

EVS

Environmental Studies Ch-1

Environment the term derived from French word *environer* which means surrounding, enclose, encircle

↓ ↓ ↓
Environer

- ① defⁿ - Environment refers to an aggregate of conditions or surroundings in which living beings such as humans, animals and plants or other non-living organisms are exists.
- ② defⁿ - It is a multidisciplinary academic field which systematically studies human interaction with environment in the interest of solving complex problems.
- ③ defⁿ - It refers to an extensive and systematic study of nature / environment and its physical, biological, social and cultural factors. It also about the relationships between human and environment.

Component of environment :-

- Physical Component - {space, landforms, water-bodies, climate, rocks, mountains, mineral etc}
- Biological Component - {plant, animals, microorganisms}
- Cultural Component - {including man} {include economic, social & political conditions, which are made by human beings}

Types of environment: -

① Physical or Abiotic environment →
made of solid, liquid, gas etc
↓ ↓ ↓
(lithosphere) (hydrosphere) (atmosphere)

② Living or Biotic environments →
It includes plants (flora) and animals
(fauna) - it also includes human beings.

③ Social and Cultural environments: -

- It includes social and cultural interactions and its outcome such as belief, attitude, trust.
- It describes the relationship among:
Person - Person / Person - animal /
Person - Plant / animal - animal /
animal - Plant

Scope and importance of ERE

- ① The study creates awareness among the people to know about various renewable and non-renewal resources.
- ② It gives the endowment or potential patterns of utilization and the balance of various resources available for future use in the state of a country.

- 3/ Developing an awareness and sensitivity to the total environment and its related problems.
- 4- Motivating people for active participation in environmental protection and improvement.
- 5- It provides the knowledge about ecological systems and cause and effect relationships.
- 6 → It provides necessary information about biodiversity richness and the potential dangers to the species of plants, animals and microorganisms in the environment.
- 7 → Developing a scheme for active identification and development of solutions to environmental problems.
- 8 → It identifies the ~~main~~ causes for consumption of natural resources.

Importance

- ① It helps every individual in resource planning and material management because natural resources on the earth are very limited.
- ② The resources are over-exploited and there is no foresight of leaving the resources to the future generation.
- ③ The unplanned exploitation of natural resources leads to pollution ~~and~~ of all types and at all levels.

- It helps in future development activities in connection to the environment
- It helps to save biodiversity and species extinction.
- It helps in control global warming.
- It helps in control and reduce pollution and save the earth and nature for future generation.

Public awareness of EVS

- It focus on how we save our environment.
- Public awareness is an activity to aware the human being about the different environment issues.
- Over exploitations of natural resources are stopped.
- Campaigns are made to save environment.
- The active cooperation of every one, at every level of social organization, administrative, teachers, politicians, social workers and public is needed for issue conserving environment.

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Natural resources can be defined as variety of goods and services provided by nature which are necessary for our day to day lives.

→ They are essential for the fulfillment of physical, social, economical and cultural needs at individual and community levels.

Types of Natural Resources
Based on different features. it's divided into following types.

① Living or biotic resources
↳ ex: - Plants, animals, fossils fuel, bio-organism, microorganism, water bodies etc.

② Non-living or Abiotic resources
↳ air, sun light, water

③ Exhaustible resources:-

↳ Resources that can be exhausted through continuous use ex: - soil, forest, water, coal, petroleum, natural gas, mineral etc.

④ Non-exhaustible resources:-

↳ Resources that can not be exhausted through continuous use ex: - air, sunlight

⑤ Renewable resources:- These are ~~un~~ limited in quantity and can be renewed like wind, light, water, soil, forest, animals, etc.

⑥ Non-renewable resources → These are limited in quantity. These resources can not be renewed like Natural gas, Petroleum, coal, fossil fuel.

⑦ Active resources: - we know about the quantity & utility of these resources like coal, gas, petroleum etc.

⑧ Potential resources: - we does not know about the quantity & use of that resources like Uranium stored in Ladakh etc.

Non-renewal is further divided in 2 type

① Recyclable: - which can be collected after use and can be recycled (ex! - aluminium, Copper, mercury etc)

② Non-recyclable: - which cannot be recycled in any way ex! - fossil fuel and Uranium.

Beside this there are several types of resources

- ① Forest resource
- ② water resource
- ③ Land resource
- ④ Mineral resource
- ⑤ Food resource
- ⑥ Energy resource etc

// Natural resources and associated problem.

- The main problem associated with natural resources is unequal consumption.
- The major part of natural resources are consumed in the developed world. The developing nation also over use many resource per capita of developed countries is up to 30 time greater than in most developing countries.
- Advanced countries produce over 75% of global industrial waste and greenhouse gases.
- Energy from fossil fuels consumed in relatively much greater quantities in developed countries.

Forest Resources

Forests are the dominant terrestrial ecosystem of Earth and are distributed across the globe.

- Forests account for 75% of the gross primary productivity of the Earth biosphere and contain 80% of the Earth's plant biomass.
- Forest contain 2 Component

- Biotic Component
- Abiotic Component

Forest can be classified in various way.

- ① Boreal Forest
- ② Temperate Forest
- ③ Tropical Forest
- ④ Rain forest

In 1990 there is 4128 million hector of forest
In 2015 " " 3999 million " " "

Function of forest

1. It performs very important function both to human and to nature.
2. They are habitats of millions of plants, animals and wild life.
3. They recycle rain water.
4. They remove pollutant from air.
5. They control water qualities.
6. They moderate temperature and weather.

Importance of forest.

- ① Forest is an important natural resources.
- ② Forest are vital for the ecological balance and play an important role in temperature regulation in the atmosphere.
- ③ They are natural and vast reservoirs of food and shelter for animals.
- ④ Forest provide timber, bamboo, canes, leaves, grass, oil, resins, gums, fruits, nuts, roots.

- Forest provide raw material for forest based industries.
- gt provide medical herbs and plants.
- gt have direct impact on climate.
- gt prevent flood, soil erosion, land degradation etc.
- gt purify air, water and soil pollution.

Use of Forests

- ① Commercial uses
- ② Ecological uses.

1. - Commercial uses

- ① Wood - used as a fuel.
- ② Supply wood for various industries.
- ③ Minor forest products - gum, dyes, resins.
- ④ Medicines.
- ⑤ Supply animal product - honey, Ivory, horns etc.
- ⑥ Many forest land used for - Mining, grazing for dams and recreation.

2// Ecological uses

- Production of oxygen.
- Reduction of global warming.
- Soil conservation.
- Regulation of hydrological cycle.
- Pollution moderates.
- wild life habitat.

Reasons for deficiency of forest

Due to over exploitation of forest the deficiency of forest occurs. In India the minimum area of forest required to maintain good ecological balance is about 33% of total area, but it is only 12% now.

Over exploitation of forest :-

Due to over population there is an increased demand for medicine, shelter, wood and fuel. Hence exploitation of forest materials is going on increasing.

Cause of over exploitation :-

1. Increasing agricultural production.
2. Increasing agricultural activities.
3. Increase in demand of wood resources.

Deforestation :- It is process of removal of forest resources due to natural or man made activities (i.e) destruction of forest.

Cause of deforestation :-

1. Development of project :- Developmental project causes deforestation through two ways.
 - (1) Through submergence of forest area.
 - (2) Destruction of forest area.
ex:- big dams, hydroelectric projects, road construction.

2. Mining operations:- It reduces forest areas, by digging raw material from earth crust.
EX:- Mica, Coal, Manganese and lime stone.
3. Raw material for Industries:- Tree provide important raw material for various Industries like making boxes, furniture and papers, etc.
4. Fuel requirement:- wood is the important fuel for rural and tribal population.
5. Shifting cultivation:- Replacement of natural forest ecosystem for mono specific tree plantation.
6. Forest fire which destroy thousands of acres of forest
7. over grazing reduce cultivation land.

Impact of Deforestation

1. Economic loss.
2. Loss of biodiversity
3. Destroys the habitat of various species.
4. Reduction in stream flow.
5. Increases the rate of global warming.
6. Disruption of ~~soil~~ ^{weather} and patterns and global climate
7. Degradation of soil.
8. Break the water cycle
9. Increases flood frequency, magnitude/severity.

Avoid of Deforestation / Conservation of forests.

- 1- New plants should be planted to replace the trees cut down for timbers.
- 2- use of wood for fuel should be discouraged.
- 3- Forest fire must be controlled by modern technique.
- 4- over grazing by cattle must be controlled.
- 5- Education and awareness programme must be conducted.
6. Strict implementation of law of forest Conservation Act.

CASE STUDIES

Timber extraction → Timber extraction results in deforestation and in fragmentation of last remaining forests. It harms valuable species of trees, birds and wild animals

→ wood used for engineering purposes like building houses, making furniture is called timber.

→ The product extract from timbers have been important to many civilization.

Effect of timber extraction

→ Poor logging results in a degraded forest
→ Flood may be intensified by cutting of trees or upstream watersheds.

- Loss of biodiversity.
- Climate changes such as less rains.
- Exploitation of tribal people by the contractors.
- Soil erosion due to slopy lands.

Chipko Movement - The world famous Chipko Movement pioneered by Dashrath Gram Swarajya Mandal in Gopeshwar brought about a general awareness about conservation of forests.

→ It happens in 1931.

DAMS - There are more than 45000 dams around the world, which play an important role in communities and economic. Dam helps in producing 19% of world total electric power.

→ Dams are massive artificial structures built across the rivers to store water for much beneficial purpose.

Effects of dams on forest: -

- Thousands of hectares of forest will be cleared.
- Killing of wild animals and destruction of aquatic life.
- Water logging increases the salinity of soil.

Effect of dam on tribal people: -

- It leads to displacement of tribal people.
- Displacement and cultural change effect the tribal people mentally & physically.
- Tribal people ill treated by Modern society.

Case-studies :- Sardar Sarovar project

Mining :- The process of extracting minerals and fossil fuels like coal from the earth is called as mining.

Types of Mining :-

1. Surface mining
2. Underground Mining

Steps involved in Mining

1. Exploration
2. Development
3. Exploitation
4. Ore processing

Effect of Mining

1. Pollute soil, water & air.
2. Destruction of natural habitat
3. Vibration cause earth quakes
4. Produce noise pollution.
5. Reduce shape & size of forest
6. Spoils the aesthetic beauty.

Water Resources

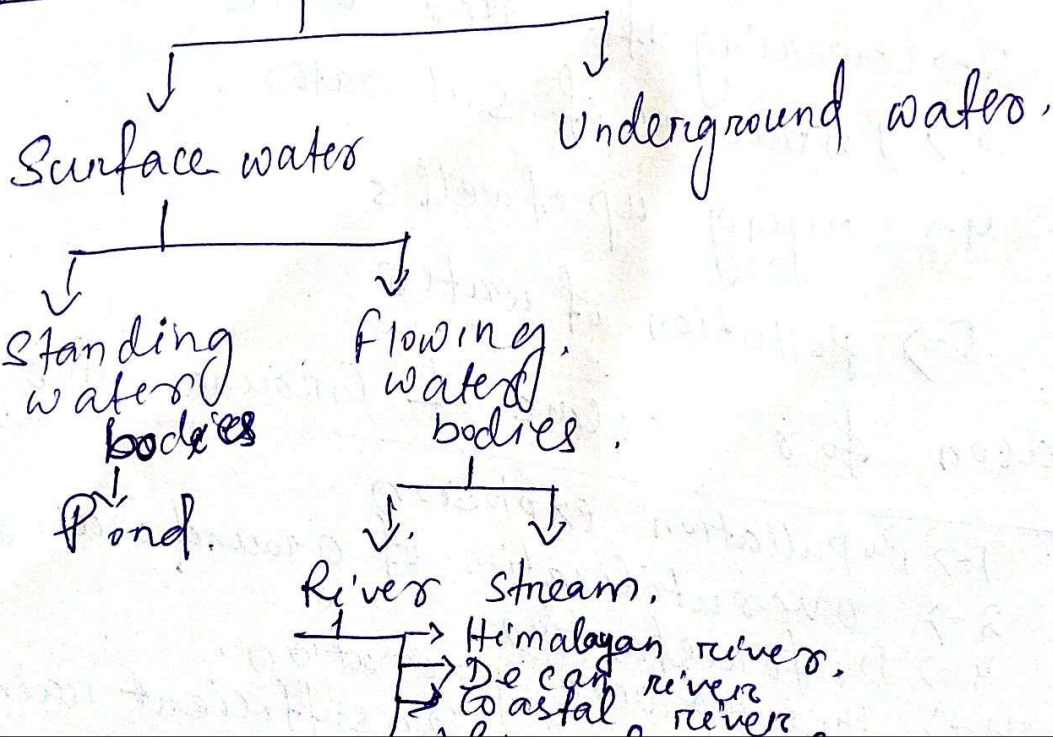
Water claims to be an important resource. An important use of water in our country is for irrigation. Water is also required for industrial and domestic consumption.

- > Water essential for all forms of life.
- > No plant or animal species can survive without water.

Hydrological cycle :-

Water from various water bodies
↓
Evaporated by solar energy.
↓
Enter into atmosphere as clouds.
↓
Falls again on earth as rain or snow
↓
return to ocean.

Types of water resources



Surface water :- The water is available on the open surface of the earth. It is the purified water present in pond, river, stream, dams & different reservoirs.

Groundwater :- water that is available in the deeper layers of the earth is known as ground water. ex! - well, Borewell etc. In the agriculture sector ground water is supporting the growth of crops and vegetable.

→ wells are used to bring ground water to the land surface by means of pump. Sometimes open dugwell are used where the water level is high.

Effect of over utilization of water

- 1 → Decrease of ground water -
- 2 → lowering of water table
- 3 → Intrusion of salt water.
- 4 → Drying up of wells
- 5 → pollution of water

Reason for Decline of Ground Water

- 1 → Population explosion
- 2 → Overutilization of ground water,
- 3 → Deforestation
- 4 → Hydro power generation,
- 5 → Dams
- 6 → Insufficient rainfall

Dams

Dams made significant contributions to human development and the benefits derived from them have been considerable.

benefits - Dams ensure a year round supply of water for domestic use and provide extra water for agriculture, industries and hydropower generation.

Problems :- They alter river flows, change nature's flood control mechanism such as wetlands and flood plains, and destroy the lives of local people and habitats of wild plants and animal species.

→ Dam construction and submersion leads to significant loss of farmland and forest and land submergence.

→ Siltation of reservoirs, water logging and salination in surrounds land reduces agricultural productivity.

→ Fragmentation and physical transformation of rivers.

→ Dislodging animal populations.

Sustainable water Management :-

- Building several small reservoirs instead of few mega projects.
- Developing small catchment dams and protecting wetlands.
- Treating and recycling municipal waste water for agricultural use.
- Effective rainwater harvesting in urban environments.
- Protects existing tanks.

Flood :- It is an overflow of water. It happens when the magnitude of flow of water exceeds the carrying capacity of the channel within its bank.

cause of flood :-

1. Heavy rainfall, melting of snow and sudden release of water from dams.
2. Reduction in the carrying capacity of the channel.
3. Deforestation, mining and over grazing increase the runoff from rains.

Effect of Flood :-

1. water spreads in the surrounding area and submerges them.
2. Cultivated land gets affected.
3. Extinction of civilization.

Flood Management

1. Floods can be controlled by dams.
2. channel management control flood.
3. Flood may also be reduced by reduction of run off & appropriate afforestation:

Drought: -

Drought is nothing but scarcity of water, which occurs due to

1. Inadequate rain fall.
2. Late arrival of rain fall.
3. Excessive withdrawal of ground water.

Drought causes serious damages to plants, animals and human life.

Cause of Drought: -

1. Annual rain fall is below normal level.
2. High population.
3. Intensive cropping pattern.

Effects of Drought: -

1. Drought causes hunger, malnutrition and scarcity of drinking water and also changes the quality of water.
2. worst situation of drought causes desertification.
3. drought increases the degradation of natural resources.
4. Drought causes large migration of people and urbanization.

Drought management : -

→ Indigenous knowledge is essential.

→ Rain water harvesting system.

→ Construction of reservoirs to improve ground water level.

→ use modern irrigation technology.

→ Afforestation activities also improve the potential of water in the drought area.

Mineral resources : -

Naturally occurring inorganic crystalline solids with uniform chemical composition are called as minerals.

- Minerals are generally called the "stock" as they are the non-renewal resources.

→ Minerals used as a raw material in industries.

- Minerals are the definite chemically bonded substances created through chemical processes between organic and inorganic matter present in the earth crust.

→ It is found in 2 form solid & liquid.

→ Prosperity of a nation depends on the stock of mineral in a country.

ex! - Iron, steel, copper, zinc, lead, gold, silver, manganese ore.

Minerals are 3 types

Metallic Minerals - Metallic minerals are found in combine state. we have to extract the metal from the minerals.

- ① Ferrous alloys
- ② Non-ferrous alloys.

Non Metallic minerals :- Minerals whose yield product are other than metals comes in this head.

ex! - Graphite, Quartz, fire clay, diamond, phosphate.

Minerals Fuels :- These include the materials used to provide energy. For ex! - coal, natural gas, fossil fuels and petroleum etc.

Effect of minerals resources over the environment

- ① Devegetation
- 2) Ground water contamination.
- 3) Surface water pollution.
- 4) Air pollution.
- 5) Subsidence of land.

Effect of over Exploitation of minerals

- 1) Rapid depletion of mineral deposits.
- 2) wastage
- 3) Environment pollution
- 4) Need heavy energy requirement
- 5) Mining causes earth quake & land slides.

- 6) Air pollution with dust and gases due to drilling, blasting and transportation by road.
- 7) Noise & vibration problem in mine.
- 8) Alteration of the land form

Food Resources

Food is essential for growth and development of living organism. These essential material are called nutrients.

- These nutrients are called available from variety of animals and plants.
- Plants can produce food, hence they are called producer. Food which is necessary for all living organism consists protein, enzyme, carbohydrate etc.
- > As per food taking habitat the species are divided into 3 type ① herbivores ② Carnivores ③ Omnivores.

Food sources

we are getting food from following 3 ways.

- ① Food crops
- ② Live stock
- ③ Aquaculture.

World food problem :-

Before 21st century, it was felt that world food production is not sufficient for present population. Food production was less because people were using old techniques, seed etc. Later on when population pressure starts, the new ways of food production using fertilizers, pesticides, insecticides etc. are discovered to increase the yield.

- Environmental degradation like soil erosion, water logging, water pollution, salinity, affect agricultural land.
- Urbanization also affect agricultural land.

In world food summit, 1996 in Rome discuss over following point.

- ① Reduce world hunger
- ② Increase Agricultural supply and demand.
- ③ Population growth.

Types of Nutrition

- ① Nutritious nutrition / Balance diet
- ② Under nutrition.
- ③ Mal nutrition.

Changes caused by Agriculture in logical, social, local level.

- ① Deforestation.
- ② Soil Erosion
- ③ Depletion of nutrients.
- ④ water logging.
- ⑤ Salinity problem.
- ⑥ Fertilizers affect on soil, which include micro nutrients.
- ⑦ Pesticide related problem, ex - Producing biological waste, death of non-target organism, biological man. plant.

over grazing :-

→ It is the process of eating the forest vegetation without giving chance to regenerate.

→ It can be caused by having too many animals on the farm or by not properly controlling the grazing activity.

→ Reduction in growth and diversity of plant species.

→ Reduce plant cover leads to increased soil erosion.

→ Cattle trampling leads to land degradation.

Effect of modern Agriculture

For sustainable production, modern techniques are ~~called~~ used to enhance productivity of different cropping systems under different zones.

→ Adoption of modern agriculture has both positive & negative effect on environment.

(1) Soil erosion.

(2) Excess of fertilizers cause micronutrient imbalance.

(3) Nitrate pollution.

(4) Eutrophication.

Problem using Pesticides :-

→ Death of non target organism.

→ Producing new pest -

→ Risk of cancer

Biomagnification! - Most of the pesticides are non bio-degradable, keep on concentrating in the food chain and it is harmful to human being.

Modern farming has led to an increased potential for damage by pests and diseases, use pesticides to

Water logging:-

Excessive irrigation on poorly drained soils is water logging. This occurs in poorly drained soils where water cannot penetrate deeply.

Cause of water logging:-

1. Excessive water supply
2. Heavy rain
3. Poor drainage.

Remedy

1. Preventing excessive irrigation
2. Subsurface drainage technology.
3. Bio drainage facility.

Problem:- Due to water logging in soil, air spaces in soil are filled with water and plant roots can not get sufficient oxygen. Water logging also damage soil structure.

Salinity: — Due to adoption of intensive agriculture practice and increased concentration of soluble salts leads to salinity.

Due to salinity different type of soil are

- Saline soils
- Non saline alkali soils.
- Saline alkali soil.

Adverse effect of salinity

- Limiting choice of crop.
- causing low yields of crops or crops failure in extreme cases.
- Creating difficulties in construction of building.
- causing excessive run off and floods due to low filtration.
- causing nutritional imbalance and create diseases.

Energy resources: —

Energy is need by all living organisms and vegetation for bio chemical reactions of their cell.

- It is power which is needed in one form or other for work done.

- Energy is the prime input of a country

It is converted into heat & electricity and other form as per requirement.

Growing energy need

As economy grows, energy intensity rises following corresponding increase in energy consumption.

- 1 - Demographic changes, including a relatively faster growth in urban areas.
- 2 - Efficient end-use devices.
- 3 - Technological improvement in conversion - equipments

Basically total type of energy divided into two types
Renewable or non-conventional or in-exhaustible energy :-

→ These sources of energy are continuously replenished by natural processes.

→ These are the essential flow of energy.

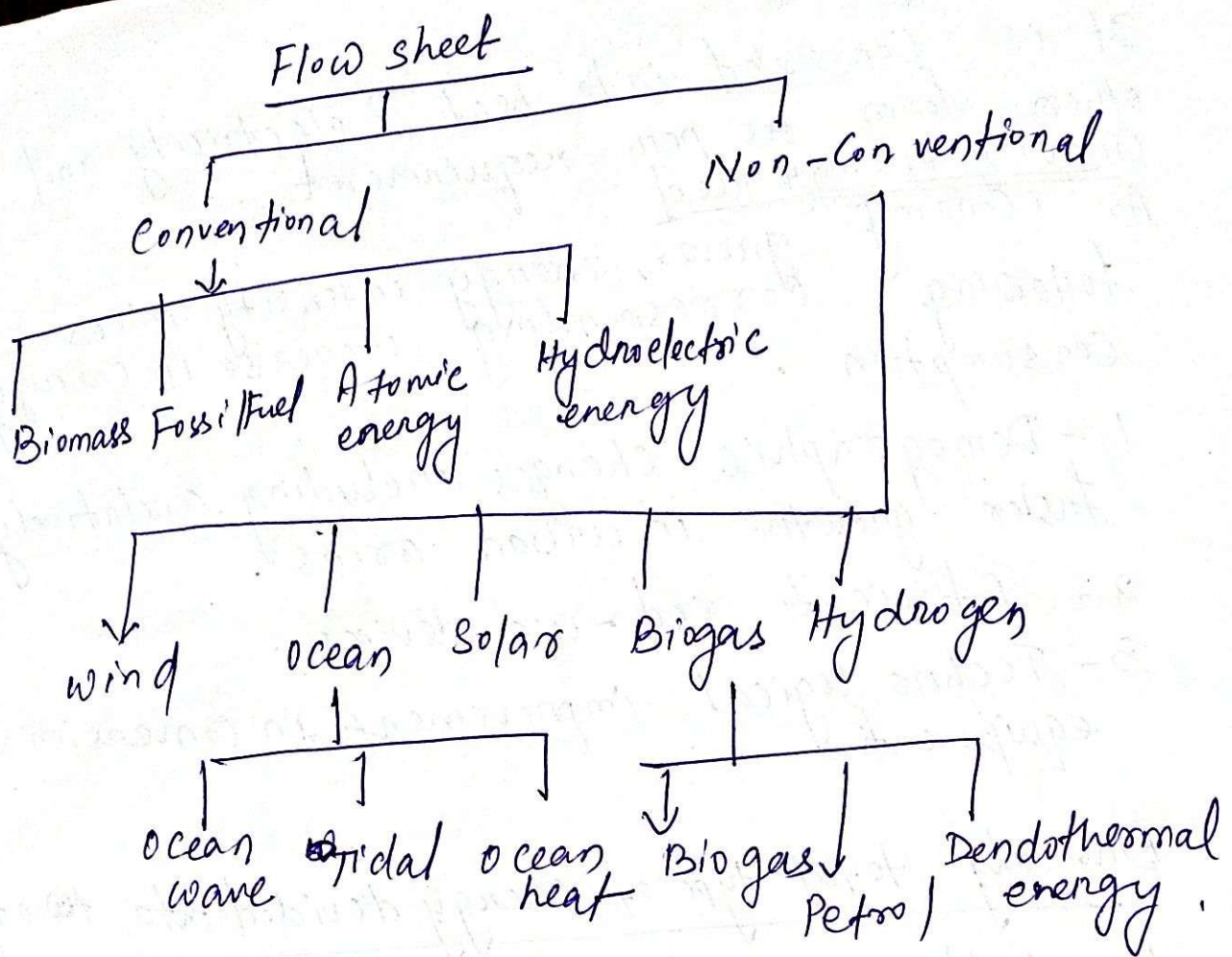
ex! - Solar energy, bio-energy, hydropower etc.

Non-Renewable or conventional or exhaustible energy

These sources of energy exhaust one day due to unlimited use.

ex! - Petroleum, natural gas, nuclear power, coal etc. These are traditional sources of energy. Limited in stock, takes million of years to form.

In Rural area :- Firewood, dung cake & agricultural wastes used for cooking & other household work.



Land Resources

99 India land is called Motherland. As it give food, shelter, fuel etc for live on earth.

→ It is a renewable resources.

→ It is an essential component of our life.

→ The top surfaces of the land is called soil.

There are 5 categories of land

→ forest land

→ cultivation land.

→ non-cultivated land

→ Grazing land.

→ barren land / un culturable land.

Factors on which measure the capability of Land.

- ex! - texture of Land / soil
- effective depth
 - Permiability of the top soil or sub soil.
 - extent of erosion.
 - degree of wetness
 - slope of Land
 - overflowing / flooding.

Land Degradation :-

Due to use and over exploitation Land resources are degraded. It is due to the more & more pressure with increasing population.

- soil formation is a very slow process. So ~~the~~ Land degradation, the fertility of soil are decrease.
- Land degradation is caused by erosion of soil, of soil, water runoff, vegetation by, shrinking of lakes etc.
- Agricultural land have been degraded to some an extent and converted to non-agricultural use such as homes, high ways, shopping centers etc.

- Different type of degraded land.
- water logged & marshy land.
 - shifting cultivation area
 - Grazing land.
 - steep sloping area.
 - mining / industrial.
 - Degraded forest

Man Induces land slides

A landslide is a sudden collapse of a large mass of hill side. Land slides mostly occur

- ① on steep slope
- ② on benches.
- ③ where drainage is causing a problem.
- ④ where land slide have occur before.
- ⑤ where certain geological condition exists.

Man can also cause slides by mining the earth, underground excavation, pumping and drawing ground water level, or over developing hill sides.

Effect :- Some of time thousands of people affect and killed due to land slides.

→ many houses can be damaged and loss of public properties is also notice.

Soil Erosion :- Soil Erosion means the removal of material from the surface of soil by the running water, wind and even by gravity.

→ The process of soil erosion involves definite loss of valuable plant nutrients.

different types :- geological erosion, Accelerated soil erosion, wind erosion, water erosion, slip erosion, streambank erosion.

Desertification: - It leads to the conversion of irrigated crop land to desert. It is characterised by loss of vegetable cover, depletion of ground water, Salinization and soil erosion.

→ Deforestation is also one of the cause of desertification.
Human activity and overgrazing is the cause of desertification.

Resources.

Ch-3

Ecosystem

- Ecosystem is derived from the term Ecology, which is a Greek word.
- It is a scientific study of the interaction of the organism with their physical environment.
- Ecology is the interrelationship between biotic and abiotic component of a ecosystem.

Ecology
oikos (home) logos (study)

ecosystem = eco (system)

↓ environment ↓ co-ordinate.

- Ecosystem is defined as community of organism interacting with one another and the environment in which they live (Study of home)

ex! - lion live in forest which is the forest ecosystem, similarly, river, pond, ocean, crop land, garden, city, aquarium etc.

→ Ecosystem is natural or artificial (human made)

→ It is also 2 types → open
→ cybernetic

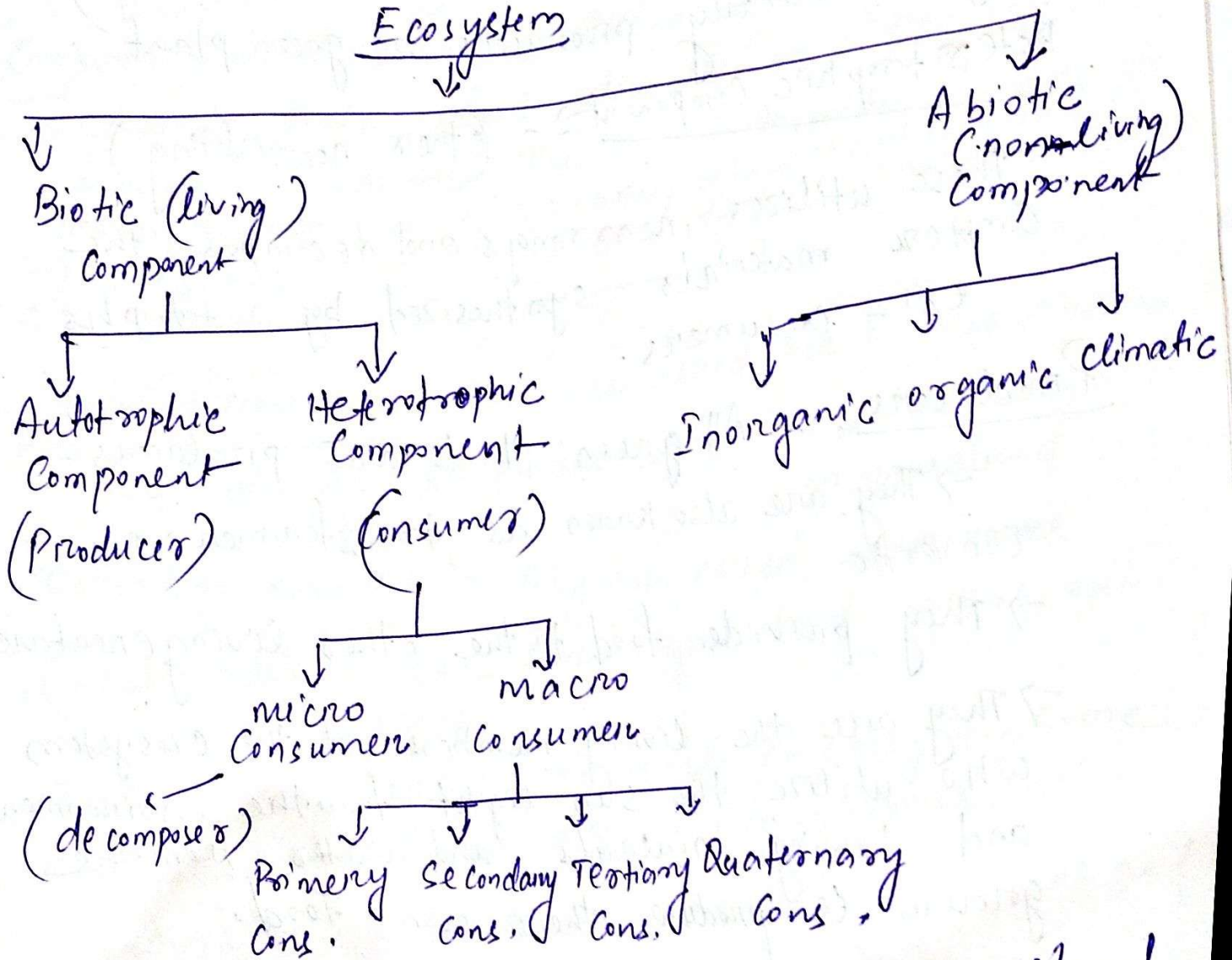
Function of an ecosystem :-

Ecosystem functions are exchange of energy and nutrients in the food chain. These exchanges sustain plant as well as the decomposition of organic matter and production of biomass.

Structure of an ecosystem

It is a description of species of organisms that are present (including information on their life histories & population) - It describes the relationship between the abiotic and the biotic components.

Ecosystem



Classification of ecosystem

① Natural ecosystem

Terrestrial ecosystem

grassland

Forest

Desert

② Man made ecosystem.

Aquatic ecosystem

Freshwaters

Marine

① Biotic structures - Biotic Structure includes plants, animals and micro organisms present in an ecosystem. we have identify producers, decomposers and consumers are the basic component of biotic system.

Autotrophic component :- (self-nourishing)
They are basically producers or green plant.

Heterotrophic component :- (other nourishing)

These utilizes, rearranges and decomposes the complex materials synthesized by autotrophs.
ex! - consumers.

Producers :- All green plants are producers.

-> They are also known as transfermer or converter.

-> They provide food to the other living creatures.

-> They are the living members of the ecosystem who utilize the sun light from the environment and taking minerals and water from the ground to produce their own food.

-> The process of producing food is called photosynthesis.
with the help of green pigment called chlorophyll

-> so the plants are called photo-auto-trophs
light self food,

Chemotrops - It is a technique through which the producers of the ocean ecosystem produce their food. They use the chemical energy instead of light energy from the sun to make their own food (H_2S)

Consumers :- Consumers are those who consume or derive their food directly or indirectly from the producers. The food is then digested i.e. broken down to simple substances which are metabolised in consumer body.
→ Consumers are of several types.

Primary consumers :- These are called herbivores which feed directly on producers, ex - cow or goat in grassland.

Secondary consumers :- They are called carnivores (meat eater) ex! - frog in grassland which eat insect.

Tertiary consumers :- In most of ecosystem some organism that eat other carnivorous.

omnivores :- A person or animal eating plants and animals is called omnivores.

Top carnivores :- Some ecosystem have animals like lion, which are not killed or rarely killed and eaten by other animals are called top carnivores.

Detritivores :- They consume nutrients by detritus. (decompose plants and animals parts)
ex! - ant, termites, crabs etc.

Decomposers: - They are mainly bacteria, and fungi, which is breakdown complex compound of dead protoplasm of producers and consumers to simple organic compounds and ultimately into inorganic nutrients.

Ex: - bacteria, fungi, mushrooms.

→ They are responsible for completion of ecosystem mineral cycle.

2) Abiotic components: -

The non living component of an ecosystem enter the body of living organism, take part in meta-bolic activity and then return to the environment. The abiotic component of the ecosystem divided into three portion.

1) Climate factors: - solar radiation, temperature, wind, water current, rainfall etc.

2) Physical factor: - light, fire, soil etc.

3) Chemical factor: - organic & inorganic substances.

Energy flow in ecosystem :-

Energy is needed for every biological activity. Solar energy is stored in plant tissue and then transform into mechanical and heat form during metabolic activity.

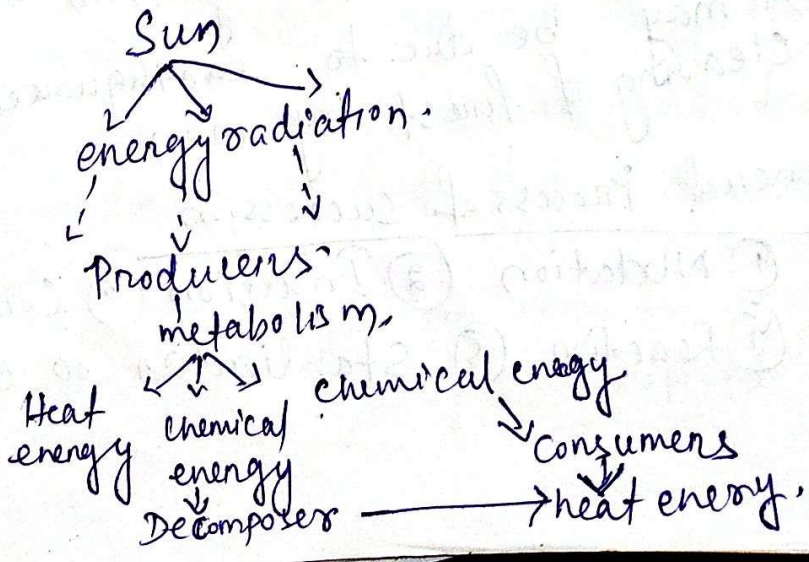
- In biological world the energy flows from sun to plants and then to all heterotrophic organisms like microorganism, animals and man i.e from producers to consumers.

→ 1% of total sunlight falling on the green plants is utilized in photosynthesis.

→ The flow of energy follows 2 laws of thermodynamics.

1st law :- This law states that energy can neither be created nor be destroyed but it can be transformed from one form to another.

2nd law :- The law states that energy transformation involves degradation or dissipation of energy from a concentrated to a dispersed form.



Ecological Succession :-

Ecological succession is the gradual continuous process by which ecosystem change and develop over time. Nothing remain the same and habitats are constantly changing.

→ It is an orderly process of community development that involves changes in species structure and community process with time.

2 types :-

Primary Succession :- It is the series of community changes which occur on an entirely new habitat which has never be colonized before.

Secondary Succession :- The term, secondary succession refers to community development on locations or site previously occupied by well developed communities. It occurs where a community has been disrupted and the surface is completely or largely devoid of vegetation.

→ It may be due to earthquake, fire or even clearing of forest by man.

General Process of Succession

(1) Mutation (2) Invasion (3) Competition

(4) Reaction (5) Stabilization or climax.

Food web

→ A food web is also known as food cycle.
→ It is a natural interconnection of food chains and representation of ~~what~~ ^{who} eat what in an ecological community.

→ It is a network of food chains where different types of organisms are connected at different trophic levels.

Types of food web

(i) Grass → Grasshopper → Hawk

(ii) Grass → Grasshopper → Lizard → Hawk

(iii) Grass → Rabbit → Hawk / vulture / man

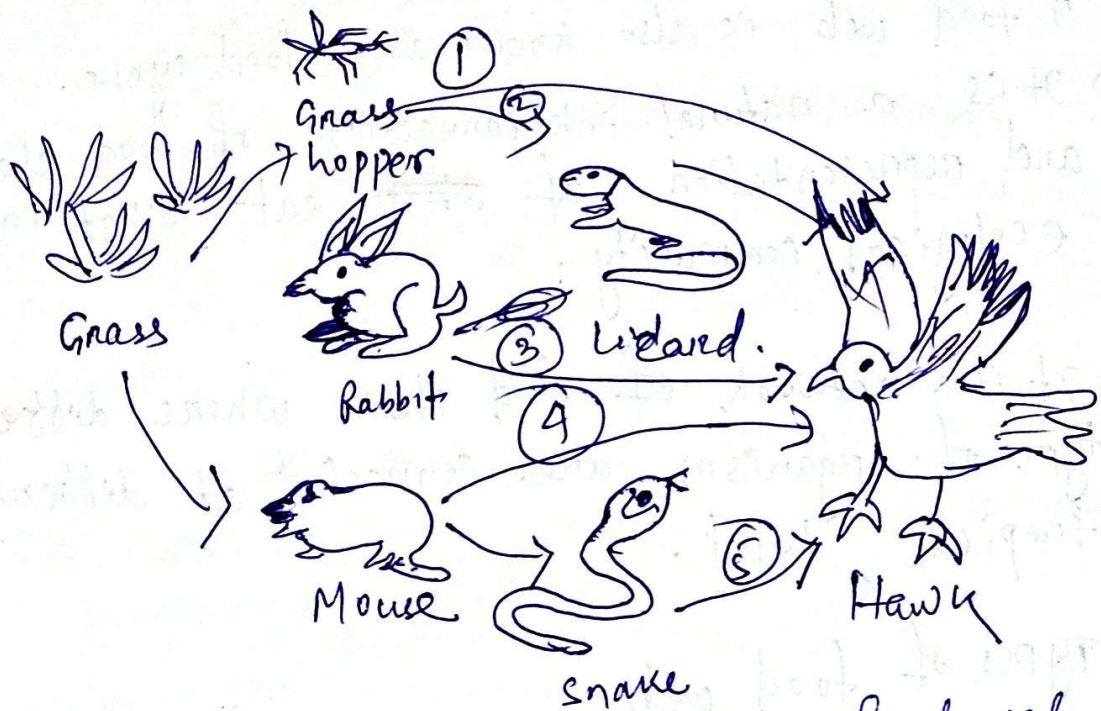
(iv) Grass → Mouse / Rat → Hawk

(v) Grass → Mouse / Rat → Snake → Hawk

(F) Always the food chain is interconnected with each other. It can not operate in isolate manner.

→ Food web shows same organism may operate in the ecosystem at more than one trophic level. It derived its food from more than one sources.

→ Even the same organism may be eaten by several organisms in higher trophic level.



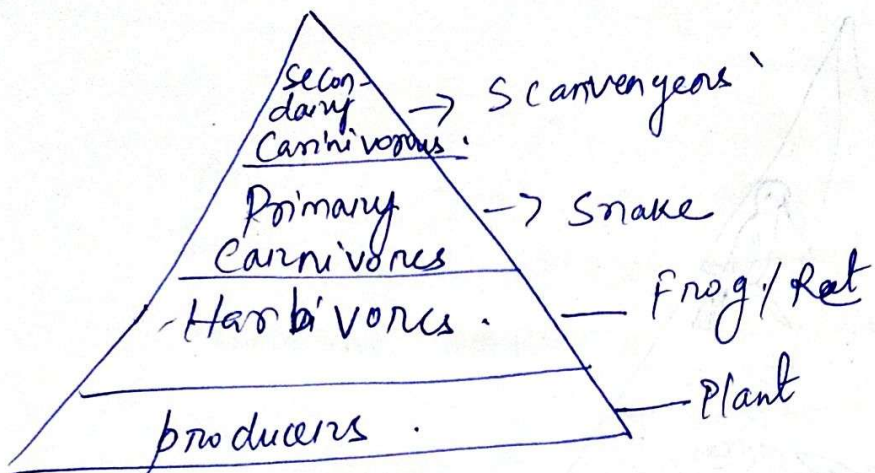
Ecological Pyramids → In food chain & food web the interdependency of different organism community when represented in a diagrammatic form then it is known as Ecological Pyramids.



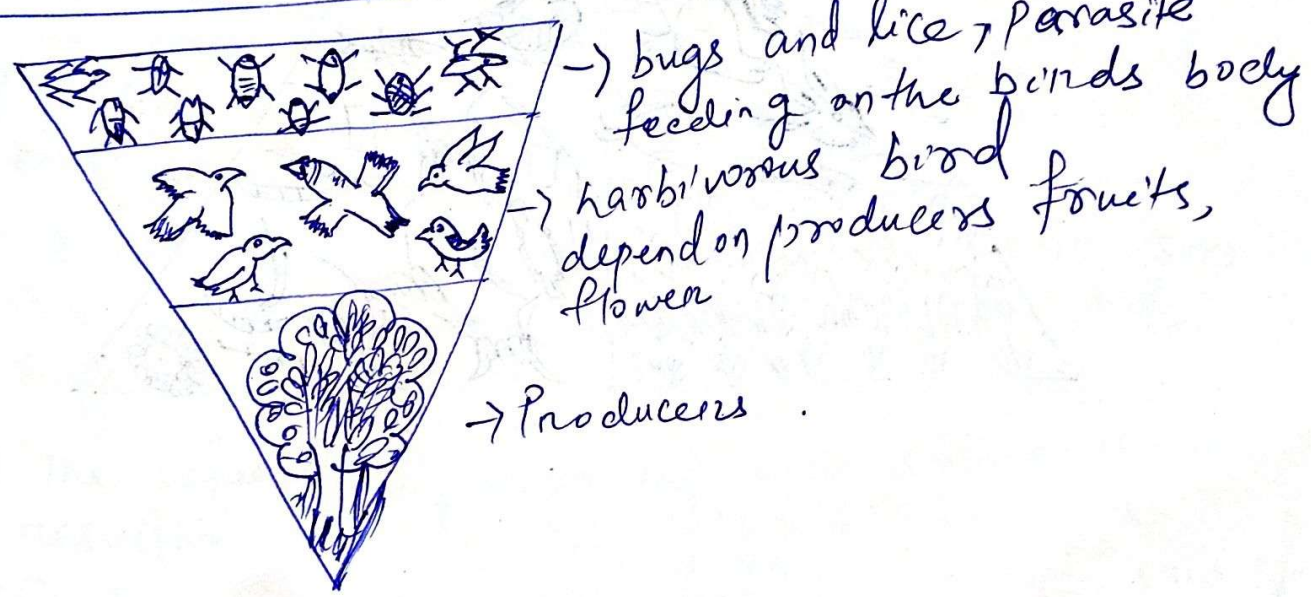
Pyramids of Numbers

This deals with the relationship between the numbers of producers, herbivores and carnivores at successive trophic level.

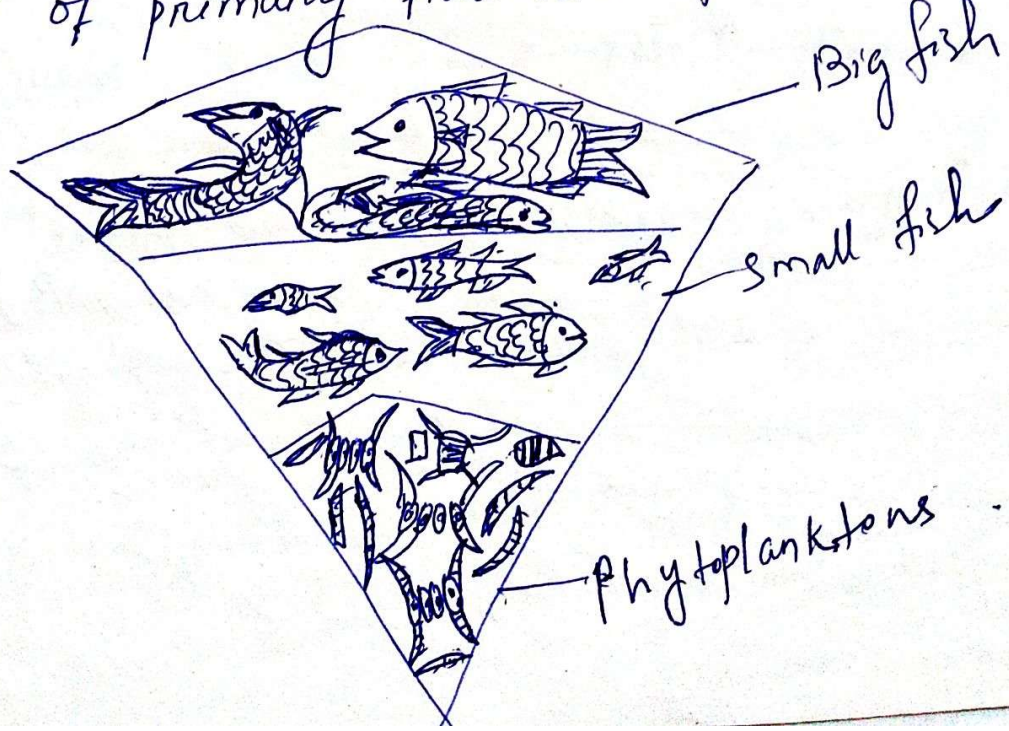
- There are 3 types of ecological pyramids
- ① Pyramids of Numbers
 - ② Pyramids of Biomass
 - ③ Pyramids of energy.



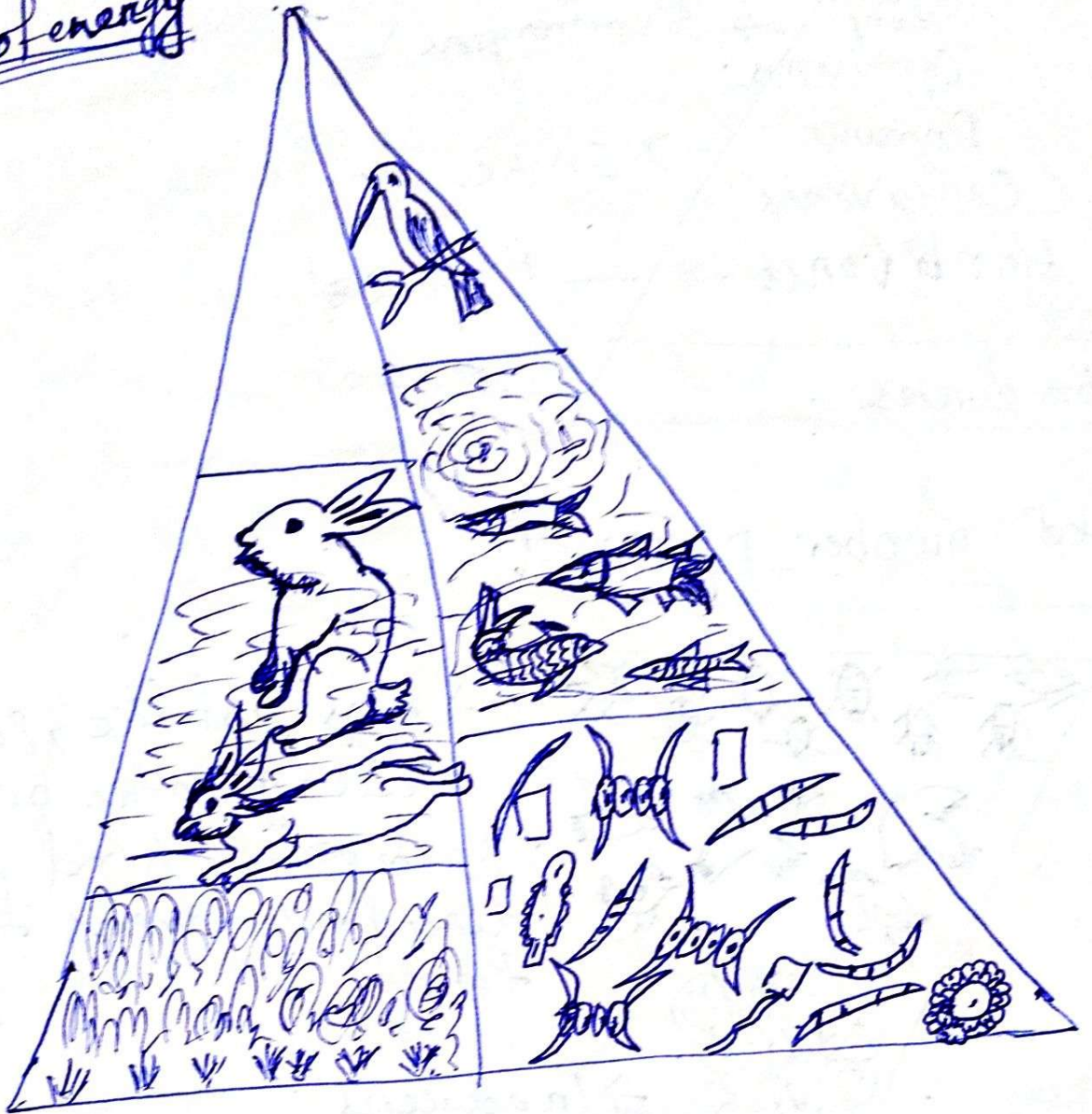
Inverted number pyramid



Pyramid ^① of Biomass ↓ - It deals with the weight of primary producers, from the base,



Pyramid of energy



Food chain

Anything which we eat to live is called food. Food contains energy, food can be transferred from one organism to the other.

→ The process of transfer of food from one organism to a series of organisms is called 'food chain'

→ A food chain always starts with a plant and ends with animal life.

→ A food chain also shows how the organisms are related with each other by the food they eat.

→ The sequence of eating and being eaten with the resultant transfer of energy is known as 'Food chain'. Thus in food chain organisms of an ecosystem are linked together. Each step is known as trophic level.

ex:- ① Grass → Rabbit → Fox → wolf → Lion.
(Grassland ecosystem)

② Phytoplanktons → water fleas → small fish → Tuna
(Pond ecosystem)

③ Lichens → reindeer → Man.
(Arctic Tundra)

Grazing food chain :- This type of food chain starts from green plant and ends with carnivores by passing through herbivores.

Detritus food chain :- It is derived from grazing food chain.

~~Food web~~

Different types of Ecosystem

Forest ecosystem :-

A forest ecosystem is a natural wood land unit consisting of all plants, animals, microorganism in that area functioning together with all of the non-living physical factors of the environment.

→ A forest ecosystem in fact encompasses all the interdependent living and non-living component of community and their function to balance a system.

Types of forest

- ① Tropical Rain forest
- ② Tropical seasonal forest.
- ③ Temperate Deciduous forest.
- ④ Boreal Forest.

Abiotic component :- These are inorganic or organic substances present in soil & atmosphere, minerals & dead organic material present in forest.

Biotic Component :-

Producers :- These are mainly trees. Trees are different kinds depending upon kind of forest. Besides trees, shrubs and ground vegetation are also present.

2. Consumers :-

- a) Primary Consumer! - These are herbivores that include animals feeding on tree leaves as ants, flies, beetles, leafhoppers, spider etc.
- b) Secondary Consumers! - These are carnivores like snakes, birds, lizards, fox etc feeding on herbivores.
- c) Tertiary consumers! - Top carnivores like lion, tiger etc. that eat carnivores of this level.
- ③ Decomposer! - Bacteria, fungi, microorganisms.

Aquatic Ecosystem

An aquatic ecosystem is an ecosystem in which water bodies, different organisms are interdependent on each other and on their environment to live.

Type of aquatic ecosystem

- | | |
|----------------------------|--------------------------|
| ① Pond ecosystem | } Fresh water ecosystem. |
| ② River ecosystem | |
| ③ Ocean ecosystem (Marine) | |
| ④ Lake ecosystem | |

- POND ECOSYSTEM
- This is a wide available ecosystem.
 - Ponds may be found in most regions of adequate rainfall.
 - Ponds are created by human for damming purpose.

Components of pond ecosystem

- ① Abiotic component -
- ② Biotic component.

Abiotic component :- Apart from heat, light, organic & inorganic compounds of water there are other compounds also present like - CO_2 , oxygen, calcium, nitrogen, etc.

Biotic Component :-

Producers :- autotrophic, green plants and bacteria.

④ Macrophytes :- These are rooted larger plants which include partly and completely submerged floating and emergent hydrophytes
ex: - Hydrilla, Chara, Marsilea

⑤ Phytoplankton :- These are minute floating or suspended lower plants like Ulothrix, Spirogyra, Cosmarium, etc.

Consumers: -

Primary Consumers: - Benthos, zooplanktons,

Secondary Consumers: - insects & small fish.

Tertiary Consumers: - Big fish which feed on small fish.

Decomposers: - Microorganism that decompose the things (bacteria, fungi)

STREAM ECOSYSTEMS

Most of streams of Urban area are polluted. Streams are fresh water aquatic system where water current is a measure controlling factor, oxygen and nutrients are in water.

(i) Current: -

velocity of current varies greatly in different parts of same stream and from one time to other. A large stream the current may be so reduced that virtually standing water.

(ii) land water interchange: - The land water surface

junction is relatively great in proportion to the size of stream habitat. Some time plankton and detritus coming in to streams from surface water.

(iii) Oxygen: - The small depth large surface exposed to the air and constant motion stream generally contain an abundant supply of oxygen even when there is no green plant.

Lake Ecosystem

It include living plants, animals and microorganism and chemical interaction.

→ Lake ecosystem is a fine example of lentic ecosystem.

→ Lake are vary in size and depth

→ some lakes wave outlet streams.

→ some lakes wave inlet streams.

There are different level of lakes.

- (1) Littoral zone:
- (2) Sublittoral zone:
- (3) Limnetic zone:
- (4) Profoundal zone.

Lake are inland depression & containing standing water.

Biotic communities of lake:-

- (i) Neustons:- These include floating plant such as duckweeds
- (ii) Planktons:- These are small plants and animals whose powers of self locomotion is very limited.
- (iii) Nekton:- These animals are swimmers.
- (iv) Benthos:- These include the organism living at the bottom of water mass.

MARINE ECOSYSTEM

- Marine ecosystem generally found in ocean surface.
- Ocean covers 70% of earth surface.
- All the sea are interconnected by current, waves and tides.
- It carry a large & stable ecosystem.
- Ocean play an important role to control the ecosystem by regulating biogeochemical and hydrological cycle.
- It also contain
 - biotic component
 - Abiotic component

Abiotic component: - The volume of surface area of marine environment lighted by Sun which is small in comparison to total volume of water involve.

Biotic component: -

Producers: - These are autotrophs which are mainly phytoplankton. Phytoplankton produce food from sun through their pigments.

→ Here also different zones are found at different level of water.

Consumers: - Primary Consumers: - molluscs, fishes,

Secondary Consumers: - crustaceans
Big fish (Shad, herring)

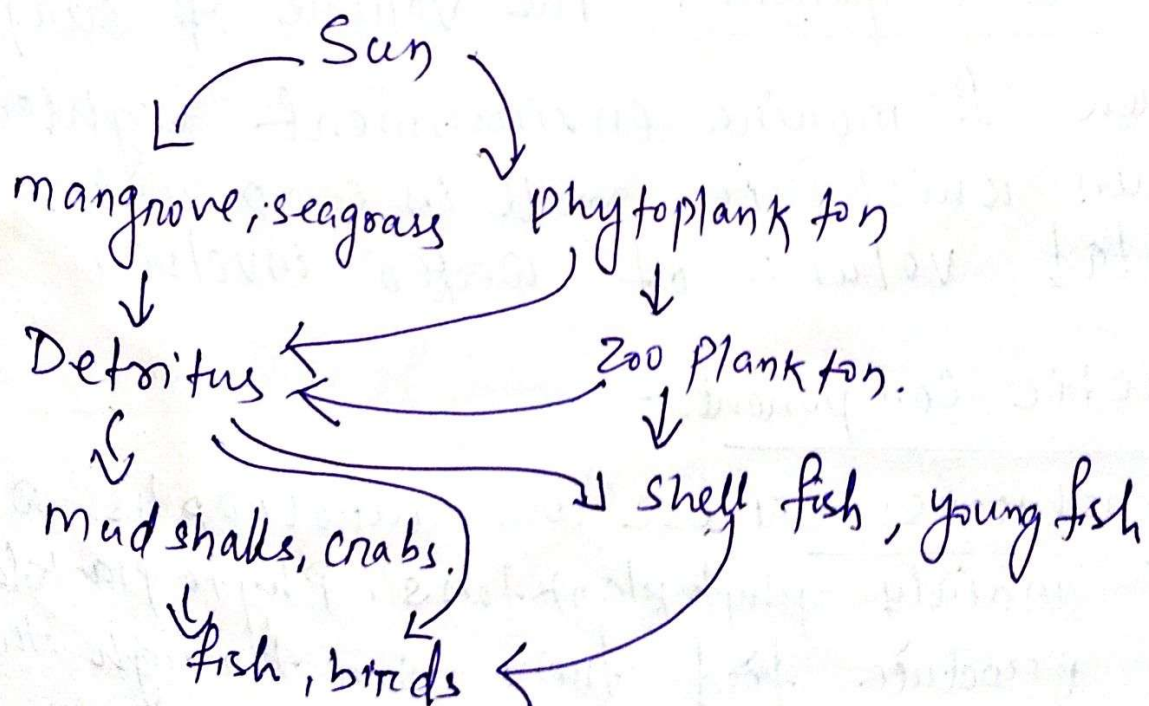
Decomposers: - Tertiary Consumers: - Big fish than secondary consumers
Fungi & bacteria which decay dead organic matter.
Caddoc - Cod fish

ESTUARIES (ESTUARINE ECOLOGY)

Estuarine define as a semi enclosed coastal body of water, which has a free connection with the open sea. It is strongly affected by tidal action and within it seawater. i.e mixed with fresh water from land drainage. Ex! - River mouths, coastal bays, tidal marshes and bodies of water behind barriers beaches.

Biotic Community of estuaries

Estuarine ecosystem is a complex ecosystem



Biodiversity & its conservation -

Biodiversity may be defined as, Biological diversity means the variability among living organisms from all sources including, terrestrial, marine and other ecosystems and the ecological complexes of which they are part, this includes diversity within species between species and of ecosystem.

Biological diversity is the total variety of life on our planet. Total number of races, varieties or species. i.e. the sum total of various types of microbes, plants, animals present in a system is referred as biodiversity.

Genetic, species, and Ecosystem diversity:-

Biodiversity is usually analysed at 3 levels, i.e. species, genetic and ecosystem.

1. ~~Diversity at genetic organization within a species -~~

• Genetic diversity - Genetic diversity is the variety of genes within a species. Each species is made up of individuals that have their own particular genetic composition. This means the species may have different populations, each having different genetic compositions. To conserve genetic diversity, different populations of a species must be conserved.

• Species diversity - species diversity is variety of species within a habitat or a region. Species are the basic units of biological classification and normal measure of biological diversity. The world total is estimated at 5 to 10 million species, though only 1.75 million have been named scientifically so far.

Ecological diversity:-

Ecosystem diversity is the variety of ecosystems in a given place. An ecosystem in a given place. An ecosystem is a community of organisms is a community of organisms and their physical environment interacting together.

An ecosystem cover a large area, such as a whole forest, or a small area, such as pond.

Biogeographical classification of India:-

India is one of the 12 mega-biodiversity countries in the world. The country is divided into 10 biogeographical regions. The wide variety according to physical features and climatic conditions have resulted in a diversity of ecological habitats like forests, grasslands, wetlands, coastal and marine ecosystems and desert.

The following 13 biogeographical regions have been identified in India:-

1. Himalaya.
2. The desert.
3. Deccan Peninsula.
4. Malabar.
5. Andaman Island.
6. Nicobar Islands.
7. Gangetic Plains.
8. Laccadive Islands.
9. Maldiva Island.
10. Western Ghats.
11. Bangalian forests.
12. Marine Coast.
13. Coromandal Mahanandian.

Value of biodiversity:- Biodiversity is the valuable natural resources for the survival of mankind. So man has domesticated a number of economically important plants and animal species.

Consumptive value:- Most of developing countries obtain fuel wood from forest.

Hunting of wild life, ~~use of grass~~, wood is used for fuel, ^{use of grass} with some commercially important plants as fodder are of only comptive.

• Various tribal society fully depend on forests. They used tubers, roots, fruit, seeds and meat of wild animals as their food.

Productive value- Bamboos, grasses, canes, essential oils, gums, resin, drugs, poisons, insecticides, Rudraksha, honey and other flower or seeds are forest products, they have high commercial values. Various animal body parts are sold in commercial market, both at national & international levels.

Social value:- The biodiversity has distinct social value attached with different societies. Goods and services provided by ecosystem to our society include:-

- * Provision of food, fuel & timber.
- * " " " shutter & building material.
- * Purification of air & water.
- * Decomposition of wastes.
- * Generation and renewal of soil fertility including nutrient cycling.
- * Control of pests & diseases.
- * Stabilization of earth's climate.

* The loss of biodiversity threatens our existence i.e. social life. Thus protecting biodiversity is in our self interest.

Ethical values:-

Ethical or religious values is also one of the indirect values of biodiversity. The ethical value of biodiversity is ~~more~~ understanding that humanity is part of nature and that we are just one species among others.

Ex- Christian belief, Conserving biodiversity.

Aesthetic value:-

The aesthetic value of biodiversity has been expressed in many ways through art, poetry, songs, literature, music, dance. Many types of trees are worshipped in tribal & Hindu societies. i.e. Peepal, Tulsi etc. Some animals like Cow is worshipped by Hindus in all over India. In series of many birds, colourful butterflies, mammals have great aesthetic value for human being.

Option value:- Option value is indirect value of a species to provide an economic benefit to human society at some point in near future.

* A person's ~~value~~ ^{willingness} to pay to preserve the option ~~value~~ of having an

It is a person's willingness to pay to preserve option of resource available for future use.

Biodiversity Global level.

* It is estimated that there exists 5-30 millions species of living forms on our earth and of these only 1.5 million have been identified and include 30,000 species of green plants & fungi, 80,000 species of insects, 40,000 species of vertebrates and 3,60,000 species of microorganisms. The data related to different species in different parts of world are different.

Biodiversity national level

India is bounded by Himalayas in the north, the bay of Bengal in east, the Arabian sea in the west, and Indian ocean in the south. The wide variety in physical features and climatic situation have resulted in a diversity of ecological habitats.

Biodiversity at local level

* We can also study the local biodiversity on following items

- * Richness of species at a given place.
- * Physical characteristics of habitat and vegetation in particular area.
- * Change in species composition across different habitats
- * Local diversity based on climate, geographical, ecological & other process responsible for creation.

Threats of Biodiversity:-

Biodiversity is under serious threat as a result of human activity. The main dangers world wide are population growth and resource consumption, climatic change, global warming, habitat conservation and urbanisation, over exploitation of natural resources, and environmental degradation.

Habitant loss:- It is process by which natural habitat becomes incapable of supporting its native species. Habitant loss by human activity is mainly for the purpose of harvesting natural

resources for industrial production and urbanization. Clearing habitat for agriculture is the principal cause of habitat loss. Other causes of habitat loss include mining, logging etc.

Poaching of wild life:-

It has been defined as the illegal hunting or capturing of wild animals ~~mainly associated~~ ^{mainly associated} with ~~hunters~~ As an ancient period, hunters, collectors, & smugglers are a severe threat to a number of species including endangered species. They collect furs, hides, horns, are smuggled to other for millions dollars. Now it is an illegal trade & internationally banned.

Manwild life conflicts:-

- * Due to habitat loss animals come out of the forest and destroy the crops later on they become danger to human being. Villagers & affected people kill them.
- * The elephants & other wild animals suffer pain & violent when they come to destroyed the electric fenced crop field. It is noted that ill, weak & injured animals have tendency to attack man.