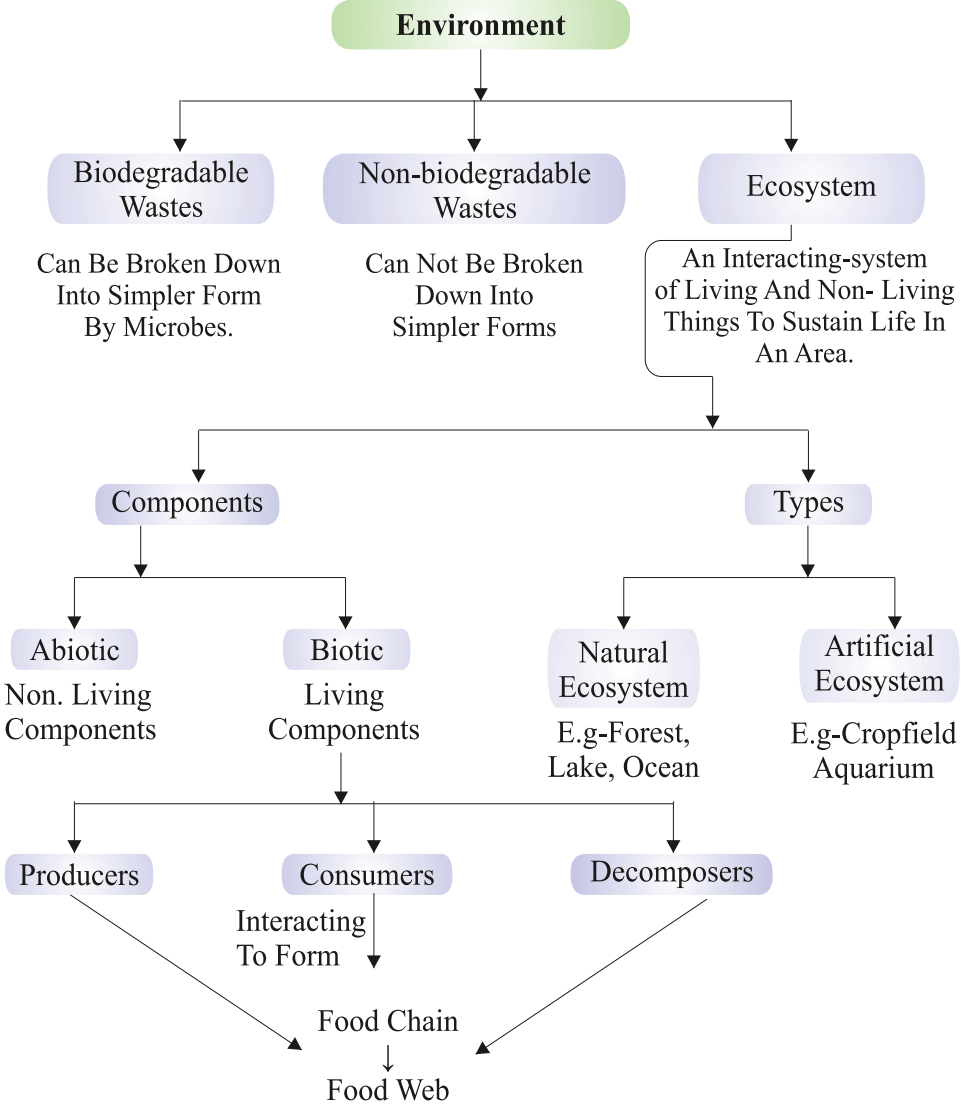
Chapter - 13

Our Environment



- Everything that surrounds us is environment. It includes both living (biotic) and non-living (abiotic) components.
- Interaction between these biotic and abiotic components form an ecosystem.
- In an ecosystem living components depend on each other for their food which give rise to food chains and food webs in nature.
- Human activities lead to environmental problems such as depletion of ozone layer and production of huge amount of garbage.

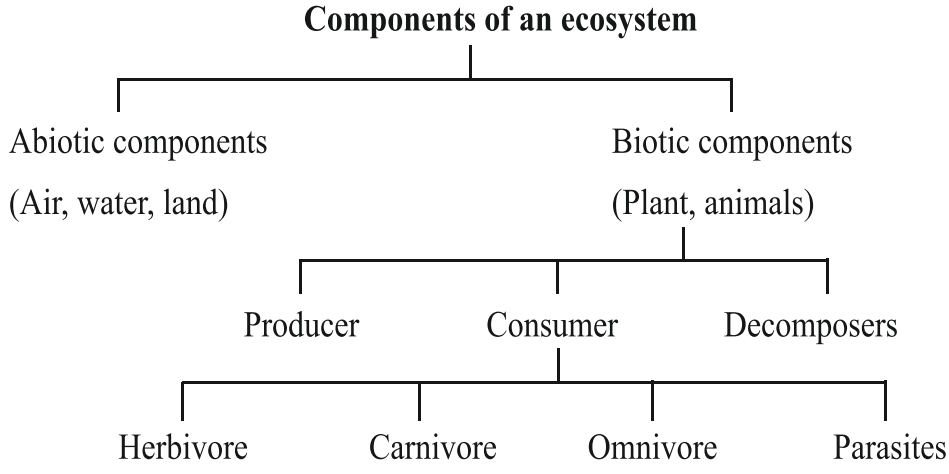
Ecosystem

All the interacting organisms in an area together with the non-living constituents of the environment form an ecosystem. *E.g.,* forest, pond temperature, rain, air, soil and all living organisms.

Types of ecosystem : It is of two types :

(a) Natural ecosystem : The ecosystem which exist in nature on its own. *E.g.,* forest, lake, ocean.

(b) Artifical ecosystem : Man-made ecosystems are called artificial ecosystem. *E.g.,* crop field, aquarium, garden.



(a) **Abiotic Components :** All the non-living components such as air, water, land, light, temperature etc. form the abiotic components.

(b) **Biotic Components :** All the living components such as plants, animals, bacteria, fungi etc. form the biotic components.

On the basis of nutrition biotic components are further divided into :

Producers : All green plants and blue-green algae can produce their own food using abiotic components (photosynthesis), hence called producers.

Consumers : Include all animals which depend on producers directly or indirectly for their food.

Consumers are further divided into :

(i) **Herbivores :** Plant eaters *e.g.,* goat, deer.

(ii) **Carnivores :** Flash eaters *e.g.,* tiger, crocodile.

(iii) **Omnivores :** Eats both plants and animals *e.g.,* human.

(iv) **Parasites :** Live on the body of host and take food from it, *e.g.* lice, cuscuta.

Decomposers : Include organisms which decompose the dead plants and animals *e.g.,* bacteria, fungi. These help in the replenishment of natural resources.

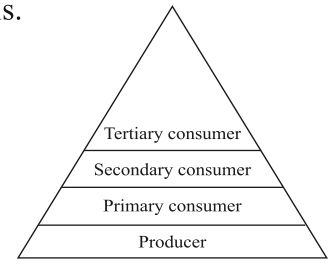
FOOD CHAIN

- Food chain is a series of organisms in which one organism eats another organism as food. *e.g.,*
  Grass $\rightarrow$ Deer $\rightarrow$ Lion
- In a food chain various steps where transfer of energy takes place is called a trophic level.

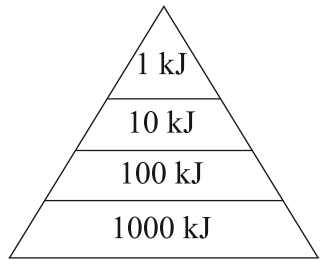
Flow of energy between trophic levels

- Flow of energy in a food chain is unidirectional.
- Green plants capture 1% of sunlight and convert it into food energy.
- **10 percent law :** Only 10% of energy is transferred to the next trophic level. The remaining 90% energy is lost as heat to the environment. Some amount goes into digestion and in doing work and the rest goes towards growth and reproduction.
- An average of 10% of the food eaten is turned into its own body and made available for the next level of consumers.

- Due to this gradual decrease in energy, food chains contain 3-4 trophic levels.



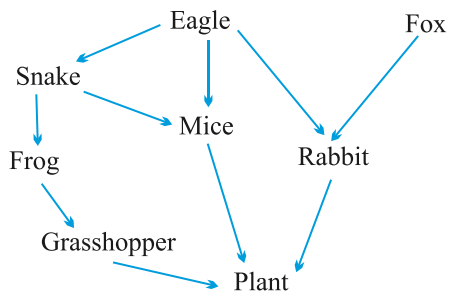
Trophic levels



Decrease in energy

- **Biological magnification :** The concentration of harmful chemicals increases with every next trophic level in a food chain. This is called biological magnification.
- Maximum concentration of such chemicals get accumulated in human bodies as human occupy the top level in any food chain.

Food web : In nature large numbers of food chains are interconnected forming a food web.



Food web

Environmental problems : Changes in the environment affect us and our activities change the environment around us. Human activities leads to pollution, deforestation etc.

Ozone layer

- Ozone layer is a protective blanket around the earth which absorbs most of the harmful UV (ultraviolet) radiations of the sunlight, thus protecting living beings from many health hazards such as skin cancer, cataract, weak immune system destruction of plants etc.
- Ozone (O_3) layer is present at higher levels of atmosphere (*i.e.,* stratosphere). It is a deadly poison at ground level.

Formation of ozone molecule

(i) The high energy UV radiations break down the O_2 molecules into free oxygen (O) atoms.

$$O \xrightarrow{UV} O + O \text{ (atoms)}$$

(ii) These oxygen atoms then combine with oxygen (O_2) molecule to form the ozone molecule.

$$O_2 + O \rightarrow O_3 \text{ (ozone)}$$

Depletion of ozone layer

- The decrease in the thickness of ozone layer over Antarctica was first observed in 1985 and was termed as ozone hole.
- This decrease was linked to excessive use of synthetic chemicals like chlorofluorocarbons (CFCs) which are used in refrigerators, ACs, fire-extinguishers, aerosols sprays etc.
- In 1987 United Nations Environment Programme (UNEP) succeeded in forging an agreement to stop CFC production at 1986 levels (KYOTO PROTOCOL) by all countries.

Garbage disposal

Garbage disposal is a main problem of today which effects our environment. Improvements in lifestyle have resulted in accumulation of large amounts of waste materials.

Garbage contains following type of materials :

(a) **Biodegradable :** Substances which can be decomposed by the action of micro-organisms are called biodegradable wastes.

E.g., fruit and vegetable peels, cotton, jute, dung, paper, etc.

(b) **Non-biodegradable wastes :** Substances which cannot be decomposed by the action of micro-organisms are called non-biodegradable wastes.

E.g., plastic, polythenes, metals, synthetic fibres, radioactive wastes, pesticides etc.

Micro-organisms release enzymes which decompose the materials but these enzymes are specific in their action that's why enzymes cannot decompose all the materials.

Some methods of waste disposal

(a) **Biogas plant :** Biodegradable waste can be used in biogas plant to produce biogas and manure.

(b) **Sewage treatment plant :** The drain water can be cleaned in sewage treatment plant before adding it to rivers.

(c) **Land fillings :** The wastes are buried in low lying areas and are compacted by rolling with bulldozers.

(d) **Composting :** Organic wastes are filled in a compost pit and covered with a layer of soil, after about three months garbage changes to manure.

(e) **Recycling :** Non-biodegradable wastes are recycled to make new items.

(f) **Reuse :** It is a conventional technique to use an item again *e.g.,* newspaper for making envelops.

(g) Incineration: It is a waste treatment process that are described as themal treatment, it converts the waste into ash mainly it is used to transforms medical wastes.

QUESTIONS

Mutiple Choice Question

1. Which pollutant released into the air during refrigeration and airconditioning is the greatest contribute to the depletion of ozone layer?
   (a) BHC (b) DDT
   (c) CFC (d) NEP
2. What percentage of sun's energy falling on the leaves of green plants is utilised by the plants in the process of photosynthesis and stored as chemical energy of food?
   (a) 99% (b) 10%
   (c) 1% (d) 20%
3. The flow of energy is an ecosystem is always
   (a) Unidirectional (b) Bidirectional
   (c) Cyclic (d) Multidirectional
4. If the energy transferred to a tertiary consumer in a food chain is 10J. How much enegy was available to the primary consumer?