Class 10th

BIOLOGY

(SHORT NOTE)

OUR ENVIRONMENT

1. Ecosystem and its component:

Ecosystem is a self-reliant unit of living things and their non-living environment. Thus, an ecosystem consists of biotic components comprising living organisms and abiotic components comprising physical factors like temperature, rainfall, wind, soil and minerals etc.

COMPONENTS OF ECOSYSTEM

Each and every ecosystem consists of several components to sustain it for long duration. It requires matter such as water, oxygen, mineral, and carbon dioxide; different types of organisms (bacteria, plants, animals) and continuous recycling of energy.

These requirements are met by two important components present in ecosystem; biotic components and abiotic components.

1. Abiotic(non-living) components

These includes the non-living (physical and chemical) factors of the environment. Abiotic factors include.:

(a) Inorganic substances: Inorganic substances, for example, carbon, nitrogen, oxygen, calcium, phosphorus, etc and their compounds (calcium oxide, carbon dioxide, etc.)

(b) Physical environment: For example, Air, water and soil (land). It also includes edaphic factor, for example, soil, substrate, topography, minerals, pH, etc.

(c) Climate factors: For example light, temperature, humidity, wind, rainfall, water, etc.

2. Biotic components

The biotic community of an ecosystem comprises three types of organisms:

(a) Producers: These organisms can prepare their own food from simple inorganic substances like carbon dioxide and water by using sunlight in the presence of chlorophyll (photosynthetic pigment) by the process called photosynthesis.
E.g. Green plants and certain bacteria.

(b) Consumers: These organisms are dependent on producers for their food, directly or indirectly. All the animals are consumers.
Consumers can be further categorized into three groups:

(i) Herbivores: Those animals which eat only plants are called herbivores. E.g. Buffalo, Goat, Sheep, Horse, Deer, Camel, Grasshopper.
Since herbivores obtain their food directly from producers (plants) therefore herbivores are primary consumers.

(ii) Carnivores: Those animals which eat the meat or flesh of other animals are called carnivores. E.g., Lion, Tiger, Frog, Vulture.
Those carnivores which feed upon herbivores (primary consumers) are called secondary consumers.
Those carnivores (top carnivores) which feed upon the primary consumers (small carnivores) or secondary consumers are called tertiary consumers. E.g., lion, tiger, hawk

(iii) Omnivores: Those animals which eat plants as well as animals, i.e., eat plant food the meat or flesh of other animals are called omnivores.
E.g. Man, Dog, Crow, Sparrow, Bear and Ant.

(c) Decomposers: The microorganisms which break down the complex organic compounds found in dead and decaying organisms like dry plants and dead animals and their waste products like faeces, urine, etc., into simpler substances are called decomposers.
E.g. Bacteria and Fungi.

Importance of decomposers

1. They acts as cleaning agents of the environment by decomposing the dead bodies of animals and plants.
2. They play an important role in bio-geochemical or nutrient cycles by helping in recycling the material in biosphere.
3. They maintain soil fertility.
4. In the absence of decomposers, the earth would have been a heap of dead organisms.

2. **Food chain and food web:**

(i) A series of organisms feeding on one another constitute a food chain.

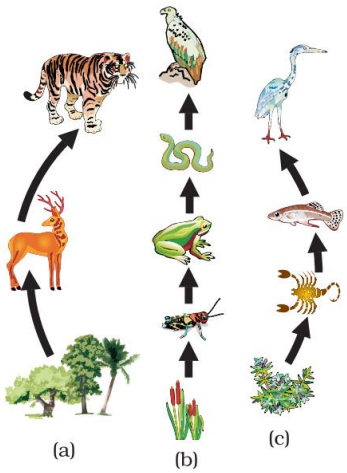
(ii) The autotrophs or the producers are at the first trophic level. The herbivores or the primary consumers come at the second, small carnivores or the secondary consumers at the third and larger carnivores or the tertiary consumers form the fourth trophic level.

(iii) The biotic components of the ecosystem are linked to each other through food chain.
In a typical food chain, producers are present at the bottom and their role is to provide food for the rest of the community by utilizing sunlight as energy. Other organisms belong to the consumers and finally decomposers are placed at the bottom to recycle the organic compound. In this way, an interactive relationship is formed between the living organisms of an ecosystem.

♦ Some examples of food chain are given below:

(i) $\underset{\text{(Producer)}}{\text{Grass}} \rightarrow \underset{\text{(Herbivore)}}{\text{Grasshopper}} \rightarrow \underset{\text{(Omnivore)}}{\text{Rat}} \rightarrow \underset{\text{(Camivore)}}{\text{Snake}}$

(ii) $\underset{\text{(Producer)}}{\text{Grass}} \rightarrow \underset{\text{(Herbivore)}}{\text{Insects}} \rightarrow \underset{\text{(Carnivore)}}{\text{Frog}} \rightarrow \underset{\text{(Top Carnivores)}}{\text{Birds}}$



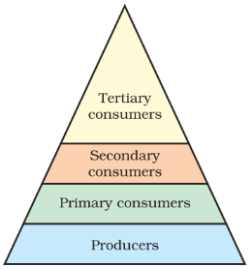
Food chain in nature (a) in forest, (b) in grassland and (c) in a pond

(iv) Each step of the food chain forms a trophic level.
There is a gradual decrease in the amount of energy transfer from one trophic level to the next trophic level in a food chain.

(v) So only 10% of energy is transferred to next trophic level while 90% of energy is used by present trophic level in its life processes.

(vi) The various trophic levels are given below :

- The plant or the producers constitute the first trophic level.
- The herbivores or primary consumers form the second trophic level.
- Carnivores or secondary consumers make up the third trophic level.
- Large carnivores or the tertiary consumers which feed upon the small carnivores constitute the fourth trophic level.



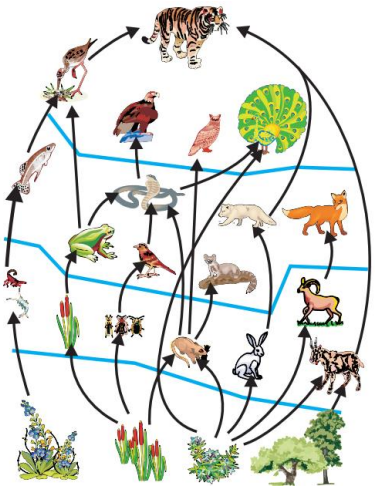
Trophic levels

Typical examples of food chains in different ecosystems

Type of Ecosystem	Primary Producers	Primary Consumers	Secondary consumers (Primary Carnivores)	Secondary Carnivores	Tertiary Carnivores
Forest Ecosystem	Trees	Phytophagous insects Herbivorous mammals	Lizards, birds Foxes	Predatory birds Wolves	Lions, Tiger
Aquatic Ecosystem	Phytoplanktons	Zooplanktons	Small fishes	Large fishes	
Grassland Ecosystem	Grasses	Insects Rat and mice Grazing cattle	Frogs Snake Carnivore Mammals	Snakes Predatory birds	Predatory birds
Desert Ecosystem	Shrubs, bushes Grass and some trees	Rats and mice	Snakes	Predatory birds	

(iii) When a number of food chains are interlinked together, it is called a food web. It provides stability to the food chain.

(iv) In a food web, one organism may occupy a position in more than one food chain. An organism can obtain its food from different sources and in turn, may be eaten up by different types of organisms.



(v) The flow of energy is unidirectional.

(vi) Several pesticides and other harmful chemicals which enters the food chain. The toxin concentration increases successively in the organism's tissues across the food chain. This phenomenon is known as biological magnification.

$$\underset{\text{DDT}}{\text{Grass}}\ (10\,\text{ppm}) \rightarrow \underset{\text{DDT}}{\text{Deer}}\ (200\,\text{ppm}) \rightarrow \underset{\text{DDT}}{\text{Lion}}\ (5000\,\text{ppm})$$

(vii) Due to biological magnification, wheat, rices, vegetables, fruits, and even meats contain varying amounts of pesticide residue.

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3. HOW DO OUR ACTIVITIES AFFECT THE ENVIRONMENT?

(A) Ozone layer and its depletion:

(i) Ozone shields the Earth's surface from UV radiation from the sun. This radiation is highly damaging to organisms by causing skin cancer, cataract in eyes, weaken immune system, in human beings, destruction of plants.

(ii) The amount of ozone in the atmosphere began to drop sharply in the 1980s. This decrease has been linked to synthetic chemicals like CFCs (chlorofluorocarbons) used as refrigerants and in fire extinguishers.

(iii) In, the United Nations Environment Programme (UNEP) succeeded in forging an agreement to freeze CFC production.

(B) Managing the garbage we produce.

Solid waste refers to everything that goes out in trash. It includes wastes from homes, schools, offices, cattle sheds, industries, agricultural fields, etc. It also includes peelings of fruits and vegetables, kitchen waste, ash, paper, cow dung, human excreta, glass, plastics, leather and rubber articles, brick, sand, worn out clothes and metal objects, etc.

Biodegradable and Non-biodegradable

(i) The solid waste we generate may be biodegradable or non-biodegradable.

(ii) Substances that can be broken down by biological process are called biodegradable; the substances that are not broken down in this manner are called non-biodegradable substances.

(iii) Many human-made materials like plastics will not be broken down by the enzymatic action of microbes. So, these non-biodegradable substances persist for a long time.

(iv) Domestic waste products, sewage, agricultural residue, paper, and cloth are biodegradable, but plastics, polythene bags, and aluminum foil are non-biodegradable substances.