Module I

Environment, Eco System &Biodiversity

1.5 Biodiversity at global level

Biodiversity at national level

Biodiversity at local level (in Tamil Nadu)

India as a mega diversity nation

Hot spots of biodiversity

Endangered species of India

Endemic species of India

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1.5 BIODIVERSITY AT GLOBAL LEVEL

There are 20 million species are living in the world. But we found and given scientific names to 1.5 million species only.

Tropical deforestation reduces 0.5% of biodiversity every year.

Terrestrial bio diversity

1)Tropical rain forest

i) It is the store house of biodiversity.

ii) 50-75% global diversity present in these tropical rain forest.

iii)It consists of millions of animals, birds, amphibians, mammals, insects.

iv)25% the medicinal drugs are obtained from tropical forest.

v)1,30,000 plant species are present in tropical rain forest.

(Ex) Silent valley in Kerala is the only one tropical forest in India.

1.Temperate forest

These forest have less biodiversity. It consists of:

1,70,000 flowering plants, 30,000 vertebrates, 2,50,000 other species.

Marine diversity

It has high biodiversity than terrestrial. Estuaries, coastal waters, oceans are biologically diverse.

BIODIVERSITY AT NATIONAL LEVEL

Bio diversity at national level

i)   India is second largest nation containing 5% of world's biodiversity.

ii)   India gets 10th rank among plant rich countries

iii) 11th rank among endemic species of higher vertebrates.

iv)   6th rank among the centers of diversity and origin of agricultural crops.

v)   India is 'mega-diversity' nation, because it is rich in both founa and flora.

vi)   The Indian species has more value in abroad

Medicinal value

(vii) 2000 plant species are cultivated for medicinal purpose for curing the diseases.

(viii) (Ex) Neem, Tulsi, Turmeric

Commercial value

(ix) Indian sandal wood, Tobacco has high commercial value, if it is sold in abroad.

(x) several species of non-edible mushrooms are cultivated and exported to advanced countries.

(xi) More than 100 species of microorganisms were collected from Indian soils are cultured, developed and formulated in the abroad laboratories.

Biodiversity at Local Level (In Tamil Nadu)

Distribution of plants and animals among different districts of Tamilnadu is uneven.

i)   (Ex) there are some dense forest in Selam District.

ii)   Western Ghats has 1500 species of plants, 50 species of mammals and 90 reptiles

iii) The elephant sanctuary at Anaimalai

iv)   Tiger sanctuary at Mundanthurai

v)   Birds sanctuary at Vedanthangal

Measurement of Bio diversity

Based on their spatial distribution, bio diversity level is split into 4 types.

1) Point richness

It refers to the number of species present at a single point in a given space.

2) Alpha richness

It refers to the number of species present in a small homogeneous area.

3) Beta richness

It refers to the rate of change of species composition across different habitats.

4) Gamma richness

It refers to the rate of change across large landscape.

RED Data Book

Red Book is a catalogue, which give

i)   The information about the species in extinction condition.

ii)   Provide awareness to the degree of threat to biodiversity.

iii)   Help in conservation action

iv)   Information about international agreements

According to Red data book, 44 plant species are critically endangered, 54 endangered and 143 are exposed to damage.

India as a Mega diversity nation

1) India is one among the 12-mega diversity countries in the world.

2) Out of 7.31% of global fauna species, 89,450 animal species present in India.

3) Out of 10.8% of global floral species, 47,000 plant species present in India.

4) Endemic species

The species which are present at a particular area are called endemic species.

33% flawering plants

53% fresh H_2O fishes

50% amphibians

35% reptiles

10% mammals are endemic species in India.

5) **Plant diversity**: 5000 flowering plants, 166 crop plant species are origined in India.

6) **Marine diversity**: Several species of mangrove plants, Sea grasses are found in our country.

7) **Agro-bio diversity**: India is the centre of origin of 30000-50000 varieties of rice, mango turmeric, ginger and sugarcane.

HOT SPOTS OF BIODIVERSITY

Hot spots are bio rich areas. The geographical area which is rich in plant and animal species, of which many are endemic and endangered is called hot spot.

Criteria for the designation of hotspots.

- Plant diversity is the basis for the designation of hotspots.
- The area must support at least 1500 endemic plant species.
- The endemic vertebrate species must be high.
- The region must have lost 70% of its original habitats
- The area must be under threat.
- It should have a wealth of useful plants.

Reason for rich bio diversity in the tropics

1) The tropics have more stable climate
2) Warm temp, high humidity providefavourable conditions.
3) There is an opportunity for many species to coexist.
4) Among plants, rate of out-crossing appear to higher in tropics.

1) Western ghats

The western ghats is one of the diversity hotspots in India. The area comprises Maharastra, Karnataka, Tamilnadu and Kerala and Sri Lanka.

It covers a total area of 1,70,000 sq.km.

The Western ghats shows high level of endemics for plants, invertebrates and vertebrates.

12 species of mammals

13 species of birds

89 species of reptiles

88 species of amphibians

108 species of fresh water fishes.

It is a serious threat to the biodiversity of the western ghats due to land cleaning for different purposes. So many species face the danger of extinction. Therefore the Western ghats is said to be a biodiversity hotspot.

1) Eastern Himalayas

The eastern Himalayas are also rich in wild plants of economic value. The area comprises Nepal, Bhutan and neighbouring states of northern India. Huge wealth of fungi, insects, mammals, birds have been found in this region.

60% of Indian birds

63% of mammals are from Eastern Himalayas.

Endangered species of India

A species is said to be endangered, when its number has been reduced to a critical level. Unless it is protected and conserved, it is in immediate danger of extinction.

In India 450 plant species have been identified as endangered species. About 100mammals, 150 birds are estimated to be endangered species.

Factors affecting endangered species

Endangering of a species may be caused by

1) Habitat loss

2) Clearing of forest areas

3) Deforestation

4) Pollution

5) Quarrying in forest areas

6) Climate change

7) Poaching and Hunting

8) Export to other countries

9) Over exploitation of natural resources

10) Lake ofAwarness.

Examples for endangered species

Reptiles   -   Tortoise, Python

Birds   -   Peacock, Pelican

Mammals -   Indian wool, red fox, desert cat

Plants   -   A large number of medicinal plants, sandal wood tree

Remedial measures

1. Several international organizations and conventions help to protect endangered species in the world.

2. Convention on international trade in endangered species 1975, restricts international trade of 2900 species, because they are endangered.

1.45 Endemic species of India

The species, which are found only in the particular region are known as endmic species.

In India, 47,000 species, 7000 plants are endemic. Nearly 62% our endemic species are found in Himalaya and Western ghats.

Factors affecting endemic species

1) Habitat loss
2) Deforestation
3) Poaching and hunting
4) Pollution
5) Climate change.

Examples of endemic species

Amphibians   -   (frogs, toads)

Reptiles   -   lizards, crocodiles

62% amphibians, 50% lizards are endemic in western ghats.

Birds   -   Nilgiri wood pigeon, Nilgiri pipit.

Insects   -   Chloroneura, Esme etc.

Module I

Environment ,Eco System & Biodiversity

1.4 Definition

Importance of biodiversity

Conscequence of biodiversity loss

Classification of biodiversity

Important values of biodiversity

BIO DIVERSITY

1.4 Definition

Bio means 'life' and diversity means 'variety'. It is defined as, "the variety and variability of all living organisms and the eco system in which they occur"

IMPORTANCE OF BIODIVERSITY

1. Bio diversity is very important for human life.
2. Human beings depend on plants, animals, medicines, industrial products
3. It protects the fresh air, clean H_2O and productive loss
4. It is important for forestry, fisheries and agriculture
5. Loss of biodiversity reduces the economic status

CONCSIQUENCE OF BIODIVERSITY LOSS

Biodiversity loss is caused by five primary drivers: habitat loss, invasive species, overexploitation (extreme hunting and fishing pressure), pollution, climate change associated with global warming.

Many Medicinal plant species become extinct due to the collection of drugs for the pharmaceutical company

Tropical forest may destroy due to agriculture, mining and logging.

CLASSIFICATION OF BIODIVERSITY

It is classified into three types

1) Genetic diversity
2) Species diversity
3) Eco system diversity

(1) Genetic Diversity

Def: It is defined as, the variation of genetic characteristics within the species.

Genes are the basic units of hereditary information transmitted from one generation to other. They are responsible for both the similarities and the difference between organisms. **"Genetic diversity is the variationof genes within species".**

(Ex) All rice varieties belong to 'Oryzasativa" family. But there are thousands of rice varieties which are differ from each other in their size, shape, colour, nutrient content.

(2) Species diversity

It is defined as, the difference between the species level is known as species diversity. Species is a group of plants, animals, fungi and microbes. Species diversity is the number of different species of living things available in an area.

(3) Ecosystem diversity

The diversity at the ecological (or) habitat level is known as ecosystem diversity. The ecosystem also shows variations with respect to physical parameters like moisture, temperature, altitude, precipitation etc.

(Ex) River ecosystem.

River ecosystem consists of fish, aquatic insects, mussale and variety of plants.

IMPORTANT VALUES OF BIODIVERSITY

Bio diversity is need for healthy environment. It is must for the stability and proper functioning of the biosphere.

Biodiversity values are classified into 6 types.

1) Consumptive use value

2) Productive use value

3) Ethical value

4) Aesthetic value

5) Social value

6) Option value

I.   Consumptive use value

1. It is a direct use value

2. The Biodiversity products are directly consumed.

3. Food: about 80-90% of our food purpose is satisfied by tropical (forest) wild plants.

4. Drugs: 70% of modern medicines are derived from plant and plant extracts. 3000 plant species are used in Unani, Ayurveda &siddha.

   According to research about 85% of global community use plants for primary health care.

   (Ex) Lifesaving drugs like quinine (Malaria), reserpine (hypertension) penicillin (antibiotic) morphine (pain killer) are derived from plant origin.

II.   Productive use value

(i) Biodiversity products are obtained from plants and animals, which are marketed and sold.

(ii) (Ex) Animal products like silk, wool, musk, tusk, leather and food is obtained from animals and are sold in foreign countries.

(iii) Plant products like wood, cotton, fruits, vegetables and ivory, pearls are obtained from animals.

(iv) On importing edible oils help to improve our economic status.

III. Social Value

i) It refers to the bio resources which are used to the society.

ii) These values are related with social life, religion and spiritual activities of the people.

iii) (ex) Tulsi, lotus, Neem plants are considered as Holy plants.

Cow, snake, peacock is considered as Holy animals.

IV. Ethical value (or) Existence value

i) It refers to all life must be preserved.

ii) It means that a species may (or) may not be used but its existence in nature gives us pleasure.

iii) Ethical value is related with religious and cultural basis.

iv) (Ex) Vembu, Tulsi, Vengai trees are worshippes by Tamilians.

We are not get directly from, Kangaroo, Zebra, but we feel happiness that these should excist in nature.

V. Aesthetic Value

i) Most important aesthetic value of biodiversity is eco-tourism

ii) The beautiful nature of plants and animals insist us to protect biodiversity.

iii) (Ex) the beautiful sites, pleasant music of birds, colours of butterfly, flowers, peacock are important for their aesthetic value.

VI. Optional Value

i) It refers that 'any species may be proved to be a valuable species after some day'

ii) (Ex) the growing biotechnology field is searching a species which is used to cure cancer and AIDS diseases.

Module I

Environment Ecosystem & Biodiversity

1.7 Conservation of bio diversity

In-situ conservation

Ex-situ conservation

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1.7 Conservation of Biodiversity

It refers to the maintanance and preservation of biodiversity.

The management of biosphere so that it will yield the greatest sustainable benefit to present generation while maintaining its potential to meet the needs of future generation.

Types

1) In-situ conservation (within habitat)
2) Ex-situ conservation (outside habitat)

Insitu conservation

In-site conservation involves protection of fauna and flora within its natural habitat, where the species normally occurs is called in-situ conservation.

Important in-situ conservation

Biosphere reserve, national parks, wild life sanctuaries, gene sanctuary.

Methods of in-situ conservation

Biosphere reserves

India has 7 biosphere reserves all over the state. It covers large area, more than 5000 sq.km. It is used to protect species for long time.

(Ex) Gulf of mannar, Nilgiri   -   Tamilnadu

Sundarbans   -   West Bengal

Role of biosphere reserves

1) It gives long terms survival of evolving ecosystem
2) It protects endangered species.
3) It acts as a site of recreation and tourism
4) It is useful for educational and research purpose.

5) It protects maximum number of species and communities

6) Tourism and explosive activities are not permitted in the biosphere reserves.

National Park

India has 80 national parks all over the state. A national park is a protected area to conserve plants, animals together in a natural habitat.

It is usually a small reserves covering an area of about 100-500 sq.kms. within the biosphere reserves, one (or) more national parks are also exists.

(Ex) Gir national park   -   Gujarat

Periyar Park   -   Kerala

Bandipur Park   -   Karnataka

Role of national Parks

1. It is used for enjoyment through tourism without affecting environment.

2. It is used to protect, develop the wild life.

3. Grazing of domestic animals inside the national park is prohibited.

4. All private rights, and forestry activities are prohibited within a national park.

Wild life sanctuaries

At present, 492 wild life sanctuaries in our country.

(Ex) Vedanthangal bird sanctuary   -   Tamilnadu

Mudumalai Wild life sanctuary -   Tamilnadu

Nalsarover bird sanctuary   -   Gujarat.

Role of wild life sanctuaries

1) It protects animals only

2) It allows the operations such as harvesting of timber collection of forest products.

3) Killing, hunting (or) capturing of wildlife is prohibited.

Gene sanctuary

2 gene sanctuary are found in northern India. A gene sanctuary is an area, where the plants are conserved.

(Ex)gene sanctuary for citrus – Lemon family

Gene sanctuary for pitcher plant – an insect eat plant.

Advantage of Insitu conservation

1) It is very cheap and convenient method.
2) The species gets adjusted to the natural disasters like drought, floods, forest fires.

Disadvantage of Insitu conservation

1) 1) A large surface area of the earth is required to preserve the biodiversity
2) Maintenance of the habitats is not proper due to shortage of staff and pollution.

Ex-situ conservation

It involves the protection of fauna and flora outside the natural habitat.

Role

1) It involves maintanance and breeding of endangered plant and animal species under controlled conditions.
2) It identifies the species, which are in more risk condition of extinction
3) It prefer the species which are more important to man in near future among the endangered species.

Methods:

It is maintained in the following way.

- Zoos (for animals)
- Botanical gardens (for plants)
- Culture collections (for micro organisms)
- Cryobanks (for gametes, cells and tissues)

- Germplasm banks (for seeds, semen, cells, ovam)

1)National Bureau of plant Genetic Resources (NBPGR)

It is located in New Delhi. It used cryo preservation techniques to preserve agricultural and horticultural crops.

Cryo preservation techniques

It involves the preservation of seeds, pollen grains of some important agricultural and horticultural crops by using lig. Nitrogen at temp as low as 196°C Varieties of rice pearl millet, turnip, radish, tomato, onion, carrot, chills, tobacco have been preserved successfully for several years.

National Bureau of Animal Genetic resources (NBAGR)

It is located at Haryana. It preserves the semen of domesticated bovine animals.

National Facility for plant tissue culture Repository (NEPTCR)

It is used for conservation of varieties of crop plants (or) trees by tissue culture.

Advantage of Ex-situ conservation

1. Survival of endangered species are increasing due to special care and attention.
2. Animals are assured for food, water, shelter and also security and hence longer life span.

Disadvantages of ex-situ conservation

1) It is expensive method
2) The freedom of wild life is lost
3) The animals cannot survive in natural environment
4) It can be adopted only for few selected species.

Module 1

Environment, Eco system & Biodiversity

1.3 Ecological succession

Process of Ecological Succession

Community

Types of ecological succession

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1.3 ECOLOGICAL SUCESSION

The Progressive replacement of one community by another till the development of stable community in a particular area is called ecological succession. Ecological succession is the steady and gradual change in a species of a given area with respect to the changing environment. It is a predictable change and is an inevitable process of nature as all the biotic components have to keep up with the changes in our environment.

The gradual and fairly predictable change in the species composition of a given area is called ecological succession.

The changes lead finally to a community that is in near equilibrium with the environment and that is called a **climax**

Process of Ecological Succession

1.Nudation: It is the development of bare area without any life form. The bare area may be caused due to landslide, drought, volcanic eruption.

2.Invasion: It is the establishment of one or more species on a bare area through migration followed by establishment.

(a)Migration: The seeds are brought about by wind, water or birds.

(b) Establishment: the seed then germinate and grow on the land and establishes their Pioneer communities.

3.Competition: There is the competition with the same species and between different species for space, water and nutrients.

4.Reaction: The living organism, take water, nutrients and grow

and modify the environment is known as reaction. Thus reaction

leads to several seral communities

5.**Stabilization**: It leads to stable community, which is in balance

with the environment. Stages of ecological succession

Community.

During succession some species colonise an area and their populations become more numerous, whereas populations of other species decline and even disappear.

The entire sequence of communities that successively change in a given area are called **sere(s).**

1)Pioneer Community

First Group of organism, which establish their community in the area is called pioneer community.

1) **Seral community**

Various developmental stage of a community is called seres.

Types of ecological succession:

1.Primary succession:

Succession that starts where no living organisms are there or these could be areas where no living organisms ever existed. Primary succession can occur in newly cooled lava, bare rock, newly created pond or reservoir.

It involves the gradual establishment of biotic communities onlifeless ground.

(a). Hydrarch / Hydrosere → This type of Succession starts in a water body like pond. Succession takes place in wetter areas and the successional series progress from hydric to the mesic conditions is called hydrarch succession. when the plant succession occurs starting on relatively shallow water such as ponds reaching to a highest point of development in a mature forest. The hydrarch succession proceeds as

• A new formed water body

• The phytoplankton stage starts to grow in the water

• The phytoplanktons extend their roots to the ground and get submerged into water

• The soil starts to collect more dense due to the dead plants and the new plants starts to move on the surface

• Reed swamp stage — the water becomes more and more shallow and the soil gets rich in nutrients from the dead

• Sedge marsh — the water level decreases and the soil becomes unfavourable for the growth of reed swap. Cyperaceae become dominant. There is ultimately formation of terrestrial soil.

• Woodland forest stage — shrubs and trees start to grow. The soil becomes dry.

(b)Xerarch / Xerosere → This type of succession starts in a dry area like desert and rock. Succession takes place in dry areas and the series progress from xeric to mesic conditions is called xerarch succession. plant succession starting on bare ground or rock and reaching up to a highest point in a mature climax forest. This occurs in dry regions. It includes —

• Lichen stage — crustose lichen is a special form that can live in extreme conditions. In case of rainy days these become wet. They absorb all the water causing weathering of rocks. This allows the land to get prepared for its next stage.

• Foliage lichen stage — they are leaves like lichen and get attached at a single point. It produces shade on the previous growing lichen which makes their growth hinder. The rocks become rough.

• Moss stage — All the lichen litter gets collected making the soil more porous. The moss and lichens compete for water sources.

The lichens become dead adding more humus to soil.

• Herbaceous stage— The soil has a large amount of humus and litter. The herbaceous plants grow in the region.

2.Secondary succession:

It involves the establishment of biotic communities in an area, where some type of biotic community is already present. Succession that starts in areas where all the living organisms somehow lost that existed there is called secondary succession.

Secondary succession can occur in abandoned farm lands, burned or cut forests, lands that have been flooded.

Secondary succession is faster than primary succession because some soil or sediment is present.

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Module 1

Environment, Eco System & Biodiversity

1.2 Definition types

Structure (or) components of an Eco system
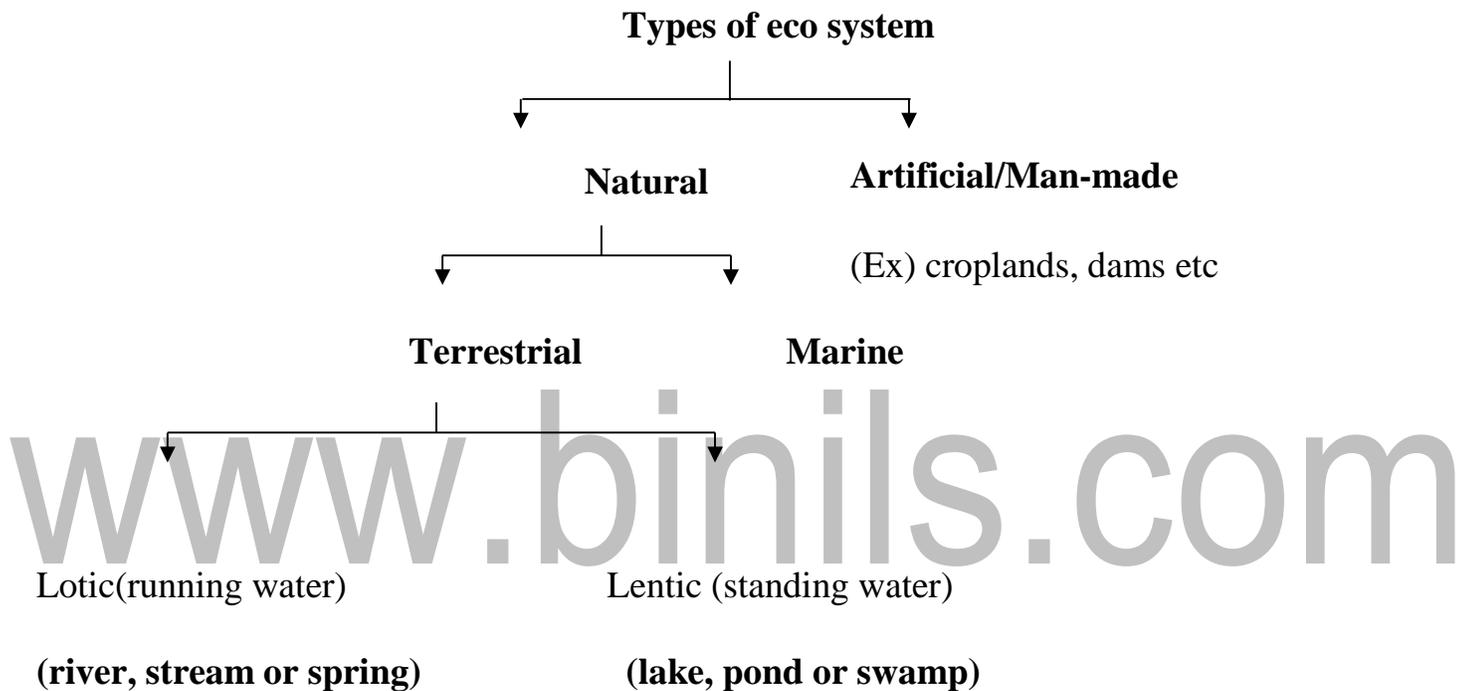
Energy flow in the ecosystem

Ecological pyramids

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1.2 DEFINITION&TYPES

Definition:

A group of organism interacting among themselves and with environment is known as eco system. An ecosystem consists of the biological community that occurs in some locale, and the physical and chemical factors that make up its non-living or abiotic environment.

Types of eco system

Natural   **Artificial/Man-made**

(Ex) croplands, dams etc

Terrestrial   **Marine**

Lotic(running water)   Lentic (standing water)

(river, stream or spring)   **(lake, pond or swamp)**

STRUCTURE (OR) COMPONENTS OF AN ECO SYSTEM

The structure of an ecosystem is the description of the organisms and physical features ofenvironment including the amount and distribution of nutrients in the ecosystem.

From the structure point of view, all ecosystems consist of the following basiccomponents:

1) Abiotic components

Abiotic components of an ecosystem include basic inorganic elements and compounds. Non-living components of an eco-system

(Ex) Climate, soil, water

2) Biotic components

The biotic components include all living organisms present in the environmental systemLiving components of an eco-system.

(Ex) Plants and Animals

1) Producers (Autotrophs)

Producers can prepare their food themselves through photo synthesis.

(Ex) All green plants, trees

2) Consumers (Heterotrophs)

Consumers cannot, prepare their food but they directly (or) indirectly depends on producers.

a) Primary consumer

* it is called herbivores (or) plant eaters.

* directly depends on plants for their food

* (ex) rat, goat, cow

b) Secondary consumer

* It is called primary carnivores (or) meat eaters

* depends on primary consumer

* (ex) Tigers, lions

c) Tertiary consumer

* It is called Secondary Carnivores (or) meat eaters
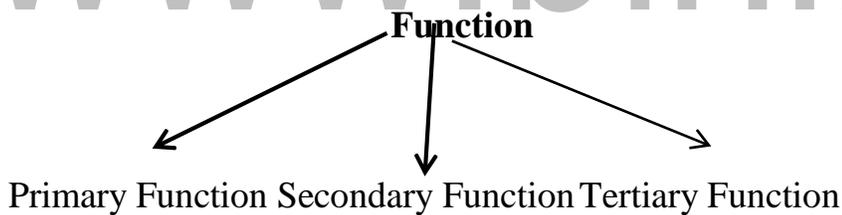
* depends on Secondary consumer

* (ex) Tigers, lions

3) Decomposer:

Decomposers are used to decompose the body of dead organisms, plants, animals into simple compounds.

(Ex) micro organisms like bacteria, fungi

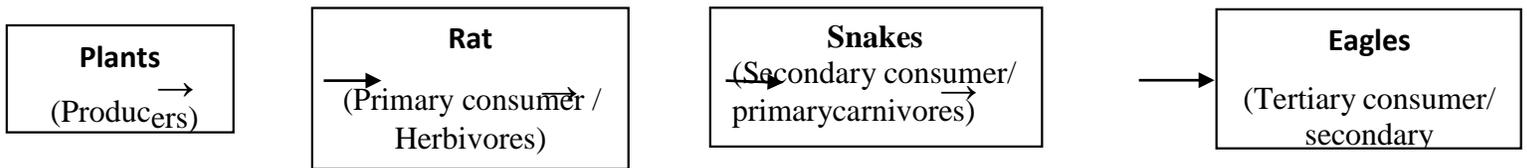(Ex) Grass → Rat   cat ⟶   Tiger

Functions of an ecosystem

Function

Primary Function Secondary Function Tertiary Function

ENERGY FLOW IN THE ECOSYSTEM

FOOD CHAIN

Definition : The sequence of eating & being eaten in an ecosystem is food chain (or) transfer of food energy from the plants through a series of organisms is food chain. Food chains are more or less familiar to everyone in a vague sort of way. It may be because man occupies a position at or near the end of a chain of food items. If occupies an intermediate trophic position between primary and secondary consumers.

The inter-relationship between plants and animals and between animals and animals in the sphere of energy production and consumption results in a definite pattern of several stages of eating and being eaten up — this is referred to as the food chain.

1. Food Chain in a Grass land:

Plants (Producers) →	→ Rat (Primary consumer / Herbivores) →	→ Snakes (Secondary consumer/ primary carnivores) →	→ Eagles (Tertiary consumer/ secondary

2. Food Chain inaPond: Phytoplankton → Zooplankton → Small fist → large fish →Man

3. Food Chain inaforest: Plants →Deer→Tigers/Lions

Types of Food Chain: Grazing Food Chain → starts with green plants & goes to decomposer food chain

Detritus food chain → starts with dead organic matter & goes to decomposer food chain.

Tropic Levels:

The various steps through which food energy passes in an ecosystem is called as tropic level.

T1 → T2 → T3 → T4 →T5

T1= Producers, T2= Primary consumers, T3= Secondary consumers, T4= Tertiary consumers, T5=decomposers

In Photosynthesis process, the energy stored in the plants. During this process light energy is converted into chemical energy and it is passed through the consumer. Energy is transferred from one tropic level into other tropic levels.

FOOD WEB

Definition: A food web (or food cycle) is the natural interconnection of food chains and a graphical representation (usually an image) of what-eats-what in an ecological community. The interlocking pattern of various food chains in an ecosystem is food web. Many food chains are interconnected.

Energy Flow in Food web:

Grass → insects → fishes → birds →tigers

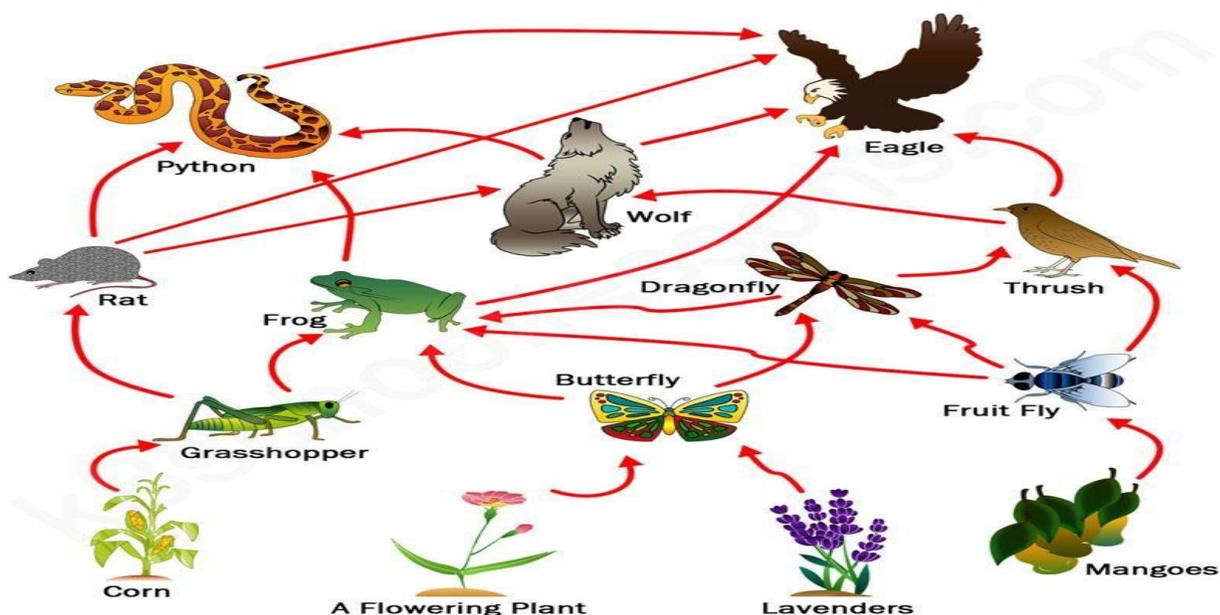Grass → insects → birds →tigers

Grass → deer → tigers

Grass → insects → birds →tigers

Grass → cattles →tigers

Grass → rats→ snakes → eagles →tigers

Grass → rats → eagles →tigers

A Food Web

Difference between food chain & food web: In food chain, if one species gets affected, then species in all tropic levels are also affected. But in food web if one species gets affected, it does not affect other tropic levels.

ECOLOGICAL PYRAMIDS

Graphical representation of structure and function of tropic levels of an ecosystem is ecological pyramid.
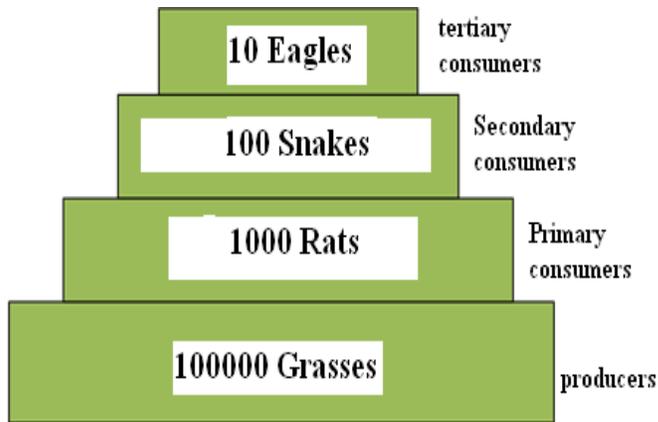
Importance of Ecological Pyramid

The importance of ecological pyramid can be explained in the following points:

1. They show the feeding of different organisms in different ecosystems.
2. It shows the efficiency of energy transfer.
3. The condition of the ecosystem can be monitored, and any further damage can be prevented.
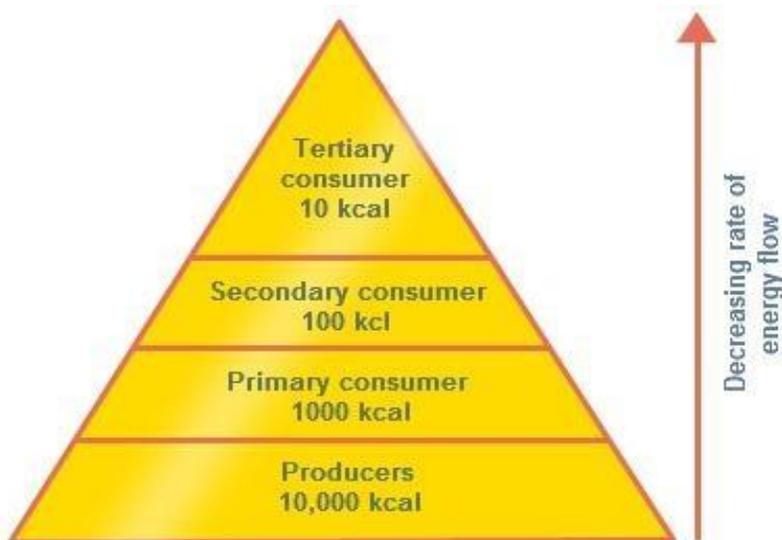
Types:

1.Pyramid of Numbers

2.Pyramid of Energy

3.Pyramid of Biomass

Pyramid of Numbers→ Represents the number of each individual organism present in each tropic level.

Pyramid of Energy: Represents the amount of energy individual organisms present
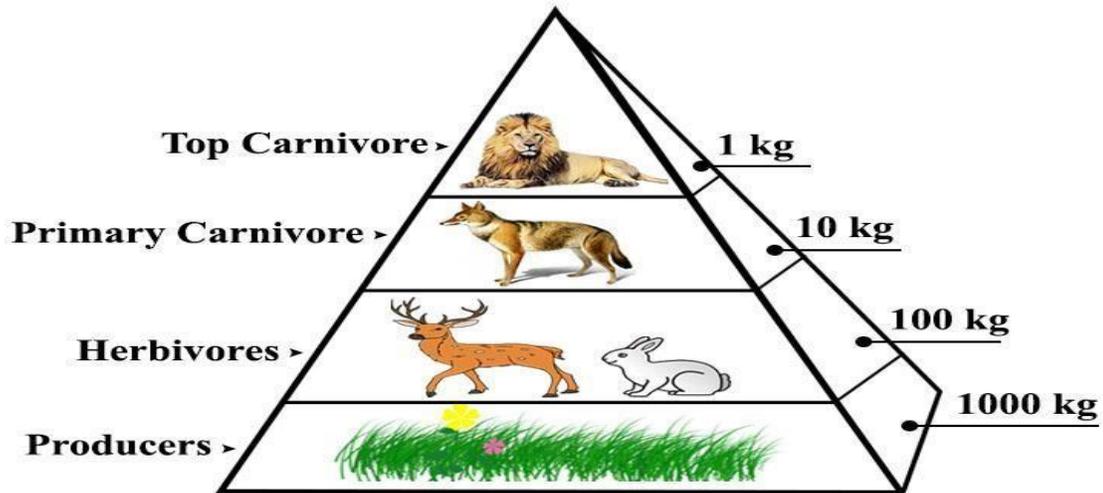
in each tropic levels.

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Pyramid of Energy

Pyramid of Biomass→ The amount of living or organic matter present in a particular environment is called biomass. There is a decrease in the biomass from the lower tropic level to the higher tropic level.

Upright Pyramid of Biomass in a Terrestrial Ecosystem

Limitations of the Ecological Pyramid

1. More than one species may occupy multiple trophic levels as in case of the food web. Thus, this system does not take into account food webs.

2. The saprophytes are not considered in any of the pyramids even though they form an important part of the various ecosystem.

3. These pyramids are applicable only to simple food chains, which usually do not occur naturally.

4. These pyramids do not deliver any concept in relation to variations in season and climate.

5. They do not consider the possibility of the existence of the same species at different levels.

Module 1

Environment, Ecosystems and Biodiversity

1.1 Introduction

Types of environment

Scope and importance of environment

Importance of environmental study

Public awareness to environmental issues/studies

Role of NGOs

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1.1 Introduction

Environment is defined as, "the sum of total of all the living and non – living things around us influencing one another. The word 'Environment' is derived from the French word 'Environe' which means to encircle, around or surround. As given by Environment Protection Act 1986, Environment is the sum total of land, water, air, interrelationships among themselves and also with the human beings and other living organisms. It studies the sources, reactions, transport, effect and fate of a biological species in the air, water and soil and the effect of and from human activity upon these. Environmental Science deals with the study of processes in soil, water, air and organisms which lead to pollution or environmental damages and the scientific basis for the establishment of a standard which can be considered acceptably clean, safe and healthy for human beings and natural ecosystems. The word environment is derived from the French word 'environ' meaning surroundings. Hence, everything surrounding us is called "ENVIRONMENT".

The Oxford Advanced Learners Dictionary defines environment as the natural world in which people, animals and plants live.

Douglas and Holland defined that 'The term environment is used to describe, in aggregate, all the external forces, influences and conditions, which affect the life, nature, behavior and the growth, development and maturity of living organisms.

Environment includes which we are directly or indirectly dependent for our survival, whether it is living component like animals, plants or non-living component like soil, air and water.

TYPES OF ENVIRONMENT

Environment can be divided into two categories

1. Natural environment

2. Man – environment

1. Natural environment

Natural environment is characterized by natural components. All biotic (living) and abiotic components (non-living) are created through a natural process. Creation of these biotic and abiotic components do not require any human support. Example: soil, water, air, tree, radiations, noise, etc.,

2. Man–made environment

Man is the most powerful environmental agent. He modifies the environment using modern technologies, according to his needs to a great extent. Thus the man-made environment is created by man. Example: House, road, schools, railway lines, parks, etc.,

SCOPE AND IMPORTANCE OF ENVIRONMENT

The scope of environmental studies is very wide and it deals with many areas like i) Conservation of natural resources, ii) ecological aspects, iii) pollution of the surrounding natural resources, iv) controlling the pollution, v) social issues connected to it, and vi) impacts of human population on the environment.

1. To get an awareness and sensitivity to the total environment and its related problems

2. To motivate the active participation in environmental protection and improvement.

3. To develop skills for identifying and solving environmental problems.

4. To know the necessity of conservation of natural resources.

5. To evaluate environmental programmers in terms of social, economic, ecological, and aesthetic factors.

IMPORTANCE OF ENVIRONMENTAL STUDY

Environmental study is based upon a comprehensive view of various environmental systems. It aims to make the citizens competent to do scientific work to find out practical solutions to current environmental problems. The environment studies make us aware about the importance of protection and conservation of our mother earth and about the destruction due to the release of pollution into the environment. The increase in human and animal population, industries and other issues make the survival cumbersome. A great number of environment issues have grown in size and make the system more complex day by day, threatening the survival of mankind on earth.

1. World population is increasing at an alarming rate especially in developing countries.

2. The natural resources endowment in the earth are limited

3. The methods and techniques of exploiting natural resources are advanced

4. The resources are over-exploited and there is no foresight of leaving the resources to the future generations.

5. The unplanned exploitation of natural resources lead to pollution of all types and at all levels

6. The pollution and degraded environment seriously affect the health of all living things on earth, including man

7. Education and training are needed to save the biodiversity and species extinction

8. The urban areas, coupled with industries, are the major sources of pollution.

PUBLIC AWARNESS TO ENVIRONMENTAL ISSUES/STUDIES

Need For Public Awareness: The United Nations Conference on Environment and Development held at Reo de Janeiro in 1992 (popularly known as „Earth Summit") and world summit on sustainable development at Johannesburg in 2002, have highlighted the key issues of global environmental concern. They have attracted the attention of people. Any government at its own cannot achieve the goals of clear environment until the public participate in action. Public participation is possible only when the public is aware about the ecological and environmental issues. Eg. Ban- the littering of polythene methods to propagate environmental Awareness

1.Among students through education introducing environmental studies in the curriculum.

2. Among public through mass media- environmental programmes through TV, radio etc.

3. Among decision makers, planners, leaders etc.

1.6 Role of NGOs

1. Advise the government in interacting with ground level people

2. Organize public meetings to create environmental awareness

(Eg.) Recent report of centre for science and environment" on permissible limits of pesticides in cola drinks. Public awareness is needed in the area

1. Study of natural resources-conservation and management

2. Ecology and biodiversity conservation

3. Environmental Pollution and prevention

4. Social issues related to development and environment

5. Human population and environment.

Module I

Environment, Eco system &Biodiversity

1.6 Threats to Biodiversity

1.6 Threats to Biodiversity

Despite the numerous benefits and advantages gotten from biodiversity, it is under serious threats as a result of human activities. The main dangers worldwide are population growth and resource consumption, climate change and global warming

Habitat conversion, urbanization etc.,

Some of the main threats to biodiversity are:

1. Human Activities and Loss of Habitat

2. Deforestation

3. Desertification

4. Marine Environment

5. Climate Change

1. Human Activities and Loss of Habitat

Human activities are causing a loss of biological diversity among animals and plants globally estimated at 50 to 100 times the average rate of species loss in the absence of human activities. Two most popular species in rich biomes are tropical forests and coral reefs.

2. Deforestation:

Forest ecosystems contain as much as 80 percent of the world's terrestrial biodiversity and provide wood fiber and biomass energy as well as critical components of the global cycles of water, energy and nutrient. Forest ecosystems are being cleared and degraded in many parts of the world. In addition to threats to biodiversity and potential shortages in the supply of forest products, the degradation of forests represents an enormous potential source of greenhouse gas emissions.

3. Desertification:

Desertification and deforestation are the main causes of biodiversity loss. Both processes are decisively influenced by the extension of agriculture. The direct cost of deforestation is reflected in the loss of valuable plants and animal species. Desertification process is the result of poor land management which can be aggravated by climatic variations. Decreasing soil organic matter is always a clear indication of soil degradation, and often is accompanied by reductions in water infiltration, fertility, and ability to retain fertilizers.

4. Marine Environment:

Oceans play a vital role in the global environment. Covering 70 per cent of the earth's surface, they influence global climate, food production and economic activities. Despite these roles, coastal and marine environment are being rapidly degraded in many parts of the globe. In coastal areas, where human activities are concentrated, pollution, over-exploitation of resources, development of critical habitats such as wetlands, and mangroves, and water-flow from poor land-use practices have led to drastic reductions in near shore fisheries production and aquatic biodiversity.

5. Climate Change:

As climate warms, species will migrate towards higher latitudes and altitudes in both hemispheres. The increase in the amount of CO_2 in the air affects the physiological functioning of plant and species composition. Moreover, aquatic ecosystems, particularly coral reefs, mangrove swamps, and coastal wetlands, are vulnerable to changes in climate.

Poaching of wildlife

Poaching is the illegal killing of animals.

Poaching and hunting of wild animals are the main reason of wildlife depletion.

Causes of poaching

1) **Flesh**: Flesh of wild animals is the tasty protein food. So they are hunted. (ex) rabbit, deer, wild pig.

2) **Trade**: the animal parts and products are sold in the market at high price. (Ex) elephant tusks, wild animals skin

3) **Drugs**: Animals are killed for drugs. (Ex) peacock, varanus

4) **Fishing**: Catching fishes during their breeding season is a threat to fish population

5) **Population explosion**: Increase of human population increases the demand for food.

MAN WILD LIFE CONFLICTS

The struggle and fight between man and wild animals constitute main wild life conflicts.

Man is afraid of wild animals like elephant tiger, lion, snake. But wild animals are afraid of man.

Forest is the home of wild animals. Man exploits the forest. When they are disturbed in their houses they enter human dwelling areas and destroy the properties of man.

Man becomes angry and attack wild animal. so there is a continuous war between man and wild animals.

Examples for man wild life conflicts.

1) In SAMBALPUR, Orissa, 195 human beings were killed in 5 years by elephants. In vengence, man killed 98 elephants and injured 30 elephants.

2) In the Royal Chit national park, Kathmandu, 16 Nepalese people and one 4 years old baby were killed by a tiger in 2004.

3) In the Sanjay Gandhi national park, Mumbai 14 persons were killed by leopards in 19 attacks.

Causes of man-wild life conflicts

1) Man is the primary cause for man- wild life conflicts. He encroaches the forest area for his benefits, disturbing the home of wild animals. So, wild animals enter into human beings habitats.

2) The villagers put electric fences, to safeguard their crop plants. The electric wires kill and injure the wild animals.

3) The injured animals are angry and they have a tendency to attack man.

4) The wild animals damage agricultural crops. So man kills them.

5) Formerly the forest department cultivated paddy, sugar cane, etc. in the sanctuaries for wild animals as food. But this practice is not followed by now a day. Hence wild animals enter human areas.

6) The compensation given by the Government to the farmers for damages is very less. So farmers take revenge and kill the wild animals.