



15

Our Environment

In the Chapter

- The many components of an ecosystem are interdependent.
- The producers make the energy from sunlight available to the rest of the ecosystem.
- There is a loss of energy as we move from one trophic level to the next, this limits the number of trophic levels in a food-chain.
- Human activities have an impact on the environment and the environment affects the human activities.
- The use of chemicals such as CFCs has endangered the ozone layer. Since the ozone layer protects against the ultraviolet radiation from the Sun, this could harm the environment.
- The waste we generate may be categorised in biodegradable and non-biodegradable.
- The disposal of the waste we generate is causing serious environmental problems.

Intext Exercises

Page No. 257

1. **Why are some substances biodegradable and some non-biodegradable?**

Ans. Those substances which can be acted upon by the microorganisms and broken down into simple substances are known as biodegradable.

Those substances which are inert and cannot be acted upon by the microorganisms and do not break down into simple substances are known as non-biodegradable.

2. **Give any two ways in which biodegradable substances would affect the environment.**

Ans. Biodegradable substances can affect the environment in the following ways :

(i) These substance are decomposed by the action of microorganisms. This causes foul smell.

(ii) During the process of decaying of biodegradable substances, various types of gases are released which cause air pollution.

3. **Give any two ways in which non-biodegradable substances would affect the environment.**

Ans. The non-biodegradable substances affect the environment in the following ways :

(i) They persist in the environment for a long time and thus damage the environment.

- (ii) Such substances cause land pollution and water pollution.

Page No. 261

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

Ans. There are various series of organisms feeding on one another. These series of organisms taking part in various biotic levels form the food chain. The steps or levels of the food chain are called trophic level.

An example of food chain :

Grass → Deer → Lion.

Various trophic levels are :

- (i) First trophic level is grass. It is producer.
- (ii) Second trophic level is deer. It is primary consumers (or herbivores).
- (iii) Third trophic level is lion. It is larger carnivores.

- 2. What is the role of decomposers in the ecosystem?**

Ans. Decomposers are called natural cleaning agent. They act on biodegradable substances and break them into simple substances. In this way, decomposers create a balance in the environment and play an important role in the environment.

Page No. 264

- 1. What is ozone and how does it affect any ecosystem?**

Ans. Ozone is a molecule formed by three atoms of oxygen. Ozone is formed by the reaction of three molecules of oxygen in presence of ultraviolet (UV) rays.

Ozone performs an essential function. It shields the surface of the earth from ultraviolet radiation of the sun. If this radiation enters the atmosphere, it could cause various disorders. So ozone protects the ecosystem from damaging.

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

Ans. (i) There are two types of wastes; biodegradable and non-biodegradable. We should use more and more substances that leave biodegradable wastes.

(ii) Biodegradable wastes are converted into manure. Non-biodegradable wastes should be sent to the factories for recycling.

Exercise

- 1. Which of the following groups contain only biodegradable items?**

- (a) Grass, flowers and leather
- (b) Grass, wood and plastic
- (c) Fruit-peels, cake and lime-juice
- (d) Cake, wood and grass

Ans. (c) Fruit-peels, cake and lime-juice

- 2. Which of the following constitute a food-chain?**

- (a) Grass, wheat and mango
- (b) Grass, goat and human
- (c) Goat, cow and elephant
- (d) Grass, fish and goat

Ans. (b) Grass, goat and human

- 3. Which of the following are environment-friendly practices?**

- (a) Carrying cloth-bags to put purchases in while shopping
- (b) Switching off unnecessary lights and fans
- (c) Walking to school instead of getting your mother to drop you on her scooter
- (d) All of the above

Ans. (d) All of the above

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

Ans. Each and every trophic level depends for its energy needs on its previous trophic level. If all organisms of any of the trophic levels in a food chain are damaged, the organisms of other trophic levels will also be destroyed because energy flow is stopped from one trophic level to other trophic level.

5. 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?

Ans. No, the impact of removing all the organisms in a trophic level is same for different trophic levels. The removal of organisms of any trophic level is damaging and it causes various disorder in ecosystem.

6. What is biological magnification? Will the levels of this magnification be different at different levels of the ecosystem?

Ans. When any harmful chemical like DDT enters in a food chain, its concentration increases gradually at each trophic level. This phenomenon is called biological magnification. The levels of this magnification will be different at different levels of the ecosystem.

7. What are the problems caused by the non-biodegradable wastes that we generate?

Ans. The non-biodegradable wastes persist in the environment for a long time and causes various problems. Non-biodegradable wastes cause :

- (i) Water pollution so that water becomes unfit for drinking.
- (ii) They cause land pollution and due to it land loses its fertility.
- (iii) They cause stoppage of flow of water in drains.
- (iv) They also cause air pollution and make the air poisonous.

8. If all the waste we generate is biodegradable, will this have no impact on the environment?

Ans. The biodegradable wastes do not persist for a long time in the environment. However, they also cause harmful effects but their effects are only for sometime. These wastes can be converted into useful substances and broken into simple substances by the action of microorganism. So, there will be impact of biodegradable waste but for a short time.

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

Ans. Enlargement of ozone hole will cause more ultraviolet rays to reach on the earth's surface. This is very harmful for us, animals and microorganisms in the following ways :

- (i) Ultraviolet radiations may cause skin disease, especially skin cancer.
- (ii) Plant life will be disturbed due to retarded growth and destruction of pigments.
- (iii) UV-rays may kill microorganisms, decomposers and other useful microbes. It may lead to ecological imbalance.

Steps to prevent damage of ozone layer

- (i) Judicious use of aerosol spray propellants such as fluorocarbon and chlorofluorocarbons which cause depletion or hole in ozone layer.
- (ii) Limited use of supersonic planes and jets.
- (iii) Control over large scale nuclear explosions.

Additional Questions

1. Why non-biodegradable substances persist in the environment for longer time ?

Ans. They persist for longer time as these substances may be inert and thus cause harm to the various members of the ecosystem.

2. What is meant by a trophic level ?

Ans. A trophic level consists of those organisms that derive their energy from same source.

Ex : Plants that derive their energy from sun constitute first trophic level and are called producers.

3. Which type of organisms constitute the first and third trophic level in a food chain?

Ans. Autotrophs form the first level and carnivore animals constitute the third trophic level in a food chain.

4. What amount of energy of sunlight is converted into food energy by the autotrophs?

Ans. 1% of the energy of sunlight.

5. What is meant by a 10% law?

Ans. According to this law, 10% can be taken as the average amount of energy that is transferred at each step and reaches the next level of consumers.

6. List any two ways by which solid wastes of urban areas are disposed off.

Ans. (i) Disposing off in landfills.

(ii) Incineration.

7. Identify which one of the following would have a hazardous impact if they persist in the environment?

Newspaper, vegetable peel, pesticides, wastes from cattleshed.

Ans. Pesticides.

8. (a) Give one example each of smallest and large sized ecosystem.

(b) Name two major kinds of ecosystems.

Ans. (a) (i) Pond (ii) Forest

(b) 1. Terrestrial ecosystem.

2. Aquatic ecosystem.

9. (a) Write three examples of terrestrial ecosystems.

(b) Give three examples of fresh water ecosystem.

Ans. (a) Forests, grasslands and desert ecosystem.

(b) Ponds, Lakes and Streams ecosystem.

10. Name two salt water ecosystem.

Ans. Marine and estuaries ecosystem.

11. Name two man-made ecosystems.

Ans. 1. Crop fields 2. Garden.

12. Write two examples where man has interfered in ecosystem.

Ans. 1. Cutting of forests 2. Construction of dams.

13. Name any two abiotic components of environment.

Ans. 1. Soil 2. Water.

14. Name two gases, other than carbon dioxide, that are given out during burning of fossil fuel and contribute towards acid rain formation.

Ans. (i) SO_2 and (ii) NO_2 .

15. Briefly describe the biotic components of an ecosystem.

Ans. Biotic components

Of an ecosystem's biotic components, the plants are producers as they introduce food materials and energy into the living world. The animals are consumers because they get food and energy by consuming plants directly and thus are called primary consumers (herbivores), secondary/tertiary consumers (carnivores) obtain energy and food indirectly from plants; and microorganisms are decomposers for they flourish by breaking dead organic matter to simple substances that are returned to environment for reuse by plants.

In an ecosystem, nutrients are used again and again in a cyclic manner, whereas energy trapped from sunlight is lost as heat.

16. List the abiotic components of an ecosystem.

Ans. The abiotic components of an ecosystem are of two types :

- (i) Climate including temperature, light, wind, gases, humidity, rain and water (also wave action, water currents) ; and (ii) edaphic factors including soil, substratum, topography, background, minerals and pH.

17. List the differences between Biotic and Abiotic components of ecosystem.

Ans. Differences between Biotic and Abiotic components of ecosystem :

Biotic Components

1. Biotic components of an ecosystem are those living substances which are different members of a community.

2. Biotic components of an ecosystem are :

- (i) Producers
(ii) Consumers
(iii) Decomposers.

Abiotic Components

1. Abiotic components are non-living factors.

2. It includes water, minerals, salts, humidity, light, temperature, pH, wind, topography, etc.

18. Why is it difficult to draw sharp boundaries between ecosystems ?

Ans. An ecosystem is an area in which the inputs and outputs can be studied across its boundaries and for convenience it is considered a separate entity. It is important to recognise that ecosystems are not strictly separate. Their boundaries are indistinct and overlapping and some movements always occur from one ecosystem to another in terms of energy and materials. Thus it is difficult to draw sharp boundaries between ecosystems.

Example. Leaves of river bank trees dropping in river water represent transfer of energy and material from terrestrial to aquatic ecosystem. Terrestrial birds diving to catch fishes in water bodies make similar transfers from aquatic to terrestrial ecosystems. Soil materials may be eroded from a forest ecosystem and washed into the adjoining stream, or dust blown

from a desert ecosystem may deposit over another ecosystem located miles away.

19. Write a note on structure of ecosystem.

Ans. Biotic and abiotic components are physically organized to provide a characteristic structure of the ecosystem. Important structural features are: species composition and stratification. Some ecosystems (e.g. tropical rain forest) show tall plant canopy and a bewildering number of biological species. On the other hand, the desert ecosystem shows a low, discontinuous herb layer consisting of fewer species and extensive bare patches of soil.

20. Explain the functions of ecosystem.

Ans. Functions of ecosystem

1. **Energy flow.** The energy flow from producers to consumers. There is loss of energy at every trophic level.

2. **Biogeochemical cycle.** The cyclic flow of nutrients between non-living environment and living organisms is called biogeochemical cycles.

21. List the key functional aspects of ecosystems.

Ans. 1. Productivity and energy flow.

2. Nutrient cycling.

3. Development and stabilization.

22. What is food chain? List the kinds of food chains.

Ans. Food chain. A nutritive interaction among biotic communities (organisms) involving a

producer, various levels of consumers and a decomposer forms a food chain. Each step in a food chain is called a trophic level.

Kinds of food chain. There are three kinds of food chains: predator, parasitic and saprophytic chains.

23. What will happen if all the decomposers are removed from the ecosystem ?

Ans. If the decomposers are removed from the ecosystem :

- (i) Complex organic matter will not be broken. So nutrients will not return to nutrient pool.
- (ii) Nutrients cycles will be disturbed.
- (iii) Balance in the ecosystem will be disturbed.
- (iv) Waste materials will get accumulated.

24. Why are bacteria and fungi called decomposers? List any two advantages of decomposers to the environment?

Ans. Fungi and bacteria feed on dead plants and animals. They break down the complex organic matter to simple components. Thus they are called decomposers.

Advantages of decomposers

- 1. They return the simple components to the soil.
- 2. They help in maintaining steady state of environment.

Multiple Choice Questions

1. Which one of the following is an artificial ecosystem ?

- (a) Pond
- (b) Crop field
- (c) Lake
- (d) Forest

Ans. (b) Crop field

2. In a food chain, the third trophic level is always occupied by

- (a) carnivores
- (b) herbivores
- (c) decomposers
- (d) producers

Ans. (a) carnivores

3. An ecosystem includes

- (a) all living organisms
- (b) non-living objects
- (c) both living organisms and non-living objects
- (d) sometimes living organisms and sometimes non-living objects

Ans. (c) both living organisms and non-living objects

4. In the given food chain, suppose the amount of energy at fourth trophic level is 5 kJ, what will be the energy available at the producer level ?

Grass → Grasshopper → Frog → Snake → Hawk

- (a) 5 kJ
- (b) 50 kJ
- (c) 500 kJ
- (d) 5000 kJ

Ans. (d) 5000 kJ

5. Accumulation of non-biodegradable pesticides in the food chain in increasing amount at each higher trophic level is known as

- (a) eutrophication
- (b) pollution
- (c) biomagnification
- (d) accumulation

Ans. (c) biomagnification

6. Depletion of ozone is mainly due to

- (a) chlorofluorocarbon compounds
- (b) carbon monoxide
- (c) methane
- (d) pesticides

Ans. (a) chlorofluorocarbon compounds.

7. Organisms which synthesise carbo-hydrates from inorganic compounds using radiant energy are called

- (a) decomposers
- (b) producers
- (c) herbivores
- (d) carnivores

Ans. (b) producers

8. In an ecosystem, the 10% of energy available for transfer from one trophic level to the next is in the form of

- (a) heat energy
- (b) light energy
- (c) chemical energy
- (d) mechanical energy

Ans. (c) chemical energy

9. Organisms of a higher trophic level which feed on several types of organisms belonging to a lower trophic level constitute the

- (a) food web
- (b) ecological pyramid
- (c) ecosystem
- (d) food chain

Ans. (a) food web

10. Flow of energy in an ecosystem is always

- (a) unidirectional
- (b) bidirectional
- (c) multi directional
- (d) no specific direction

Ans. (a) unidirectional

11. Excessive exposure of humans to UV rays results in

- (i) damage to immune system
- (ii) damage to lungs
- (iii) skin cancer
- (iv) peptic ulcers
- (a) (i) and (ii)
- (b) (ii) and (iv)
- (c) (i) and (iii)
- (d) (iii) and (iv)

Ans. (c) (i) and (iii)

12. In the following groups of materials which group(s) contains only non-biodegradable items?

- (i) Wood, paper, leather
- (ii) Polythene, detergent, PVC
- (iii) Plastic, detergent, grass
- (iv) Plastic, bakelite, DDT
- (a) (iii)
- (b) (iv)
- (c) (i) and (iii)
- (d) (ii) and (iv)

Ans. (d) (ii) and (iv)

13. Which of the following limits the number of trophic levels in a food chain?

- (a) Decrease in energy at higher trophic levels
- (b) Diffident food supply
- (c) Polluted air
- (d) Water

Ans. (a) Decrease in energy at higher trophic levels

14. Which of the statement is incorrect?

- (a) All green plants and blue green algae are producers.
- (b) Green plants get their food from inorganic compounds.
- (c) Producers prepare their own food from inorganic compounds.
- (d) Plants convert solar energy into chemical energy.

Ans. (b) Green plants get their food from inorganic compounds.

15. Which group of organisms are not constituents of a food chain?

- (i) Grass, lion, rabbit, wolf
 - (ii) Plankton, man, fish, grasshopper
 - (iii) Wolf, grass, snake, tiger
 - (iv) Frog, snake, eagle, grass, grasshopper
- (a) (i) and (iii) (b) (iii) and (iv)
(c) (ii) and (iii) (d) (i) and (iv)

Ans. (c) (ii) and (iii)

16. The percentage of solar radiation absorbed by all the green plants for the process of photosynthesis is about

- (a) 1% (b) 5%
(c) 8% (d) 10%

Ans. (a) 1%

17. What will happen if deer is missing in the food chain given below?

Grass – Deer – Tiger

- (a) The population of tiger increases
(b) The population of grass decreases
(c) Tiger will start eating grass
(d) The population of tiger decreases and the population of grass increases.

Ans. (d) The population of tiger decreases and the population of grass increases.

18. The decomposers in an ecosystem

- (a) convert inorganic material, to simpler forms
(b) convert organic material to inorganic forms
(c) convert inorganic materials into organic compounds
(d) do not breakdown organic compounds

Ans. (b) convert organic material to inorganic forms

19. If a grasshopper is eaten by a frog, then the energy transfer will be from

- (a) producer to decomposer
(b) producer to primary consumer
(c) primary consumer to secondary consumer
(d) secondary consumer to primary consumer

Ans. (c) primary consumer to secondary consumer

20. Disposable plastic plates should not be used because

- (a) they are made of materials with light weight
(b) they are made of toxic materials
(c) they are made of biodegradable materials
(d) they are made of non-biodegradable materials

Ans. (d) they are made of non-biodegradable materials