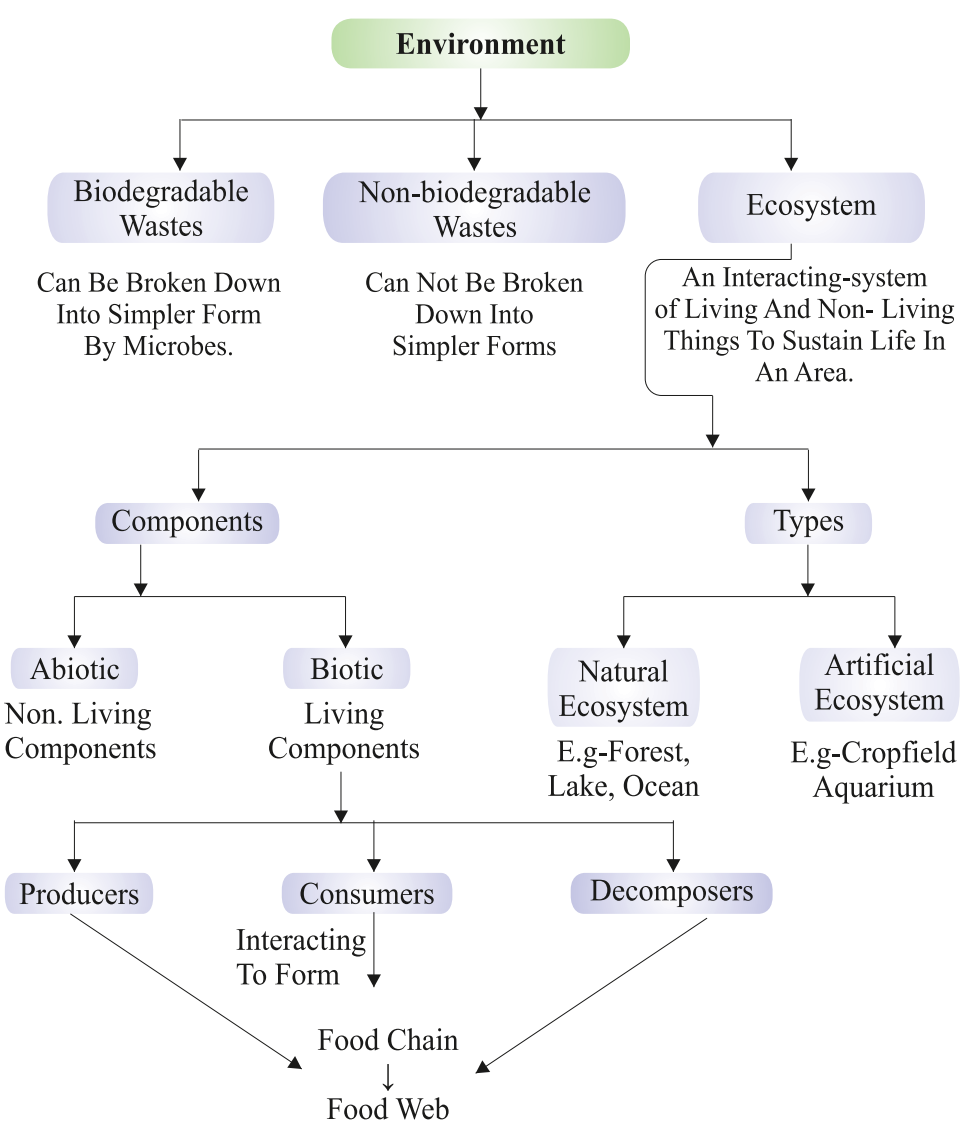
Chapter - 13

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.

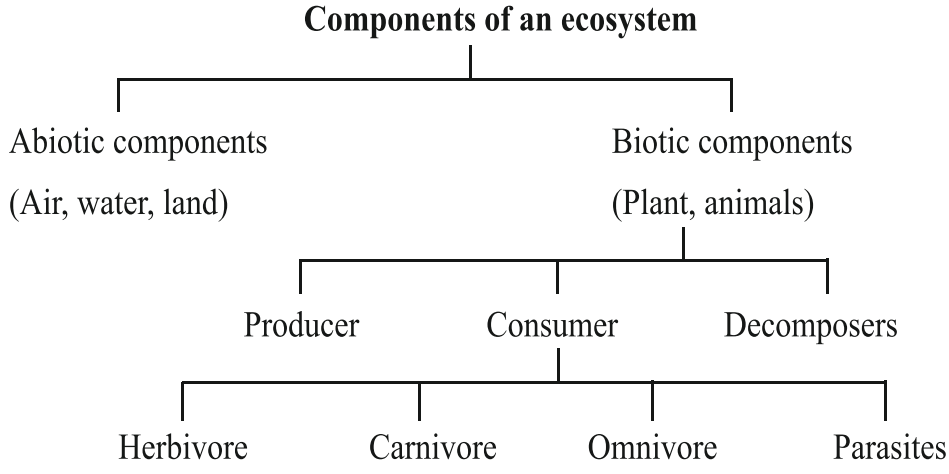
Ecosystem

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.

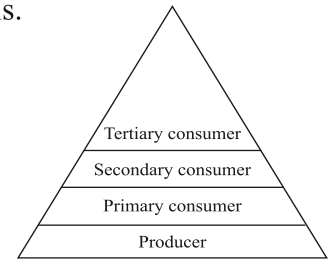
FOOD CHAIN

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

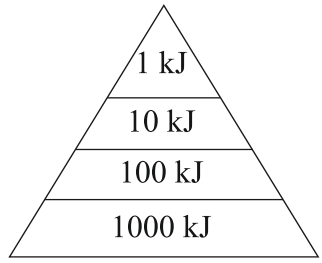
Flow of energy between trophic levels

- 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.



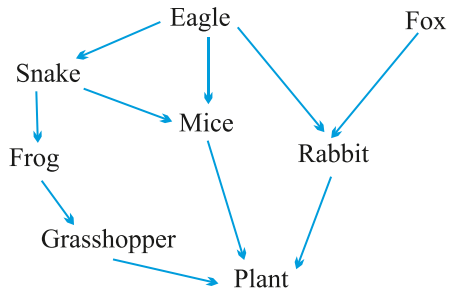
Trophic levels



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?

(a) 100J (b) 500J

(c) 1000J (d) 5000J

5. The ten percent law is associated with

(a) Transfer of energy from various trophic to decomposers in a foodchain.

(b) Transfer of ATP energy into muscular enerrgy

(c) Transfer of chemical energy from one organism to another

(d) Transfer of sun's energy to the organisms called producers.

6. O_2 converted into O_3 by the action of

(a) Infrared radiations (b) Ultraviolet radiations

(c) Gamma radiations (d) Cosmic radiations

7. As human being occupy the top level in any food chain, the maximum concentration of insecticides get accumulated in our bodies. This phenomeon is known as.

(a) Pollution (b) Eutrophication

(c) Biological magnification (d) None of these

8. Which one of the following is as artificial ecosystem?

(a) Pond (b) Crop field

(c) Lake (d) Forest

9. What provides the energy which then flows through a food chain?

(a) Glucose (b) Oxygen

(c) Respiration (d) Sunlight

10. Which of the following is the best method to dispose of biological wastes from hospitals?

(a) Landfill (b) recycling

(c) incineration (d) composting

11. Which of the following is biodegradable.

(a) Plastic mugs (b) Leather belts

(c) Silver foil (d) Iron nails. &

Answers

1. (c) 2. (c) 3. (a) 4. (c) 5. (c) 6. (b) 7. (c) 8. (b) 9. (d) 10. (c) 11. (b)

Competency Based Question:

Ultraviolet radiation could destroy the organic matter Plants and planktons cannot thrive, both act as food for and sea animals respectively. For humans excessive exposure to ultraviolet radition leads to higher risk of skin cancer and cataracts. it is calculated that 1% decreases in ozone layer results in a 2–5 percent increase in the occurrence of skin cancer. other ill-effects of the reduction of protective ozone layer include-increase and suppression of the immune system.

a. How is ozone formed in the atmosphere?

b. What damages ozone layer?

(a) Choloroflurocarbons (b) Nitric oxide

(c) Free radicals of chlorine (d) All of them

c. Which of the following is global step that has been taken by the world to reduce ozone depletion?

(a) KYOTO protocol (b) Gothenberg protocol

(c) Montreal protocol (d) Aarhus protocol

d. In which layer of the atmosphere ozone layer is delpleting?

(a) Ionospehere (b) Stratosphere

(c) Lithosphere (d) Thermosphere

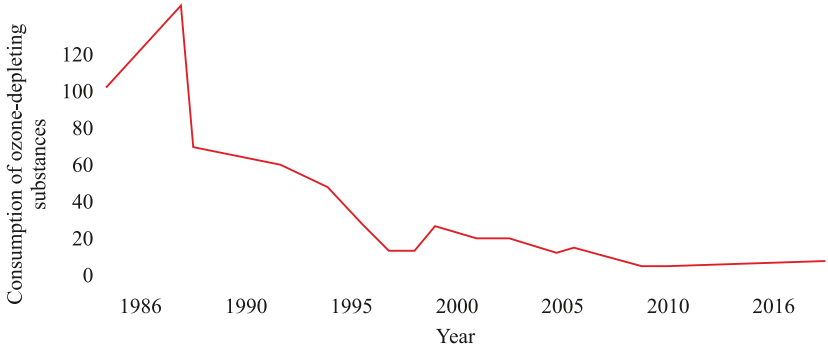
e. In the following graph shown, the magnitude of global decline in consumption of ozone deplecting substances (ODS) is shown. Study the graph and state during which period there is a sharp rise and a rapid decline seen in their consumption.

(a) During 1986–87 and 2000–2005

(b) During 1987–88 and 2016–2017

(c) During 2000–2001 and 2010

(d) During 1990–91 and 2016



Read the assertion and reason carefully and then mark the correct option out of the options given below :

(a) Both (A) and (R) are true and (R) is correct explanation of the assertion

(b) Both (A) and (R) are trrue but (R) is not correct explanation of the assertion

(c) (A) is true but (R) is false

(d) (A) is false but (R) is true

1. Asseration (A) : Decomposers act as cleaning system of envioronment

   Reason (R) : The decomposers cycle waste material only in hydrosphere.

2. Asseration (A) : Human beings occupy the top level in all food chain

   Reason (R) : The flow of energy in a food chain is unidirectional.

3. Asseration (A) : Some substances in nature are biodegradable while some are non-biodegradable.

   Reason (R) : The bacteria acting on the substances breakdown only the substances made from natural materials.

4. Asseration (A) : All green plants and certain blue-green algae can produce food by photosynthesis.

   Reason (R) : Due to Presence of cholorophyll.

5. Asseration (A) : The disposal of waste we generate is causing serious environmental problems.

   Reason (R) : We should reduce the waste generated.

Answers

1. (c) 2. (b) 3. (b) 4. (a) 5. (a)

1 Marks Question

1. Classify the following into biotic and abiotic components: Water, air, animals, Temperature, Plants, Soil.
2. Make a food chain with following organism-

   Snake, Grass, Eagle, Frog, Grass Hopper.

3. How much energy is transferred to the next trophic level

   (a) 1% (b) 90%

   (c) 10% (d) 100%

4. CFC Causes depletion of
   (a) Ozone (b) Oxygen
   (c) Nitrogen (d) None of these
5. The concentration of harmful chemicals increases with energy next trophic level in a food chain. Name this process.
6. Name two materials which can be recyled.
7. Define trophic level.
8. What is the full form of CFC and UNEP?
9. Name the radiations that are absorbed by the ozone layer.
10. Which will get more energy secondary consumers or tertiary consumers?
11. What is the functional unit of environment.
12. Which of the following are non biodegradable.
    Wool, Glass, Silver foil, Leather
13. Name any two parasites
14. What is KYOTO protocol?

Answers

1. Abiotic-Soil air, water temperature Biotic- Plants, animals
2. Grass → grasshopper → frog → snakes → eagle
3. 10%
4. a
5. Biological magnification
6. Paper, Plastic

2 Marks

1. Explain how does making of Kulhads affects our environment?
   (CBSE 2013)
2. What will happen if all the phytoplanktons are eliminated from pond?
3. State two differences between a consumer and producer.
4. Draw the line diagram showing flow of energy is an ecosystem.
5. Define a food web. State its significance for ecosystem.
6. What are phytoplanktons.
7. Name two natural ecosystem.

8. What is an ecosystem? List its two main components.
9. We do not clean ponds or lakes, but an aquarium. needs to be cleaned regularly explain.
10. In the following food chain 20J of energy was available to the hawks. How much would have been present in the plants?

Plants → Rats → Snakes → hawks.

SHORT ANSWER TYPER QUESTIONS

1. Why are green plants called producers?
2. Name two matrerials which can be recyled.
3. What will happen if we kill all the organisms of a trophical level?
4. Why only 10% energy is transferred to the next trophic level?
5. Which bag will you prefer for shopping and why?

   (a) Jute bag (b) Polythene bag
6. Why is ozone layer important for the existence of life on earth?
7. What is the role of decomposers in ecosystem?
8. Draw an energy pyramid showing different trophic level.
9. Differentiate betweem biodegradable waste and non-biodegradable waste.
10. How ozone molecule is formed in the atmosphere?
11. Define consumers. What are its further divisions?
12. Why natural ecosystem is more stable than artificial ecosystem?
13. Why some materials are not decomposed by the action of micro-organisms?
14. What is a food web? Explain with example.
15. Give any two ways in which non-biodegradable wastes would affect the environment.
16. How the components of an ecosystem are dependent on each other?

LONG ANSWER TYPE QUESTIONS

1. What are different methods for disposal of garbage?
2. What is food chain? Give its characteristics. Explain how energy flows through different trophic levels a food chain.
3. Explain how harmful chemicals enter our body.

Hints to Long Answer Type Questions

1. Methods for Garbage disposal :

Land filling	Compositing
Recycling	Resuse
Biogas plant	Sewage treatment plant

2. Food Chain : Transfer of energy through various trophic level in an ecosystem.

   Characteristics : (i) Unidirectional

   (ii) 1% of total solar energy is absorbed by plants.

   (iii) Transfer of energy throgh various trophic level is in accordance with 10 percent law.

3. Bio magnification