Siltation and sedimentation of reservoirs
- Loss of non-forest land
- Stagnation and water logging near reservoir
- Breeding of vectors and spread of vector-borne diseases
- Reservoir induced seismicity (RIS) causing earthquakes
- Growth of aquatic weeds
- Microclimatic changes

Downstream impacts:

- Water logging and salinity due to over irrigation
 - Micro-climatic changes
 - Reduced water flow and silt deposition river
 - Flash floods
 - Salt water intrusion at river mouth
 - Loss of land fertility along the river since the sediments carrying nutrients get deposited in the reservoir
 - Outbreak of vector-borne diseases like malaria
- Thus dams are built to serve the society with multiple uses, but it has several serious side-effects. That is why now there is a shift towards construction of small dams or min-hydel projects.

Effects beyond the reservoir

Effects on humans

Diseases

Reservoirs are helpful to humans, they can also be harmful as well. One negative effect is that the reservoirs can become breeding grounds for disease vectors. This holds true especially in tropical areas where mosquitoes (which are vectors for malaria)

Resettlement

Dams and the creation of reservoirs also require relocation of potentially large human populations if they are constructed close to residential areas. This is true of the Three Gorges dam built in China. The Three Gorges reservoir submerged a large area of land, forcing over a million people to relocate. "Dam related relocation affects society in three ways: an economic disaster, human trauma, and social catastrophe".

DAMS AND THEIR EFFECTS ON FORESTS AND PEOPLE

Big dams and river valley projects have multi-purpose uses and have been referred to as "Temples of modern India". However, these dams are also responsible for the destruction of vast areas of forests. India has more than 1550 large dams, the maximum being in the state of Maharashtra (more than 600), followed by Gujarat (more than 250) and Madhya Pradesh (130). The highest one is Tehri dam, on river Bhagirathi in Uttaranchal and the largest in terms of capacity is Bhakra dam on river Satluj in H.P. Big dams have been in sharp focus of various environmental groups all over the world which is mainly because of several ecological problems including deforestation and socio-economic problems related to tribal or native people associated with them.

For building big dams, large scale devastation of forests takes place which breaks the natural ecological balance of the region. Floods, droughts and landslides become more prevalent in such

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areas. Forests are the repositories of invaluable gifts of nature in the form of biodiversity and by destroying them (particularly, the tropical rain forests) we are going to lose these species even before knowing them. These species could be having marvelous economic or medicinal value and deforestation results in loss of this storehouse of species which have evolved over millions of years in a single stroke.

Sardar Sarovar Dam (Uprooted Forests And Tribals):

A case study

The dam is situated on river Narmada and is spread over three states of Gujarat, Maharashtra and Madhya Pradesh. Although the project is aimed at providing irrigation water, drinking water and electricity to the three states, the environmental impacts of the project have raised challenging questions.

A total of 1,44,731 ha of land will be submerged by the dam, out of which 56,547 ha is forest land.

A total of 573 villages are to be submerged by the Narmada Dam.

Submergence of about 40,000 ha of forest under Narmada Sagar, 13,800 ha under Sardar Sarovar and 2,500 ha under Omkareshwar would further create pressure on remaining forest areas in adjoining areas. Submergence area is very rich in wildlife e.g. tigers, panthers, bears, wolves, pangolins, hyenas, jackals, flying squirrels, antelopes, black bucks, chinkara, marsh crocodiles, turtles etc. Many of these species are listed in schedule I & II of Wildlife Protection Act, 1972. Thus massive loss of these wildlife species is apprehended due to the devastation of the forest under the project.

As per the estimates of the Institute of Urban Affairs, New Delhi, the Narmada valley project will lead to eventual displacement of more than one million people, which is probably the largest rehabilitation issue ever encountered as per the World Bank. Uprooting of the tribals and their forced shifting in far-flung areas may not be easily adjusted to. Besides serious economic deprivation, the displacement will affect the tribal peoples' culture, their beliefs, myths and rituals, festivals, songs and dances, all closely associated with the hills, forest and streams. Most of these tribals belong to poor, unprivileged schedule castes and tribes who are being uprooted from a place where they have lived for generations. The displaced persons have to undergo hardship and distress for the sake of development and prosperity of a larger section of the society. It is therefore the duty of the project proponents and government to pay maximum attention for proper rehabilitation of the displaced tribals.

USES OF FORESTS

Commercial uses: Forests provide us a large number of commercial goods which include timber, firewood, pulpwood, food items, gum, resins, non-edible oils, rubber, fibers, lac, bamboo canes, fodder, medicine, drugs and many more items, the total worth of which is estimated to be more than \$ 300 billion per year.

Half of the timber cut each year is used as fuel for heating and cooking. One third of the wood harvest is used for building materials as lumber, plywood and hardwood, particle board and chipboard. One sixth of the wood harvest is converted into pulp and used for paper industry. Many forest lands are used for mining, agriculture, grazing, and recreation and for development of dams.

Ecological uses: While a typical tree produces commercial goods worth about \$ 590 it provides environmental services worth nearly \$ 196, 250.

The ecological services provided by our forests may be summed up as follows:

1 Production of oxygen: The trees produce oxygen by photo-synthesis which is so vital for life on this earth. They are rightly called as earth's lungs.

1 Reducing global warming: The main greenhouse gas carbon dioxide (CO₂) is absorbed by the forests as a raw material for photosynthesis. Thus forest canopy acts as a sink for CO₂ thereby reducing the problem of global warming caused by greenhouse gas CO₂.

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1 Wild life habitat: Forests are the homes of millions of wild animals and plants. About 7 million species are found in the tropical forests alone.

1 Regulation of hydrological cycle: Forested watersheds act like giant sponges, absorbing the rainfall, slowing down the runoff and slowly releasing the water for recharge of springs. About 50-80 % of the moisture in the air above tropical forests comes from their transpiration which helps in bringing rains.

1 Soil Conservation: Forests bind the soil particles tightly in their roots and prevent soil erosion. They also act as wind-breaks.

1 Pollution moderators: Forests can absorb many toxic gases and can help in keeping the air pure. They have also been reported to absorb noise and thus help in preventing air and noise pollution.

DESERTIFICATION

The world's great deserts were formed by natural processes interacting over long intervals of time. During most of these times, deserts have grown and shrunk independent of human activities. Paleodeserts, large sand seas now inactive because they are stabilized by vegetation, extend well beyond the present margins of core deserts, such as the Sahara. In some regions, deserts are separated sharply from surrounding, less arid areas by mountains and other contrasting landforms that reflect basic structural differences in the regional geology. In other areas, desert fringes form a gradual transition from a dry to a more humid environment, making it more difficult to define the desert border.

These transition zones have very fragile, delicately balanced ecosystems. Desert fringes often are a mosaic of microclimates. Small hollows support vegetation that picks up heat from the hot winds and protects the land from the prevailing winds. After rainfall the vegetated areas are distinctly cooler than the surroundings. In these marginal areas, human activity may stress the ecosystem beyond its tolerance limit, resulting in degradation of the land. By pounding the soil with their hooves, livestock compact the substrate, increase the proportion of fine material, and reduce the percolation rate of the soil, thus encouraging erosion by wind and water. Grazing and the collection of firewood reduces or eliminates plants that help to bind the soil.

This degradation of formerly productive land-- desertification--is a complex process. It involves multiple causes, and it proceeds at varying rates in different climates. Desertification may intensify a general climatic trend toward greater aridity, or it may initiate a change in local climate.

Desertification does not occur in linear, easily mappable patterns. Deserts advance erratically, forming patches on their borders. Areas far from natural deserts can degrade quickly to barren soil, rock, or sand through poor land management. The presence of a nearby desert has no direct relationship to desertification. Unfortunately, an area undergoing desertification is brought to public attention only after the process is well underway. Often little or no data are available to indicate the previous state of the ecosystem or the rate of degradation

Problem

Desertification became well known in the 1930's, when parts of the Great Plains in the United States turned into the "Dust Bowl" as a result of drought and poor practices in farming, although the term itself was not used until almost 1950. During the dust bowl period, millions of people were forced to abandon their farms and livelihoods. Greatly improved methods of agriculture and land and water management in the Great Plains have prevented that disaster from recurring, but desertification presently affects millions of people in almost every continent.

Increased population and livestock pressure on marginal lands has accelerated desertification. In some areas, nomads moving to less arid areas disrupt the local ecosystem and increase the rate of erosion of the land. Nomads are trying to escape the desert, but because of their land-use practices, they are bringing the desert with them.

Continued land abuse during droughts, however, increases land degradation. had caused the deaths of more than 100,000 people and 12 million cattle, as well as the disruption of social organizations from villages to the national level.

Local Remedies

At the local level, individuals and governments can help to reclaim and protect their lands. In areas of sand dunes, covering the dunes with large boulders or petroleum will interrupt the wind regime near the face of the dunes and prevent the sand from moving. Sand fences are used throughout the Middle East and the United States, in the same way snow fences are used in the north. Placement of straw grids, each up to a square meter in area, will also decrease the surface wind velocity. Shrubs and trees planted within the grids are protected by the straw until they take root. In areas where some water is available for irrigation, shrubs planted on the lower one-third of a dune's windward side will stabilize the dune.

Oases and farmlands in windy regions can be protected by planting tree fences or grass belts. Sand that manages to pass through the grass belts can be caught in strips of trees planted as wind breaks 50 to 100 meters apart adjacent to the belts. Small plots of trees may also be scattered inside oases to stabilize the area. On a much larger scale, a "Green Wall," which will eventually stretch more than 5,700 kilometers in length, much longer than the famous Great Wall, is being planted in northeastern China to protect "sandy lands"--deserts believed to have been created by human activity.

More efficient use of existing water resources and control of salinization are other effective tools for improving arid lands. New ways also being sought to find and tap groundwater resources and to develop more effective ways of irrigating arid and semiarid lands. The most effective intervention can come only from the wise use of the best earth-science information available.

Class:- B.Com. IV Semester

Subject:- Environmental Studies

Unit II

BIODIVERSITY AND ITS CONSERVATION

Biological diversity (Biodiversity) is part of our daily lives and livelihood and constitutes resources upon which humanity depends, Biodiversity is fundamental to fulfillment of human needs. An environment which is rich in biological diversity, offer the broadest array of options for sustaining human welfare and for adopting change. Loss of biodiversity has serious economic and social costs for any country. The experience of the past few decades have shown that as industrialization and economic development take place. the patterns of consumption. production and needs change. strain alert and even destroy ecosystems.

Genetic, Species and Ecosystem Diversity

Biodiversity involves three levels: diversity between the species (Species diversity), diversity within species (ie. Genetic diversity) and the diversity of the ecosystem (Ecosystem – diversity). However, apart from these specific hierarchical components of diversity e.g. genetic, species (or taxonomic) and ecological diversities. one must also consider the interaction amongst these.

Species and their population is a big library kept alive by natural ecosystem. Thus

- I. **Genetic diversity:** At finer levels of organisation, biodiversity includes the genetic variation within species, both geographically separated population and among individuals within single population.
- II. **Species diversity:** Biodiversity at its most basic level includes the full range of species on earth from microorganisms such as viruses, bacteria and protists through the multicellular kingdom of plants, animals and fungi.
- III. **Community/Ecosystem diversity:** On a wider scale, biodiversity includes variations in the biological communities in which species live, the ecosystem in which communities exist, and the interactions among these levels.

4.2 Biogeography Classification of India

India is known for its genetic and species richness with a wide variety of ecological zones. Because of its unique biogeographical realms, viz. Indo-Malayan. Eurasian and Afro-tropical. It is one of the mega-diversity centers with several bio-diversity 'hot and (eg. Eastern Himalays and Western Ghats) and is well known for species- richness and endemism (Fig. 4.1)

The diversity of the country's biological resources is yet to be fully known- Approximately, 65% of the total geographical area has been surveyed so far. Based on this over 4600 species of plants and 81000 species of animals have been described by Botanical Survey of India (Estd. 1890) and Zoological Survey of India (Estd. 1916) According to an estimate about 30% plant species are endemic to India. Area rich in endemism are also reported from Eastern Ghats. About 3000-4000 plant species are reported under different degrees of threat.

India has sufficient number of biomes. Which represent a sum total of the biological community interacting within single life zone where climate is similar. Twelve such biogeographic regions, ie. "Ecological protectorate' have been identified in the country.

1. Himalayan Highlands
2. The desert
3. Malabar Rain Forest
4. Deccan Thorn Forest
5. Coromondal Mahanandian
6. Burman Manson Forest
7. Bengalian Rain Forest

8. Laccadive Islands
9. Maldive and Chagoas Island
10. Indus-Ganges Mansson Forest
11. Andaman Islands and
12. Nicobar Islands

India has large numbers of wetlands. Mangroves and coral reefs to its credit.

4.3 Value of Bio diversity

Though conservation of biodiversity is advocated by all globally, this is very often assessed in terms of money, How much will it cost? And how much is it worth? Standard economics provides one method of assigning a value to anything, even biodiversity. One has to decide what is the economic value of a species to be conserved, and how much money may be needed in its conservation? A new developing discipline that integrates economics, environmental science and public policy, and includes valuations of biodiversity in economic analyses is known as environmental economics or ecological economics.

The economic values are divided as follows:

1. **Direct values:** These are assigned to the products harvested by people and
2. **Indirect values:** These are assigned to benefits provided by biodiversity that do not involve harvesting or destroying the resources.

Direct values (also known as use values and commodity values) can often be readily calculated by observing the activities of representative groups of people, by monitoring collection points for normal products and by examining import/export statistics. Direct values can be further divided as follows:

- (a) **Consumptive use value:** This can be assigned to goods such as fuelwood and game that are consumed locally and do not figure in national and international market.
- (b) **Productive use value:** This is assigned to products that are harvested from the wild and sold in commercial markets. Both at national and international levels.

Indirect values are assigned to biodiversity that provide economic benefits to people without consumption of the resource. Such benefits include water quality, soil protection, recreation, education, scientific research, regulation of climate and producing future option for human society. Indirect values could be further divided as follows:

- (a) **No consumptive use value:** This includes ecosystem productivity, protection of water resources, soil protection, climate regulation, waste disposal, species environmental monitoring etc.
- (b) **Option value:** This value of a species is its potential to provide an economic benefit to human society at some point in the future. The growing biotechnology industry is finding rare species to tackle pollution, and fight problems of cancer, AIDS etc.
- (c) **Existence value:** This is assigned to protect wildlife. People value charismatic animals such as lion, panda, birds etc, in a direct way to contribute money to conservation organisation. Governments also spend money on conservation.

Biodiversity at Global, National and local levels

Most of the world's biodiversity concentrations are near the equator, especially tropical rainforests and coral reefs. Of all the world's species, only 10 to 15 percent live in North America and Europe. Many of the organisms in megadiversity countries have never been studied by scientists. The Malasian Peninsula for instance, has at least 8,000 species of flowering plants, while Britain with an area twice as large, has only 1400 species. There may be more botanists in Britain than there are species of higher plants. South America, on the other hand, has fewer than 100 botanists to study perhaps 200,000 species of plants.

Area isolated by water, deserts, or mountains can also have high concentrations of unique species and biodiversity. Madagascar, New Zealand, South Africa and California. are all multitude area isolated by barriers that prevent mixing with biological communities from other regions and produce rich, unusual collections of species.

Precipitation and temperature are among the most important determinants of biodiversity. Many biomes occupy characteristic ranges of latitude, tundra occurs only in cold regions near poles while tropical forests occur only within the tropic – near the equator.

There are 8 large realms of biodiversity. On the earth which include 193 biogeographical provinces. Each biogeographical province is a definite ecosystem. in which communities of living species live in part of the ecosystem. As a matter of fact, biodiversity, in developing countries of tropical and subtropical part of the world, is much richer compared to that in the industrial countries temperate part. In addition vavilovian centres of diversity of crops and domestic animals are also localised in these countries.

India possesses a rich diversity of biological resources and indigenous knowledge related to this is well recognized.

In India, formal policies and programmes for conservation and sustainable utilisation of biodiversity resource date back to several decades. The concepts of environmental protection are enshrined in the Indian constitution in Articles 48a and 51a(g). Major central Acts relevant to biodiversity are-Forest Act 1972, Wildlife (Protection) Act 1972. Forest (Conservation) Act 1980 and Environment (Protection) Act 1986. The various central Acts are supported by a number of state laws and statues concerning forests and other natural resources. Policies and stages directly relevant to biodiversity include National Forest Policy amended in 1988, National Conservation strategy and policy statement for Environment and sustainable Development ; National Land Use policy, and Action Strategy on Biodiversity, National Wildlife Action Plan and Environmental Action plan.

India as a Mega-Diversity Nation: India possesses a rich diversity of plants, animals and microbes. This is also true for the diversity of ecosystems, species and the genetic pool within the species. Rated as one amongst the world's twelve, mega diversity, countries, India has Eastern Himalays and Western Ghats as the important hot spots of biodiversity.

India stands in between the developed and developing countries. Its biosphere, agriculture, animal husbandry, fisheries, forestry and pharmaceutical industry all are well placed. In addition, its cultural diversity which is well exemplified in its different religions, languages, traditions festivals etc, also helps in maintaining biodiversity.

Conservation and sustainable use of biological resources based on local knowledge systems and practices in ingrained in Indian ethos. Application and practices for use of biodiversity in the country have developed over the years in traditional scientific process. The country has a strong system of alternative medicine, namely, Ayurveda, Unani, Siddha and Homcopathic systems, which are predominantly based on plants raw materials in most of their preparations and formulations. Herbal preparations for various purposes, including pharmaceutical and cosmetic purposes, form part of the traditional biodiversity uses in India.

India's biodiversity is due to its changing and/or different environmental conditions. i.e. factors such as latitude, altitude, geology, climate, longitude etc. It has 629 million ha geographical area. which includes

7000 km area of coasts. It has all types of climate from hottest (Deserts) to coldest (Himalays). Rainfall varies from 100mm in Thar desert to 5000 mm in Cherapunji. Although India covers only 2% of the world's total area. But it habitats 5% species of world's animals and plants. Biodiversity is an important strength of India. Out of world's one lac species of insects, 60 thousands are found in India. Similar is the case with plants and trees (~60% species are found in India). Out of 4100 species of fishes in the world. 1693 are found in India. In addition 1200 species of birds (out of 9000 in the world) and 10% of mammals (out of 4000 in the world) are founded in India. In India 45000 species of plants and 68371 species of animals have been identified while the total sum of the species (of bacteria, fungi, and plants) identified comes to 1,08,276 (table 4.1). If we look at the number of species in table 4.1 we come to the conclusion that only insects make 50% biodiversity of India. These species are located in land, fresh water and marine habitats as symbionts or parasites.

Threats to Biodiversity

Extinction, the elimination of a species, is a normal process of the natural world. Species die out and are replaced by others. Often their own descendants. As part of evolutionary change. In undisturbed ecosystems the rate of extinction appears to be about one species lost every decade. In this country however human impacts on populations and ecosystems have accelerated that rate, possibly causing thousands of species, subspecies and varieties to become extinct every year. Ecologist E. O. Wilson estimates that we are losing 10,000 organisms a year-that makes more than 27 per day. If present trends continue, we may destroy millions of kinds of plants animals, and microbes in the next few decades. Studies of the fossil record suggest that more than 99 percent of all species that ever existed are now extinct. Most of those species were gone long before humans came on the scene. Periodically, mass extinctions have wiped out vast numbers of species and even whole families. The best studied of these events occurred at the end of the Cretaceous Period when dinosaurs disappeared, along with at least 50 percent of existing species. An even greater disaster occurred at the end of the Permian Period about 250 million years ago when ninety percent of species and half of all families and out over a period of about 10,000 year-a mere moment in geologic time. However, in the present century, human activity is the major threat to biodiversity and following are the chief causes of extinction of species caused by man to fulfill its needs.

[I] Habitat destruction : The primary cause of the loss of biodiversity is not direct human exploitation but the habitat destruction that inevitably results from the expansion of human populations and human activities. The greatest destruction of biological communities has occurred during the last 150 years during which the human population went from 1 billion in 1850 to 6.5 billion. In many cases, the factors causing habitat destruction are the large industrial and commercial activities, associated with a global economy, such as mining, cattle ranching, commercial fishing, forestry, plantation, agriculture, manufacturing, and dam construction, initiated with the goal of making profit. Huge amount of habitat are lost each year as the world's forests are cut down. Rain forests, tropical dry forests, wetlands, mangroves and grasslands are threatened habitats and leading to desertification.

[II] Habitat Fragmentation : Habitat that formerly occupied wide areas are now often divided up into pieces by roads, towns, canals, powerlines etc. Habitat fragmentation is the process where a large, continuous area of habitat is both, reduced in area and divided into two or more fragments. When habitat is destroyed there is often a patchwork of habitat fragments left behind. Habitat fragmentation limits the potential of species for dispersal and colonisation.

[III] Habitat degradation and pollution : Some activities may not affect the dominant species in the community, but other species are greatly affected by such habitat degradation. For example, physical

degradation of forest habitat by uncontrolled ground fires, might not kill the trees, but the rich perennial wild plant community and insect fauna on the forest floor would be greatly affected. Boating and diving in coral reef areas degrade the fragile species. The most subtle form of habitat degradation is environmental pollution, the most common causes of which are pesticides, industrial chemicals and wastes, emissions from factories and automobiles, and sediment deposits from eroded hill sides. Effects of pesticide pollution, water pollution and air pollution on environment are well known. Problem of acid rains and global climate change are also well known and of global concern.

[IV] Hunting and Fishing : Over harvesting is responsible for depletion or extinction of many species e.g. the American passenger pigeon. Once upon a time this was the world's most abundant bird with a population of 2-5 billion. In spite of this vast abundance, market hunting and habitat destruction caused the entire population to crash in only about 20 years (1870-1890). Similar threat is seen for whales, American bison etc. Fish stocks have been seriously depleted by over harvesting in many parts of the world. 13 of 17 principal fishing zones are now reported to be commercially exhausted or in steep decline.

Introduction of Exotic Species : The great majority of the exotic species do not become established in the introduced new places. However some of the species are able to establish in new area. Such successful exotic species may kill or eat native species to the point of extinction or may so alter the habitat that many natives are no longer able to persist. The effect of exotic species is maximum on islands. Disease causing microorganisms, if introduced to new virgin areas may cause epidemics and native species are eliminated completely. Among these species Eucalyptus, Cryptomeria, Acacia, Morlingiformis are important.

[VI] Disease: Human activities may increase the incidence of disease in wild species. The extent of the disease increases when animals are confined to a nature reserve rather than being able to disperse over a large area. Also animals are more prone to infection when they are under stress. Animals held in captivity are also more prone to higher level of disease.

[VII] Shifting or Jhoom Cultivation: Some rural people destroy biological communities and hunt endangered species because they are poor and have no land of their own. The local farmers often have no choice except to move to remote undeveloped areas and attempt for their livelihood through shifting cultivation. This commonly practiced agricultural system. Known also as **Swidden agriculture, slash-and-burn agriculture, and Jhoom cultivation** greatly affects forest structure and species composition by creating a mosaic of forest patches of different ages. In shifting cultivation, plots of natural tree vegetation are burnt away and the cleared patches are formed for two or three seasons after which their fertility goes down to a point where adequate crop production is no longer possible.

Unit III

Population Growth: Variation Among Nations

Ecologically, a population can be defined as a group of organisms of the same species occupying a particular space.

Populations are not static but they are instead dynamic entities which are always in a state of flux. A population has its own characteristic, such as population density, birth rate biotic potential, age distribution and population pressure, size growth and cycles etc. The issue of population explosion in the developing countries attracted wide, attention especially over last 50 years. Issues related to resources, environment; population and development have become a matter of concern for the whole world.

Every second, on an average, four or five children are born somewhere on the earth. In that same second, two other people die. This difference between births and death means a net increase of nearly 2.5 more humans per second in the world population. This means we are growing at a little less than 9,000 per hour, 214,000 per day or almost 78 million more people per year. In 1999 the world population passes six billion making us the most numerous vertebrate species on the planet

For most of our history, human have not been very numerous compared to other species. Studies of hunting and gathering societies suggest that the total world population was probably only a few million - people before the invention of agriculture and the domestication of animals around 10,000 year ago. The agricultural revolution produced a larger and more secure food supply and allowed the human population to grow, reaching perhaps fifty million people by 5000 B.C. For thousands of years, the number of humans increased very slowly. Archaeological evidence and historical descriptions suggest that only about three hundred million people at the time of Christ

Agricultural and industrial revolution innovations, development and progress were the reason for fivefold increase of population from 1650 to 1950. Population in 1987 had reached the mark of 5 billion, two-fold increase within a period of 40 years.

The present rate of increase in world population is estimated at 1.3 percent per year. The present growth rate cannot possibly last much longer without exhausting simple living space as well as the resources of the earth. A decisive factor in the people-resource ratio is the coupling of increased longevity to the marked rise in the per capita consumption of food materials and energy. A few nations only have faced the problems of restricting their rates of growth to bring about better balance between population number and resources. Very great differences in rates of population growth continue to occur among different regions of the earth. The other demographic world is made up of the richer countries of North America, Western Europe, Japan, Australia and New Zealand. This world is wealthy. Old and shrinking Italy, Germany.

Some countries in the developing world have experienced amazing growth rates and are expected to reach extraordinary population sizes by the middle of the twenty-first century. While China was the most populous country throughout the twentieth century; India is expected to pass China in the twenty-first century because India's population control programs have been less successful than China's. Nigeria which had only 33 million residents in 1950 is to have more than 300 million in 2050. Ethiopia, with about 18 million people 50 years ago, is likely to grow at least tenfold over a century. In many of these countries rapid population growth is a serious problem. Bangladesh about the size of Iowa, is already overcrowded at 128 million people. Another 83 million people by 2050 will only add to current problems.

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Population Explosion: Family Welfare Programmes

Human populations have grown at an unprecedented rate over the past three centuries. By 1999, the world population passed six billion people. If the current growth rate of 1.3 percent per year persists, the population will double in 54 years. Almost all of that growth will occur in the less-developed countries of Asia, Africa and Latin America, A serious concern is that the number of humans in the world and impact on the environment will overload the earth's life-support system

Reasons for High Birth-rate in India

Social, economic, religious all types of reasons are responsible for the high rate of birth in the country. The more important reasons may be enumerated as follows:

1. Lack of proper education
2. Traditional society
3. Joint-family system
4. Importance of Male-child
5. Rural Society
6. Religious mis-beliefs
7. Love marriage-age

In addition to the very high birth-rate in the country, the cause of explosion in the population may also be traced in lower death-rate. During past 80 years death-rate in India was 42.6/1000 person, 91% was reduced to 10.8/100 during the year 1980-81 At present the death-rate is nearly 9 per thousand person. This reduction in death-rate may be due to increase in income of person, improvement in the standard of living and health-management programme in the country.

Environment and Human Health

Nature teaches us that the world of living things. Plants and animals remain embedded in their environment as a very well knit system functioning under the dictates of the laws of nature. This integrated system is called as "Ecosystem"

In the present context the environment has to be visualized as a life-support system. Manson and Lagenheim (1957) discussing the interrelationships between the environment and organism from the ecological stand point advocated that environment has to be organism directed. Organism spaced, organism timed and organism ordered.

The environment which we are presently concerned is the "human environment".

Man is losing the benevolence and blessings of nature, which he has so far enjoyed for his very existence. The dawn of "industrial civilization" is characterized by exploitative relationship of man with nature, resulting into 3P's syndrome i.e. population, poverty and pollution. The three are interrelated. Man's basic resources-soil, water, energy, space and air interacting with the natural biota such as plants, animals, microbes, etc. generate an environment which acts as the life-supporting system of 'Man'. In addition to these natural resources man made resources are also generated by means of service based on exploitative technology inflicting deep wounds on natural environment "Pollutant" is a resource lodged at a wrong place, at wrong time and wrong concentration.

Every human beings born on this earth is now subjected to the contract of dangerous chemicals from the moment of conception to death. Explosion of scientific knowledge and its use with a view to bring comforts to human life has threatened his very survival. Introduction of new "synthetic products" incompatible to the human ecosystem is a great environmental of risk for man today. The- World Commission on Environment and Development (1987) reported that human race has today arrived at a cross-road where it has to bring a 'conceptual change from -one earth to one world". The report points out that within a span of 900 days which clasped between the first meeting and the publication of the report the world witnessed several major environmental disasters. These are:

1. The drought-triggered, environmental crises in Africa peaked, putting 35 million people at risk, killing perhaps a million.
2. A leak from a pesticide factory in Bhopal. India killed more than 2000 people and blinded and injured over 2,00,000 more
3. Liquid gas tanks exploded in Mexico city, killing 1000 and leaving thousands more homeless.
4. The Chernobyl nuclear reactor explosion sent radioactive nuclear debris fall out across Europe and Scandivian countries increasing the risk of cancers to future human generations in wide areas.
5. Agricultural chemicals solvents and mercury flowed into the Rhine River during a warehouse fire in Switzerland, killing Millions of fish and other aquatic life and Poisoning drinking water in the Federal Republic of Germany and the Netherlands.

Thus forgetting the fact that Our environment not only is providing us habitat, but also nursing us; we in greed have degraded our environment to a great extent by over exploiting natural resources; resulting in great health problems in terms of air, water, land, noise, thermal and radioactive pollutions. Whether we talk of global warming, ozone hole, acid-rain, smog or 'Alnino effect; all these in combination with soil erosion, drought, desertification and water-scarcity or flood have affected human health; giving different types of diseases and hazards.

UNIT-IV MULTIDISCIPLINARY NATURE OF E.V.S

Natural Resource

Natural resources occur naturally within environments that exist relatively undisturbed by mankind, in a natural form. A natural resource is often characterized by amounts of biodiversity existent in various ecosystems. Natural resources are derived from the environment. Many of them are essential for our survival while others are used for satisfying our wants. Natural resources may be further classified in different ways.

Classification

On the basis of origin, resources may be divided into:

- Biotic resources are obtained from the biosphere, such as forests their products, animals, birds and their products, fish and other marine organisms. Mineral fuels such as coal and petroleum are also included in this category because they are formed from decayed organic matter.
- Abiotic - Abiotic resources include non-living things. Examples include land, water, air and ores such as gold, iron, copper, silver etc.

Considering their stage of development, natural resources may be referred to in the following ways:

- Potential Resources - Potential resources are those that exist in a region and may be used in the future. For example, petroleum may exist in many parts of India, having sedimentary rocks but until the time it is actually drilled out and put into use it remains a potential resource.
- Actual Resources are those that have been surveyed, their quantity and quality determined and are being used in present times. The development of an actual resource, such as wood processing depends upon the technology available and the cost involved. That part of the actual resource that can be developed profitable with available technology is called a reserve.

On the basis of status of development, they can be classified into potential resources, developed resources, stock and reserves.

With respect to renewability, natural resources can be categorized as follows:

- Renewable resources are ones that can be replenished or reproduced easily. Some of them, like sunlight, air, wind, etc., are continuously available and their quantity is not affected by human consumption. Many renewable resources can be depleted by human use, but may also be replenished, thus maintaining a flow. Some of these, like agricultural crops, take a short time for renewal; others, like water, take a comparatively longer time, while still others, like forests; take even longer.
- Non-renewable resources are formed over very long geological periods. Minerals and fossil fuels are included in this category. Since their rate of formation is extremely slow, they cannot be replenished once they get depleted. Of these, the metallic minerals can be re-used by recycling them. But coal and petroleum cannot be recycled.

On the basis of availability, natural resources can be categorized as follows:

- ***Inexhaustible natural resources*** – Those resources which are present in unlimited quantity in nature and are not likely to be exhausted easily by human activity are inexhaustible natural resources (sunlight, air etc.)
- ***Exhaustible natural resources*** – the amount of these resources are limited. They can be exhausted by human activity in the long run (coal, petroleum, natural gas, etc.)

Some examples of natural resources include the following:

- Air, wind and atmosphere.
- Animals
- Coal, fossil fuels, rock and mineral resources.
- Forestry
- Range and pasture
- Soils
- Water, oceans, lakes, groundwater and rivers
- Solar power

Social problems & the environment: Environment problems arise both directly and indirectly from people's social institutions, social behavior, and cultural values. Conditions of population growth affluence and poverty, technological and industrial development, domestic and international economic activities, and patterns of consumption all affect the use-and abuse-of land, energy resources, and natural resources such as plants and animals, as well as the quality of soil, water, and air. Top problems of environment quality today include deforestation, global warming, biodiversity loss, and hazardous waste. The solutions to these and environmental problems involve social change.

Ecosystem:

An ecosystem is a biological environment consisting of all the organisms living in a particular area, as well as all the nonliving, physical components of the environment of the environment with which the organisms interact such as air soil, water and sunlight. It is all the organisms in a given area, along with the nonliving (abiotic) factors with which they interact; a biological community and its physical environment.

The entire array of organisms inhabiting a particular ecosystem is called a community. In a typical ecosystem plants and other photosynthetic organisms are the products that provide the food. Ecosystems can be permanent or temporary. Ecosystems usually form a number of food webs.

Ecosystems are functional units consisting of living things in a given area, non-living chemical and physical factors of their environment, linked together through nutrient cycle and energy flow.

- 1) Natural –
 - a. Terrestrial ecosystem
 - b. Aquatic ecosystem
 - i. Lentic, the ecosystem of a lake, pond or swamp.
 - ii. Lotic, the ecosystem of a river, stream or spring.
- 2) Artificial, ecosystem created by humans.

Central to the ecosystem concept is the idea that living organisms interact with every other element in their local environment. Eugene Odum, a founder of ecology, stated: "Any unit that includes all of the organism (i.e.: the "community") in a given area interacting with the physical environment so that a flow of energy leads to clearly defined trophic structure, biotic diversity, and material cycles (i.e.: exchange of materials between living and nonliving parts) within the system is an ecosystem."

Examples of Ecosystem:

- Agro-ecosystem, Agro ecosystem, Aquatic ecosystem, Chaparral, Coral reef, Desert, Forest
- Greater Yellowstone Ecosystem, Human ecosystem, Large marine ecosystem, Lotic

- Littoral Zone, Marine ecosystem, Pond ecosystem Prairie, rainforest, riparian zone
- Savanna, Steppe, Subsurface Litho autotrophic Microbial Ecosystem, Taiga
- Tundra, Urban ecosystem.

Natural Resources-

The term natural resource is a dynamic one as its meaning changes with the advancement of technology. Anything which is useful to mankind is a resources.

Important of natural resources-

- 1) Decrease flood situation by checking rain water.
- 2) Plants help to reduce temperature in summer.
- 3) Forests provide shelter to animals
- 4) Forests beatify the landscape.
- 5) A pollution free atmosphere is healthy for living.

Need for Natural Resources –

Water as a natural resource should be protected for the sake of both animals and main. Construction of dams controls floods and provides better irrigation facilities and helps in generating electricity.

Threat to Natural Resources –

- 1) Pollution
- 2) Diseases
- 3) Oil Spill, detergents, domestic waste, radioactive wastes pollute water.

Water conservation –

- 1) Keep water taps closed, when not in use
- 2) Water should be carefully used for domestic work and industrial purpose soil conservation.

Soil conservation –

- 1) By crop rotation.
- 2) Restore the fertility of the soil when plants and weeds are removed.
- 3) Maintaining a balance between air, water, land, flora and fauna.

Environment Management –

The goal is to achieve a sustainable development, environment and society.

The different natural resource are –

- | | | |
|---------------|------------------|-----------------|
| 1) Air, water | 4) Wild life | 7) Water bodies |
| 2) Flora | 5) Agro forestry | |
| 3) Fauna | 6) Soul | |

Uses of natural resources –

Natural resource	uses
Soil	grow crops
Water	Drinking, irrigation, transportation, fishing
Minerals	Absorbed by plants and passed on to human begins.
Animals	Dung used as fertilizer bides used for making bags etc carry leads and for transportation.

UNIT V

ENVIRONMENTAL WEALTH:

Important Rivers Madhya Pradesh

NARMADA: The Narmada also called Rewa is a river in central India and the fifth river in the Indian subcontinent. It forms the traditional boundary between North India and South India and flows westwards over a length of 1312 km before draining through the Gulf of Cambay into Arabian Sea. It is one of only three major rivers in peninsular India that runs from east to west along with Tapi and Mahi River. It flows through the states of Madhya Pradesh, Maharashtra border between Madhya Pradesh and border between Madhya Pradesh and Gujarat and in Gujarat.

SIGNIFICANCE: there are many fables about the origin of Narmada. According to one of them, once Lord Shiva; the destroyer of the universe, meditated so hard that he started perspiring. Shiva's sweat accumulated in a tank and started flowing in the form of a river. Important religious places and Ghats along with the course of the river, starting with its origin at Narmadakhund at Amarkantak hill for eg. The Amarkantak, Omkareshwar, Maheshwar and Mahadeo temples Nemawar Siddheshwar Mandir in the middle reach of the river-all named after Shiva, Chausath Yogini temple, Choubis Avtar temple, Bhojpur Shiva temple and Bhrgu Rishi temple in Bhruch. The Narmada Rivr is also worshiped as mother goddess by Narmadeeya Brahmins.

IMPORTANCE: te importance of the Narmada River as sacred is testified by the fact that the pilgrims perform a holy pilgrimage of a parikrama or circumambulation of the river. The Narmada parikrama, as it is called, is considered to be a meritorious act that a pilgrim can undertake. Important towns of interest in the valley are Jablpur, Barwani, Hshangabad, Harda, Narmada Nagar, Omkarshwar, Dewas, Mandala and Maheshwar in Madhya Pradesh, and Rajpipla and Bahruch in Gujarat. Some places of historical interest are Joga Ka Quilla, Chhatri of Baji Rao Peshwa and Bhimbetka and among the falls are- Dugdhdhara, Dhadi falls, Bheraghat, Dhuandhara, Kapildhara and Sahastradhara.

CHAMBAL: The Chambal River is a tributary of the Yamuna River in central India and forms part of the greater Gangaic drainage system. The River flows north-northeast through Madhya Pradesh, running for a long time through Rajasthan, then forming the boundary between Rajasthan and Madhya Pradesh before turning southeast to join the Yamuna in Uttar Pradesh state.

It is Legendry River and finds mention in ancient scriptures. The perennial Chambal originates at Manpura, south of Mhow town near Indore, on the south slope of the Vindhya Range in Madhya Pradesh. The Chambal and its tributaries drain the Malwa region of Northwestern Madhya Pradesh, while its tributary, the Banas, which rises in the Arawali Range, drains southeastern Rajasthan. It ends a confluence of five rivers, including the Chambal, Kaweri, Yamuna, Sind, Pahuj, at Pachnada near Bhareh in Uttar Pradesh state at the border of Bhind and Etawah district.

THE TAPTI RIVER: The Tapti River is a river in central India. It is one of the major rivers of peninsular India with a length of around 724 km. it is one of only three rivers in peninsular India that run from east to west-the others being the Narmada River and the Mahi River.

The River rises in the eastern Satpura Range of southern Madhya Pradesh state, and flows westward, drainage Madhya Pradesh's Nimar region, Maharashtra's Kandeh and east Vidarbha region in the northwest corner of the Deccan plateau and south Gujarat, before emptying into the Gulf of Cambay of the Arabian sea, in the Surat district of Gujarat.

THE SHIPRA RIVER: Shipra also known as the Kshipra, is a river in Madhya Pradesh state of central India. The rivers rise in kakri bardi hills vindhya range north of dhar, flows south across the malwa plateau to join the Chambal river. it is one of sacred river in Hinduism. The holy city is situated on its right bank. every 12 years, the kumbha mela festival takes place on the city's elaborating riverside ghats. Shipra is perennial river. The bank of river shipra river is one of the four places where the kumbha mela is held.

SONE – It also originates from Amarkantak. Anciently it was known as Shona. It journeys towards east.

BETWA – Originates from Kumra Village in Raisen and joins rivers Yamuna in Hamirpur. Anciently it was known as Vetravali.

HILLS OF INDIA -

THE HIMALAYA RANGE: the Himalaya range or the Himalaya mountains or the sanskriti devnagiri usually called as the Himalayas or himalaya for short, is a mountain range in asia, spreading the Indian subcontinent from the Tibetan plateau. The main himalay range runs west to east, from the idus river valley to brahmaputra river valley, forming an arc of 2400 km. long, which varies in width from 400 km in the western Kashmir xingiang region to 150 km in eastern Tibetan- arunachal Pradesh region. The range consist of three coextensive subranges, with the northern most and the highest, known as the greater or inner Himalayas.

GREAT HIMALAYA: the highest ranges rise abruptly as much as 4000 m (13000ft.) into the realm of perpetual snow and ice. As the Himalayan system becomes wider from east to west, the number of parallel high ranges increases.

Mountain grassland and shrubland grow above treeland. The north western himalaya, alpine shrub and meadow are found in the high elevations of northern Pakistan, J&K, and himachal Pradesh. To east, the western himalaya alpine shrubs and meadows covers extensive areas along the Tibetan border with uttarakhand and western Nepal. The eastern Himalaya alpine shrubs and meadows grow above the alpen and northern sub alpine conifer forest, along the Tibetan border with eastern Nepal, Sikkim Bhutan and arunachal Pradesh.

LESSER HIMALAY: also called is Mahabharata range at this elevation and above the bio geography of the Himalaya is generally divided by the Kali Gandagi Gorge in central Nepal, one of the deepest canyons in the world. Industrialization is the process of social and economic change that transform a human group from an agrarian society into an industrial one. It is a part of modernization process, where social change and economic developments are closely related with technological innovation, particularly with the development large scale energy and metallurgy production. It is the extensive organization of an economy for the purpose of manufacturing. Industrialization also introduces a form of philosophical change where people obtain a different attitude towards the perception of nature, and sociological process of ubiquitous rationalization.

FOREST: forest is composed of overstory (or upper tree canopy) and the under story. The under story is further subdivided into the shrub layer, herb layer and sometimes also moss layer. In complex forest, there is also a well-defined lower tree layer. Forests are central to all human life because they provide a diverse range of resources they store carbon, aid in regulating our climate, purify water and mitigate natural hazards such as floods. Forests also contain roughly 90% of the world terrestrial biodiversity.

FIELDS:

Agriculture Fields: Agricultural area is those broad areas where the types of crops and methods for cropping are similar. There are also similarities in lands and its specific properties the following factors are necessary agriculture areas:

Methods of cropping use of agriculture product association between crops and cattle labour in agriculture instruments use for agriculture and living condition of the people.

Approaches made in agriculture areas:

1. Primitive approach
2. Farming method approach
3. Multi reason analysis approach
4. Priority combinational approach
5. Technical approach

Industrial fields

Industrialization is the process of social and economic change that transform human group from a pre industrial society into an industrial one. It is a part of modernization process where social change and economic development are closely related with technology innovation, particularly with the development of large scale energy and metallurgy production. Industrial fields are those fields on which any type of industry can be established especially basic industries. Usually these are located near to any urban area so availability of resources is very high.

Characteristics of industrialization:

- ❖ Development of engineering technology
- ❖ Development of iron industry
- ❖ Development of coal industry
- ❖ Use of steam engines in textile industry
- ❖ Development of chemical industry
- ❖ Development of transportation vehicles

Common plants in India

India is a land of great variety of plants or vegetation the plants of India changes from one region to another depending the variation in the climate and the soil.

On the basis of certain common feature such as pre dominant vegetation type and climate region Indian forest can be divided into the following groups:

1 tropical evergreen and semi evergreen forest: found in north east and andaman region
Tropical deciduous forest or monsoon forest: most widespread in india.
Tropical thorn forest: found in semi arid areas of south west Punjab, Haryana, Rajasthan, Gujarat, Madhya Pradesh etc.

Montane forest: found in mountain area.

Littoral and swamp forest: found in west Bengal.

BIRDS OF INDIA (FAUNA OF INDIA)

Indian Fauna is consist of around 90,000 animal species of which 1200 species are of birds only. Peacock, which is found abundantly in India, is the National birds. Peasants, ducks, parakeets, cranes, pigeons are

some of every common bird species in India. Crow, ipcrow etc. are some bird species which are on the verge of extinction. Vultures and eagles are also the bird species which is in the category of rare bird species.

Migratory birds -

During winters, birds like Siberia, Cranes are seen in northern area including Rajasthan. The Kevea Deo Ghana National century of Bharatpur is very famous for such birds the Rann of Kachchh is also famous for migratory birds. Here thousands of flamingoes come to make their nest from the salty mud and lay their eggs.

Insects in India -

The word insect comes from a Latin word which means "cut into sections". More than a million species of insects are known at world level. Bees and mosquitoes are most common insects found in India and cause many diseases including malaria, dengue, chikungunya, cholera, sleeping sickness etc. Butterflies, cockroach, lice ticks, termites, ants etc. are other commonly known insects of India.

Some insects like wasps, bees, ants; termites show special type of social behavior. They live in large, well organized colonies. They have division of labour in their colonies some insects are harmful for human being as they cause diseases and are the major cause of deaths in India.

Not only the human being, they also infect other animals and cause fatal impacts. On the other hand, some insects are useful too. Some insects are helpful for pollination and thus help to maintain biodiversity.

Importance of Ponds -

The ponds conserve water & rain and waterfalls. They are very helpful for irrigation and water supply ponds are the main source of water in India since ancient time. Formation of ponds is considered as a religious and social work since the years. Moreover they add natural beauty and serve as a basic reservoir of water these days the ponds are in danger, due to urbanization, population growth, deforestation, encroachment and unbalanced monsoon timing.

Importance & benefits of rivers -

Rivers are the life times of the agriculture based countries like India. They are considered as mother in India and are venerated and worshiped. The civilizations begin and developed on the bank of rivers. They are the most primitive and cheapest means of transport right from the beginning. In this way they helped much in growth & development of trade and commerce. Most of the industrial and commercially developed cities are located on the bank of rivers only. Dams and canals are also built up out of the rivers which help in farming. They also enhance natural beauty and are developed as picnic spots.

Most of the pilgrimage places are also located on the banks of holy rivers like Ganges, Yamana Narmada, Brahmaputra, Sindhu, Godavari, Krishna etc.

The rivers are the biggest source of drinking water and domestic water.

Moreover they also provide hydro-electricity. They are also necessary for fisheries industry.