

Chapter 15 Our Environment Class-X Biology

Solved Questions

What is environment?

The sum total of all surroundings of a living organism, including natural forces and other living things, which provide conditions for development and growth as well as of danger and damage is called environment.

What happens when we add our waste to the environment or throw?

When we add our waste to the environment some of them are broken down by the biological processes but rest persists for a long time.

What are the different types of waste materials?

Waste that are broken down by the biological processes are said to be biodegradable. These wastes are decomposed through the actions of fungi, bacteria and other living organisms and enrich soil fertility. Examples: Food refuse, tree leaves urine and faecal matter, ewage agricultural residue, paper, wood, cloth, cow-dung, etc

Waste that are not broken down by the biological processes are said to be non biodegradable. These substances are inert and simply persist in the environment for a long time or may harm the various members of the ecosystem. Example ; these includes DDT, insecticides, pesticides, mercury, lead, arsenic, aluminium, plastics, polythene bags, glass, radioactive wastes.

What happens after we throw waste away them away?

Fungi, bacteria and other living organisms in the presence of temperature and sunlight act on waste and try to break down.

Why are some substances biodegradable and some non-biodegradable?

Some substances are biodegradable and some are non bio-degradable. This is because of the specific action of the enzymes produced by bacteria or decomposers. The enzymes can break down natural substances into non poisonous simpler substances but cannot act on man-made substances like plastics

What are the harmful effects of biodegradable substance?

1. This waste destroyed the natural beauty and surroundings become dirty.
2. Decomposition of these wastes results in the production of foul smell, which spreads to surroundings areas.
3. These wastes may also block the drains creating pools of waste which becomes the breeding sites of mosquitoes. The letter is carriers of diseases like malaria and dengue.

What are the harmful effects of non- biodegradable substance?

1. These wastes are very harmful. They enter the food chains and their concentration goes on increasing from one trophic level to the next. This leads to biological magnification and result in harmful effects in human beings and other animals.
2. Dumping these wastes affects the soil fertility and subsequently reduces the crop yield.
3. Non-biodegradable chock out the sewage system and pollute the soil.
4. Some of the non-biodegradable substances may toxic for the humans and produce various diseases.

Name some of the biodegradable plastics.

Polyhydroxyalkanoates (PHAs) like the poly-3-hydroxybutyrate (PHB), polyhydroxyvalerate (PHV) and polyhydroxyhexanoate (PHH) .

What are the differences between biodegradable and non-biodegradable wastes.

Biodegradable Wastes

1. The wastes are broken down naturally by microbial action
2. Biodegradation forms harmless and nonpoisonous products.
3. They release raw materials back to nature.
4. They pollute the environment only when they are produced in quantity beyond the capacity of environment to degrade them.
5. Recycling is possible either naturally or through human efforts.

Non-biodegradable

1. The wastes are not broken down by the microbes.
2. No such action is possible.
3. They do not release raw materials.
4. Non-biodegradable wastes pollute the environment even in small quantity.
5. Recycling is possible only through human efforts.

What is echo system?

Ecosystem is a structural and functional unit of the biosphere consisting of a community of living beings and the physical environment. For example: forests, ponds and lakes are natural ecosystems while gardens and crop-fields and aquarium are human made (Artificial) ecosystems.

What are the different types of echo system?

Natural ecosystems are grass land, a forest, a sea, a river, a desert, a mountain, a pond, a lake etc.

The desert, grass land and mountain represent the terrestrial ecosystem (land based ecosystem).

The ponds, rivers, lakes and sea represent the aquatic ecosystem (water-based ecosystem).

Man-made or artificial ecosystems are garden, crop fields, park, aquarium, etc.

Why does aquarium have to be cleaned once in a while?

To remove fish wastes from the water because there are no bacteria and fungi to break-down the dead remains and waste products of organisms.

Do we have to clean ponds or lakes in the same manner of aquarium? Why or why not?

No, it is because there are large number of bacteria and fungi to break-down the dead remains and waste products of organisms.

What are the different components of ecosystem?

Every ecosystem has two main components: (i) Abiotic components and (ii) Biotic components. Biotic components comprise living organisms like plants, microbes and animals whereas abiotic components comprising physical factors like temperature, rainfall, wind, soil and minerals.

What are trophic levels? Give an example of a food chain and state the different trophic levels in it.

Each step or functional level occupied by an organism in a food chain is called a trophic level.

A food chain may have 3–5 trophic levels in a terrestrial ecosystem.

Grass -----> Grass hopper ----> Frog -----> Snake -----> Eagle

- I. The plants or the producers constitute the first trophic level. (Grass)
- ii. The herbivores or the primary consumers form the second trophic level. (Grass hopper)
- iii. Carnivores or the secondary consumers make up the third trophic level. (Frog)
- iv. Large carnivores or the tertiary consumers which feed upon the small carnivores constitute the fourth trophic level (Snake)
- V. carnivores of top level which feed upon the tertiary consumers (Eagle)

What is the role of decomposers in the ecosystem?

The decomposers bacteria and fungi secrete enzymes over the organic remains. It causes breakdown of organic remains into simpler and soluble substances that are absorbed by saprophytes. They clean the earth from organic matter hence they are also known as natural scavengers.

What are the importances of decomposers?

- (I) Decomposers help in disposing off the wastes and dead bodies of plants and animals. Therefore, they clean the environment and create space for living of newer generations of organisms.
- (II) The decomposers release minerals and other raw materials trapped in organic matter. These are picked up by plants. This also helps to maintain the fertility of soil.

(III) The decomposers produce some acids which are useful in solubilisation of some minerals.

(IV) Decomposers help in recycling the materials in the biosphere so that the process of life may go on and on like an unending chain.

What is a food chain?

The series of organisms feeding on one another at various biotic levels form a food chain.

What is food web?

The network of various food chains which are interconnected at various trophic levels is called food web.

In a food web, one organism may occupy 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.

What will happen if we kill all the organisms in one trophic level?

If we kill all the organisms in one trophic level, the organisms of the next trophic level will decrease in number due to non-availability of food. On the other hand the organisms of lower trophic level will increase because no organism will be there to feed upon them. So the ecosystem of that area will disturb

Define the term 'biome'.

Biome is a bigger unit than an ecosystem, of organization and comprises all the ecosystems in a geographical area.

What are the significances of food Chains?

The significances of food Chains are:

- (i) The study of food chains helps in understanding food relationships and interactions among the various organisms in an ecosystem. The food chains transfer energy and materials between various living components of an ecosystem.
- (ii) The food chains transfer energy and materials between various living components of an ecosystem or biosphere.
- (iii) The food chains give dynamicity to an ecosystem or biosphere.
- (iv) The movement of toxic substances like pesticides, weedicides, etc., through food chains can prove very harmful.

What do you mean by trophic level?

The various levels or steps in a food chain at which the transfer of food or energy takes place from one generation to another are called trophic levels. The number of trophic levels in a food chain is equal to the number of steps in the food chain.

The various trophic levels are given below:

- a. The plant or the producers constitute the first trophic level.

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

Will the impact of removing all the organisms in a trophic level be different for different trophic levels? Can the organisms of any trophic level be removed without causing any damage to the ecosystem?

Removal of all the organisms of a trophic level will affect the entire ecosystem of that area. Its impact on different trophic levels will be different because of the organisms of a trophic level are directly dependent on them while the organisms of other trophic level are indirectly depend on them for their food. For example, killing of herbivores will increase the number of carnivores and killing of carnivores will increase the number of herbivores. Most of the organisms will die of starvation.

How do flows of energy occur in trophic level?

Energy is used and conveyed from one trophic level to another is a food chain. This is called flow of energy. Green plants capture about 1% of the solar energy during photosynthesis. A part of this trapped energy is used by plants in performing their metabolic activities and some energy is released at heat into the atmosphere. The remaining energy is chemical energy stored in the plants as 'carbohydrates'.

When plants are eaten up by herbivores, the chemical energy stored in the plants is transferred to these animals. These animals (herbivores) utilize some of this energy for metabolic activities, some energy is released as heat and the remaining energy is stored.

What are the characteristics of energy transfer in the biosphere?

The following are the characteristics of energy transfer in the biosphere:

- (i) Energy is supplied by the sun and it is not created in the biosphere. Energy is only converted from one form to another in the biosphere.
- (ii) There is a continuous transfer of energy from one trophic level to the next in a food chain.
- (iii) At each trophic level, some of the energy is utilized by the organisms for their metabolic activities.
- (iv) At each trophic level, some amount of energy is utilized for the composition of decomposers.
- (v) At each trophic level, there is loss of energy, which goes into the environment and remains unutilized.
- (vi) At each trophic level, the amount of energy available is less than that available at the previous level.

Why is energy flow considered as unidirectional?

The flow of energy is unidirectional and non cyclic. The energy captured by the autotrophs does not return to the sun, and the energy which passes to the subsequent levels does not come back to

autographs. The amount of energy goes on successively decreasing from the producers to the carnivores. How much energy is lost in transferring from one trophic level to other in a food chain?

Ans. 90%.

What is biomass?

The amount of organic matter present in an organism is called biomass.

What will happen if we kill the organisms in one trophic level?

The balance in ecosystem will be disturbed because in an ecosystem every trophic level is interlinked with the other. Thus, absence of any one trophic level will surely create problems for the other trophic level dependent on the previous one.

Define biomagnifications.

The increase in concentration of a chemical per unit weight of the organisms with successive rise in trophic level is called biomagnifications.

How does a food web an important factor of our environment? Describe its four benefits.

Importance of food web

- (i) Starvation: Food web does not allow any population to starve when members of lower trophic level decrease in number.
- (ii) Checking Overpopulation: Food web does not allow a species to overgrow as increased availability will increase the chance of higher number of its predations.
- (iii) Endangered Population: It allows endangered population to grow in size.
- (iv) Stability: Food webs provide stability to ecosystems.

What is 10% Law?

The energy available at each successive trophic level is only 10 percent of the previous level.

How much energy will be available to hawks in the food chain comprising hawk, snake, paddy and mice, if 1,000 J of energy is available to wheat plants from the sun?

Wheat plants represent the producer level. They trap only 1% of the sun's energy falling on them. So, the energy available in wheat will be 1% of 1,000 J which will be 10 J. We can now show the food chain and apply ten per cent law to it.

Wheat plant (10J) -----10%-----> Mice (1J)-----10%----->Snake(0.1J)-----10%----->Hawk(0.01J)

Thus, the energy available to the hawk will be 0.01 J.

Differentiate between food chain and food web?

Food chain

1. Food chain consists of a single series of food relations.

2. It has maximum 4-6 trophic levels of different species.
3. Each organism uses a particular food.
4. Starvation is observed whenever the members of lower trophic level decrease in number.

Food web

1. Food web is a complex network of several series of food chains or food relations.
2. It has a number of trophic levels or populations of different species.
3. Each organism can use different types of type of food.
4. Food webs do not allow starvation and help in increasing the population of endangered species.

Why is damage to the ozone layer a cause of concern? What steps are being taken to limit this damage?

Ozone layer has become a cause of concern because depletion of ozone layer can cause serious effects on human body and other organisms of the environment like —

(i) Cancer in human beings. (ii) Loss of immunity in humans. (iii) Destruction of aquatic life and vegetation. (iv) Temperature changes and rainfall failures.

Steps being taken to reduce it are :

- (i) by reducing the use of CFCs — Many countries have already banned the use of CFCs.
- (ii) by developing substitutes of CFCs — Scientists have already developed some substitutes which are ozone-friendly.

Which compounds are responsible for the depletion of ozone layer?

Ozone depleting substances like chlorofluorocarbons, hydrocarbon, N₂O, chlorine, etc. are responsible for the depletion of ozone layer.

Which disease is caused in human being due to depletion of ozone layer in the atmosphere?

Ozone layer is located in the atmosphere as a part of stratosphere. Skin cancer is caused in human being due to depletion of ozone layer in the atmosphere

Why is ozone layer getting depleted at higher levels of the atmosphere?

Due to the release of CFCs in the environment the ozone layer is getting depleted at higher levels of

How is ozone formed in the upper atmosphere? Which compounds are responsible for the depletion of ozone layer?

The ozone layer occurs naturally in the stratosphere. The ozone layer is formed when intense UV radiation from the sun reacts with ordinary molecules of oxygen (O₂) in the stratosphere to dissociate into single oxygen atoms (O). Single oxygen atoms are very reactive they combine with O₂ to form O₃.

The CFCs (chlorofluorocarbons), halons, nitrous oxide, methane, carbon tetrachloride and chlorine are responsible for the depletion of ozone layer.

When is World Ozone Layer Preservation Day celebrated?

World Ozone Layer Preservation Day is celebrated on September 16.

What is green house effect?

The gases like CO₂ and methane absorb infra red radiations of the sun and cause heating of the earth. It is known as green house effect.

Suggest activities in our daily life which are eco friendly.

- (i) Cloth bags should be used in place of plastic bags or polythenes.
- (ii) Domestic wastes and kitchen wastes can be made use of as manures or compost for plants.
- (iii) We should reduce the wastage of foods, water, or any other thing.
- (iv) We should not use the electronic equipments using the ozone depleting gases or chemicals.
- (v) From biodegradable waste, biogas can be prepared which costs much less than other fuels.
- (vi) Separation of biodegradable and non-biodegradable wastes of our house.

How can you help in reducing the problem of waste disposal? Give any two methods.

Every individual should play a role in reducing the problem of waste disposal. They can do that by-

- (i) Improved packing methods.
- (ii) Increased use of disposable items.
- (iii) Use of compost in the field

What is the importance of phytoplankton?

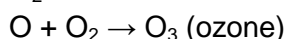
The phytoplankton supply dissolved oxygen to the organisms living in water. They are food for fish.

Which pollutants are contributed by airplanes?

Aerosols and CO₂.

How is ozone layer formed in the atmosphere? What is the function of this layer?

The ozone layer occurs naturally in the stratosphere. The ozone layer is formed when intense UV radiation from the sun causes ordinary molecules of oxygen (O₂) in the stratosphere to dissociate into single oxygen atoms (O). Single oxygen atoms are very reactive and combine with O₂ to form O₃.



Function: Ozone absorbs UV radiation from the sun, thus shielding the earth's surface from the harmful effects of this radiation eg: skin cancer.