GOVERNMENT POLYTECHNIC, SONEPUR

Lecture Note On-

Environmental Studies

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THE MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES

(*) Introduction of Environmental Studies.

→ The word environment is describe from the french word "ENVIRON" which means Surrounding.

⇒ Every Organism is surrounded by materials and forces which consistute it environment.

⇒ Environment create favourable conditions for the existence and development of living organism.

(*) Defination of Environment

→ It is the sum of water, air, and Land, and the ~~entire~~ all relationship that exist among organism and material.

(*) Scope of Environmental Studies.

→ To get awareness and sensitivity of the total environment and its related problem.

→ To motivate the activity participation and improvement.

→ To deep skills for identifying and solving environmental problems.

→ To ~~the~~ know the necessity of conservation of natural resources.

→ To evaluate environmental programmes interms of Social, economic, ecological and esthetic factors.

(*) Importance of Environmental Studies.

→ Conservation of energy by introduction alternate sources, improve technologies process. Compatible with environment

→ Increases in economic productivity through improved health people.

→ Conservation of fast depletion of natural resources.

→ New ways and means to maintain ecological balance.

→ Knowledge about waste management treatment and disposal techniques.

→ Social responsibility towards control of environmental Pollution and protection.

(*) Need for Public Awarness.

→ Important to understand that natural environment and man-made environment are interdependent.

→ Essential to make the public aware of the formidable consequences of environmental degradation.

→ Reformative measure of not understand world result in the extinction of life

→ Environmental protection is every individual's obligation and ~~bindy~~ duty.

→ Environmental Consiquencess needs to be propogated of all leveles.

→ Govt alone cannot perform all the clean up function.

CHAPTER-2

NATURAL RESOURCES

→ Natural resources occure naturally within environments.

→ Natural resources often characterized by amount of biodiversity and geodiversity existent in various ecosystem.

→ Any material which is part of earth and satisfy human need and value is called as resources.

Example- Rocks, minerals, soil, plants, rivers. animal. etc.

→ Human is a resources because developing his skill, he can develop other resources by adding value to the physical material.

(*) Renewable Resource

A resource that can be used repeatedly and does not run out because it is naturally replaced such as solar, wind, geothermal, and biomass energy

(*) Non-renewable Resource

A natural resource that is not replesible with the place at which it is consumed. It is a finite resource like ~~forest~~ fossil fuel, Natural gas, Coal, Petroleum .etc.

(*) Natural Resources and their associated Problems.

→ Unequal consumption of natural resources.

→ Producing animal food, human consumption of required more land.

→ Our use of natural resources of efects the environment in many ways.

→ The lake of water is a big problem in cities, town, villages.

→ There are variety of resources that can be explored and thus contribute to the Socio-~~ec~~economical development.

Role of Individual in conservation of natural resources

→ The measure to conserve forests save tree and planting new trees includes - Not felling the tree forests farms, roads, or houses if they are green.

→ Not uprooting the existing tree while constructing a house but Planting fast growing Plant species in open area of the house.

→ Planting herbs, shrubs or suitable tree in and around the house.

→ Maintain lawn and garden in open place in your house if possible.

→ Participating in community Plantation Programmes.

FOREST RESOURCE

The earth's land area where the vegetations are grown naturally in groups is known as Forest. vegetation means trees, shurbs, creepers, or any woody vetefations having a closed canopy.

(*) Use of forest Resources.

→ They offer hunting grounds.

→ they provide shelter to wild animals and birds.

→ They improve the sanitary condition of a place

→ They are a source of revenue to the government

→ They facilitate human existence by providing oxygen (O_2) to humans beings and ~~so~~ absorbe Carbon dioxide (CO_2) ~~by~~.

→ They provide employment large number of people in different capacities as wood collectors etc.

→ They also provide us herbal medicians.

→ They are the store house of different types of natural resources such as, coal, boxite, iron, silver etc.

(*) Forest resources and Associated Problems.

⇒ Use and over-exploitation.

⇒ Deforestation.

⇒ Timber extraction

⇒ Mining and its effects on forest.

⇒ Dams and their effects on forest and tribal people.

⇒ Filling up of waterland.

(*) TIMBER

The wood which is suitable or fit for engineering construction or engineering purpose is called Timber.

Use of Timber

⇒ Timber is used as raw material for various wood based industries like paper, furniture etc.

⇒ Timber is also used for various developmental activities like railways, boats, road construction etc

Consiquences (or) effect of Timber extraction.

(1) Large scale timber extraction causes deforestation.

(2) Timber extraction leads to soil erosion, loss of fertility landslide and loss of biodiversity.

(3) Timber extraction also leads to loss of tribal culture and extinction of tribal people.

(4) Timber extraction reduces thickness of forest area.

(5) ~~Timber extraction~~, mining

(6) If timber is overharvested the ecological functions of the forest are lost.

(7)

Function of forests

→ Forest perform very important function to both human and nature

→ They are habitates to many plants, animals and wild life.

→ They recycle rainwater and remove pollutant form air.

→ They control water quality and quantity.

→ They moderate temperature and weather and also help to maintain humidity.

→ They influence soil conditions and prevent soil erosion and perform water shed function.

→ They promote and contribute aesthetic beauty.

(*) DEFORESTATION

→ Deforestation means cleaning the cleaning of forest land.

→ ~~forest degraded~~

→ Deforestation means destruction of forest.

Causes of Deforestation.

→ Mining, industrial development and hydroelectric power plant projects or are causes of deforestation.

→ Dams open the previously inaccessible forest and damage ecosystem.

→ Most of the cleaning of forest done for Agricultural purpose.

→ Poor farmers cut down trees ~~forests~~ or burns it and start agriculture.

→ Deforestation also occures due to Overgrazing and Conservation of forest to pasture for domestic animals.

→ Expansion of agribusiness that grow oil palm, rubber fruit trees has also result in deforestation.

→ Land for mining and industrial project causes deforestation.

→ making or Road, building causes deforestation.

Effects of Deforestation

→ **Soil Erosion** :- The soil gets washed away with rain water on sloppy area in the absence of tree leading to soil erosion.

→ **Expansion of Deserts** :- Due to action of strong wind mass ~~and~~ of land gradually gets covered to sand deserts.

→ **Decrease in Rainfall** :- In the absence of forest, rainfall decreases considerably because forests bring rains and maintains high humidity in atmosphere.

→ **Loss of fertile Land** :- Less rain fall results into the loss of fertile Land owing to less natural vegetation growth.

→ **Effect on climate** :- Deforestation includes regional and global climate change. Climate become warmer due to the lack of humidity in deforestation regions.

→ **Economical Losses** :- Deforestation will causes losses of industrial timber and non-timber products and loss of long term productivity on the site.

→ **Loss of Bio-diversity** :- Deforestation causes the bio-diversity loading to disturbances in ecological blance world wild.

ECOSYSTEM

An ecosystem is a grouping of organism that interact with each other and their environment, in such a way that as to Preserve the grouping

The term Ecosystem was first proposed by A.G Tansley in 1935.

Ecology is the study of distribution and abundance of organisms and the flows of energy and materials between biotic and abiotic components of an ecosystem.

(*) Natural Ecosystem

These operate under natural conditions, with out any major interference by humans.

Natural ecosystem further divided in to -

(I) Terrestrial Ecosystem

(II) Aquatic Ecosystem.

(I) Terrestrial Ecosystem

(a) Forest ecosystem

(b) Grass land ecosystem

(c) Desert ecosystem

(II) Aquatic Ecosystem

(a) Fresh water ecosystem

(b) marine water ecosystem.

(*) Artificial (human made) Ecosystem.

These are maintained artificially by human where by addition of energy and planned manipulation natural balance is distributed regularly.

(*) Components of Ecosystems

(1) Abiotic component-

Abiotic Components consists of non-living chemical and physical components such as water air, ~~natural~~ soil, solar energy,

Physical and Chemical factors that influence living organisms in land ecosystem and aquatic life zones.

Abiotic Components are mainly of two types-

(i) Climatic factors.
(ii) Oranic factors.

(2) Biotic Components

On the basis of their trophic status organism in an ecosystem are broadly divided into

(i) Autotrophs
(ii) Heterotrophs.

Autotrophs are organisms that can produce their own food such as green plant and certain bacteria which obtain their energy from the Sun.

(*) Structure of an Ecosystem

Composition and organization of biological communities and abiotic components constitute the structure of an ecosystem.

(*) Biotic Component

The plant, animals and micro-organism present in an ecosystem forms the biotic component. They are divided based on the way they get their food.

(1) Producer

They generate food by their own. They can also called Auto-trophs. Which produce organic matter in Presence of Sun light through Photosynthesis Process. They are the starting point of a food chain.

(2) Consumer

They get their food by feeding upon either plants or other organism.

They are further divided in to -

(a) ~~Herbivores~~

(a) Primary Consumer.

→ An organism that feeel upon the producer

→ Example - Rabbit, deer, goat etc.

(b) Secondary consumer

→ An organism that feed upon primary Consumer.

→ Example - cats, snake etc

(c) Tertiary consumer

→ An organism that feed upon secondary Consumer is called teriary consumer.

→ Example - wolves, snake etc.

(d) Quaternary consumer

→ An organism that feed on tertiary Consumer is called Quaternary consumer.

→ Lion, tiger, ~~eg~~ eagle.

(3) Micro consumer

They includes parasites, detritus, feeders and decomposers. Parasites become intimately associated with their host and feed on it over an extended prior of time, typically without killing it but usually causing harm to it.

(i) Abiotic Components

The non-living factors or the physical environment prevelling in an ecosystem from the abiotic component. Abiotic component includes -

(a) Physical factors.

Physical factors such as light, temperature, humidity, wind, soil etc.

(b) Inorganic Components.

Inorganic components includes water, minerals, and natural gas. they play an important role in an ecosystem.

(c) Organic components.

Organic components includes carbohydrates, proteins, lipids, and ~~fructus~~ humus.

(d) Climatic Factors.

These includes Rain, temperature, light etc

(e) Edaphic Factors.

These includes soil, PH, topography minerals.

FOOD CHAIN

The feeding relationship between producer and consumer organisms can be written down in a series of steps called a food chain.

Example

Grass → Grasshoppes → frog → snake → Eagle.

The food chain shows how, when food is eaten energy is passed from one living to another. The arrows indicates the direction of flow of energy from one organism to another.

*) Types of food chain

① Grazing food chain:-

- The consumers utilizing plants as their food. Constitute grazing food chain.
- This food chain begains from green plants and the primary consumer, then secondary consumer, then tertiary consumer and at last Quaternary consumer.
- Most of the food chain in nature follows this type of food chain.

Example:-

Grass → grasshoppes → frog → snake → Eagle.

(2) Detritus food chain :-

→ This types of food chain starts from ~~dead organism~~ dead organic matter of decaying animals and plant bodies to the micro-organism and then to ~~detritus~~ detritus feeding organism. ~~and their~~

→ The organism of food chain includes algae, bacteria, fungi, insects, nematodes etc.

Food chain. (Examples)

(1) Tree → deer → Lion.

(2) flowere → flies → frog → Snake → Eagle.

(3) ~~Eto~~ Algae → small fish → Larger fish → Birds.

(4) Grass → Grasshopper → Bird → Snake.

(5) Tree → Goat → Fox

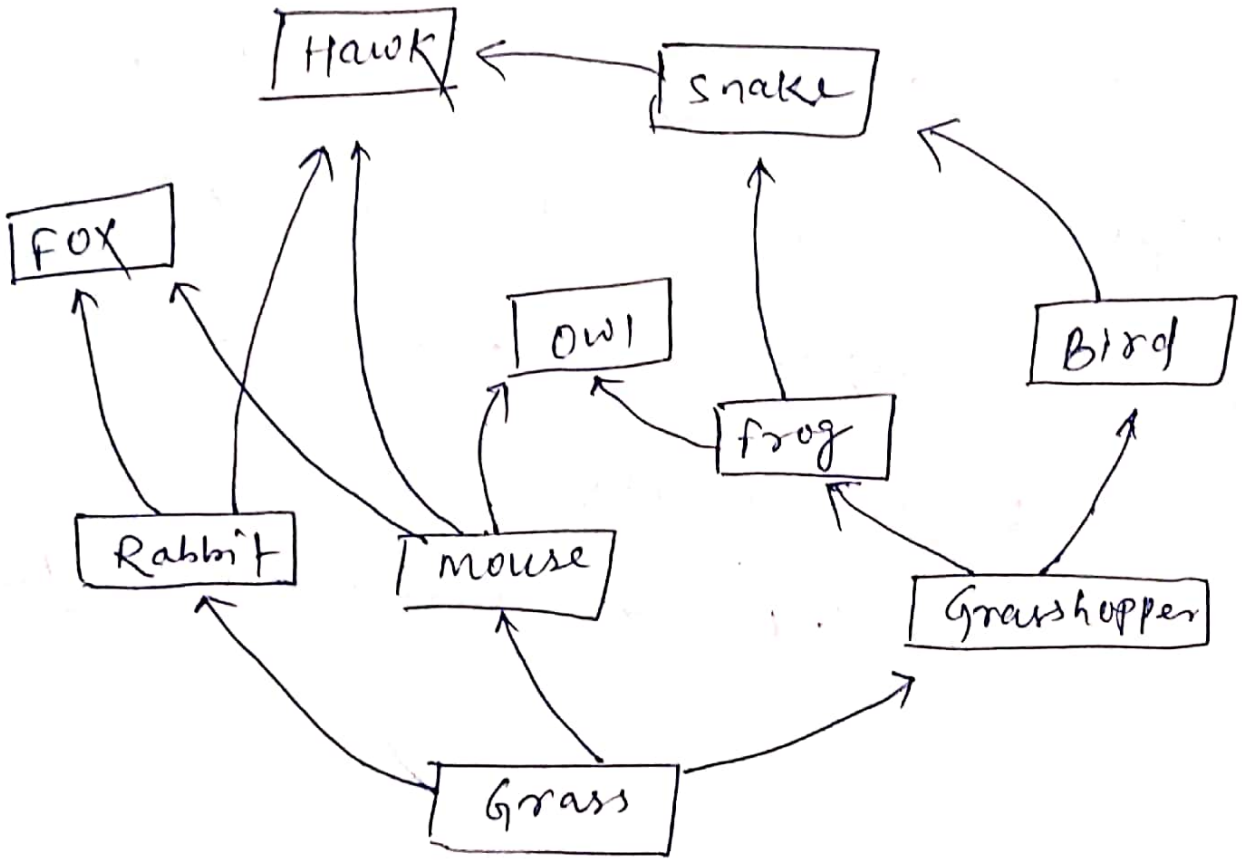
(6) Flower → fruit fly → Thrush → wolf → Eagle

FOOD WEB

Food web can be defined as, "a network of food chain which are interconnected at various tropic level, so as to form a number of feeding connection amongst different organisms of a biotic community."

It is also known as consumer resources system.

Example



BIODIVERSITY

Biodiversity is the total variety of the life on the earth. Scientist can guess how many millions of species that exists on the planet.
Biodiversity is the variability among living organism in all sources. In other word it encompasses the total numerical variety and variability of life form, level and combinations existing within the living world. It is not the sum of all the ecosystem species and genetic material. Rather it includes diversity with in species, between species and ecosystem.

(1) Ecosystem Diversity

An ecosystem diversity comprises a dynamic complex of plant, animal and micro-organism, communities and their non-living environment which interact as a functional unit. Thus ecosystem commonly exists within ecosystem.

(2) Species Diversity

species diversity is defined as a population of organism whose members able to interact freely under natural conditions.

A species represents group of organism which has evolved distrct inheritable features and occupies a unique geographical area.

③ Genetic Diversity

Geanes are the principle units of heriolity which are passed from one organism to its offspring. These are composed of nucleic acid and are located along an organisms

(*) Scope of Biodiversity

(i) Biodiversity is the main resource on which human beings depend. The existence of human is intimately related with the wide variety of plant and animal species found around us.

(ii) Biodiversity provides the vast majority of food supply. many kind of animals and plants are lived and grow in different climate and geographical conditions. These plants and animals supply lots of food products such as fruits, cereals, nuts, mushroom, honey, meat, etc.

(iii) It is estimated that 80.1. of people in the developing world depend directly on traditional medicines derived from plants and animals.

(iv) more than 1500 plants of mountain regions have medicinal plant

(v) Biological diversity exerts direct influences or regional and local weather patterns.

#) Productive value

Biodiversity used for improving crops, animals biotechnological innovations for industries agriculture. ~~for sustain~~

(i) Bio-technology which are uses bio-rich area to protect and search ~~of~~ for potential genetic properties in plants or animals that can be used to develop better varieties.

(ii) For pharmacists biological diversity is the raw material from which new drugs can be identified for plant or animals-products.

(iii) for industries biodiversity is a rich structure to develop new products.

#) Social value

(+) The use of bio-diversity as part of culture and tradition by some communities.

(ii) values associated with social life, custom, religious and spiritual aspects

(iii) Tribal people are closely linked with wild life and forest (sacred groove concept, songs, dance closely woven with wild life)

(iv) Many animals (cow, dog, bulls, crows etc) have sacred place in psyo-spetcitual space and have special social importance.

(#) Ethical and moral value

(i) Protecting all forms of biodiversity and co-existing with them.

(ii) Protecting all forms of life as preached by different religions.

(iii) Ancient Indian philosophy emphasizes on importance of preserving nature through local traditions.

(iv) plants and animals have equal, right to live and exist on this earth.

(v) Conservation of Plants and animals through ~~secured~~ sacred groves by tribal people acts as give bank of wildlife.

(#) Aesthetic value

(i) Appreciating the creation of nature.

(ii) Provides peace of mind and creativity

(iii) wilderness and eco-tourism.

(#) Optional value

(i) Willingness to pay to safeguard as asset for future use.

(ii) Improvement of domestic livestock

(iii) Preservation of biodiversity must also include traditionally used strains already in existance in crops and domestic animals.

In-Situ Conservation

(1) National Park

→ Area strictly reserved for betterment of wildlife
→ And where activities like forest, Grazing are restricted with in limits.
→ Small Area - 100 sq km - 500 sqkm
→ Mantained by National Government
→ 103 National Pak. in India
→ first National Park - Jim Corbett National Park (1936)

(2) Wildlife Sancturies.

→ Protected area which is reserved for Conservation of only animals.
→ Human activities like Harvesting of Timbers, are allowed as long as they do not interfere with well being of animals.
→ Bounderies not well defined.
→ Controlled Biotic Interference permitted. (Tourist activities)
→ 544 Sancturies in India.

THREATS TO BIODIVERSITY

(1) Habitat Loss. (Habitat → Means Natural Home)

(2) Poaching of wild Life

(3) Man Wildlife Conflicts.

Conservation of Biodiversity

→ Conservation involves Protection, Preventation and management of Biodiversity.

→ Conservation means management of man's use of Biosphere in such a way that maximum benefits is attained by the present generation while maintaining its potential to meet the requirement of future generation.

→ Deriving maximum advantage with out degrading it.

Methods of Conservation of Bio-diversity

(1) In-Situ Conservation.

→ In their natural Habitat

→ protection through Network of Protected areas

→ Less expensive and easy to manage.

→ with out Human interference.

→ Protect Interests of Indigeneous people.

(11) Ex-Situ conservation

→ Outside their natural habitat.

→ Endangered animal on verge of Extenction are Sucessfully breeded.

→ Useful Conducting Research

→ Observing wild animals.

Ex-Situ Conservation

(1) Botanical Garden

→ Plants from rear herbs, important medicinal Plants to common flowers, fruits and vegetables grown.

→ Provide Beauty and calm Environment.

→ Exotic plants for educational & Research Purposes.

(2) Zoological Gardens.

→ Commonly known as Zoos.

→ Wild animals are maintained in capativity under supervesion.

→ India's 1st Zoo ⇒ ~~Bata~~ Barrack pune (1800)

(3) Seed Gene Bank

→ Cold Storages.

→ Seeds are kept cooler Controlled low temperature and Humidity for stroge

→ Remains viable for long duration of Time.

(4) Cryopreservation

→ Preservation of Biotic parts.

→ at Ultra low temp (-196°C)

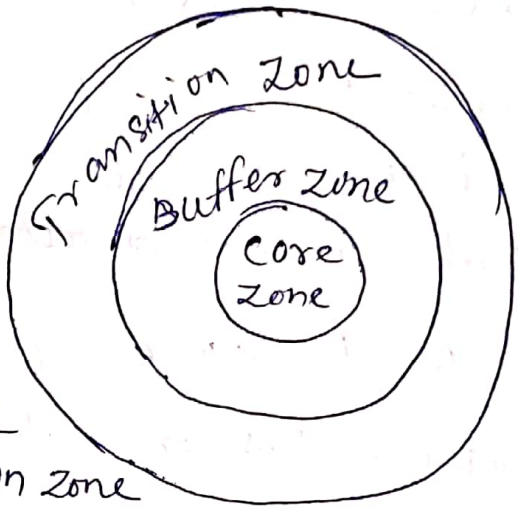
→ In liquid Nitrogen

→ Metabolic activities of organism are Suspended under low temperature.

→ Later used for ~~Res~~ Reserch purposes.

(3) Biosphere Reserves.

- Protected area where human population also forms a part of the system.
- Concept evolved by UNESCO's Man and Biosphere programme. (MABP)
- 18 Biosphere Reserves In India



Zones

Core zone → Inner zone undisturbed legally protected area.

Buffer zone → between Core and Transition zone Research and Educational activities permitted.

Transition zone → Outermost layer Cropping, foresting, Recreation, fishing, permitted.

Functions

- → Conservation
- → Development
- → ~~Scinlife~~
- → Scientific Research (Living Leboratories)

(4) Sacred Groves and Lakes

→ Sacred forest patches around places of worship.

→ Held in high esteem by Tribal Community and Govt.

→ Most undisturbed forest patches.

→ Sacred Groovs → Khasi hills of Meghalaya

→ Tribes have built temples in such patches and do not allow to cut even ~~such patches and do not allow to~~ single branch of tree.

→ There Endamic species flowrish here.

→ water bodies → Lake manser in J & K