

5

OUR ENVIRONMENT

5.1 Introduction

5.2 What Happens when we add our waste to the Environment?

5.3 Ecosystem

5.4 Food Chains and Webs

5.5 How do our activities effect the environment?

5.1 INTRODUCTION

Human activities can affect environment. Waste added to environment may be (i) Biodegradable (ii) Non-biodegradable

A “biodegradable” product has the ability to breakdown safely and relatively quickly by biological means(i.e. by action of bacteria or other saprophytes) into the raw materials of nature and disappear into environment examples- paper bags, bioplastics or biodegradable plastics etc. on the other hand artificially made products which are non-biodegradable and hence may be inert and simply persist in the environment for a long time or may harm the various members of the **ecosystem**. Examples-Plastics bags, chemicals etc.

An ecosystem consist of biotic components comprising living organisms and abiotic components comprising factors like temperature, rainfall, wind, soil and minerals. Ecosystem like forest, ponds and lakes are natural ecosystem while garden and crop-fields are human made and hence are artificial ecosystem.

Two of the **major environmental problems** are depletion of ozone and waste disposal.

Question based on basic knowledge required to understand this chapter

- Products which can be broken down by action of bacteria or other saprophytes are
 (A) Non-biodegradable (B) Biodegradable
 (C) Both (D) None of these
- Plastic bags, polyethene bags, chemicals are examples of _____ waste
 (A) Non-biodegradable (B) Biodegradable
 (C) Both (A) & (C) (D) None of these
- Biotic and abiotic components together consist
 (A) Ecology (B) Ecosystem
 (C) Environment (D) None of these
- Garden and crop fields are examples of
 (A) Natural ecosystem (B) Artificial ecosystem
 (C) Food web (D) Food chain

5. Each step or level of the food chain forms
 - (A) trophic level
 - (B) top level
 - (C) bottom level
 - (D) none of these
6. Chemicals like DDT, when enters food chain, their level keeps on increasing with successive trophic level. This is termed as:
 - (A) Biological calcification
 - (B) Biological nitrification
 - (C) Biological magnification
 - (D) Biological oxidation
7. What shields the surface of the earth from ultraviolet(UV) radiation?
 - (A) Ozone layer
 - (B) Lithosphere
 - (C) Water layer
 - (D) Atmosphere
8. Organisms which produce their food by themselves are
 - (A) Autotrophs
 - (B) Herbivores
 - (C) Decomposers
 - (D) None of these
9. Ultraviolet radiation can cause
 - (A) Diabetes
 - (B) Blood cancer
 - (C) Skin cancer
 - (D) Cough and cold
10. The various components of ecosystem are
 - (A) Self dependent
 - (B) Interdependent
 - (C) dependent
 - (D) None of these

5.2 WHAT HAPPENS WHEN WE ADD OUR WASTE TO THE ENVIRONMENT?

The biodegradable substance were broken down by the activity of enzyme secreted by micro-organism. The non - biodegradable substance are not broken. These substances may be inert and simply persist in the environment for a long time. Some material like plastic will be acted upon by physical processes like heat and pressure.

Illustration 1

The substances which cannot be broken down by the action of bacteria or other saprophytes are

- (A) *Biodegradable*
- (B) *Non-Biodegradable*
- (C) *Degradable*
- (D) *None of these*

Solution

∴ (B)

Illustration 2

Everything we eat are broken down by the action of specific

- (A) *Enzymes*
- (B) *Protein*
- (C) *Carbohydrates*
- (D) *Fats*

Solution

∴ (A)

Try yourself

1. Detergent is the examples of substances that are
 - (A) Biodegradable
 - (B) Non-biodegradable
 - (C) Ecofriendly
 - (D) Both (A) & (B)
2. The substances which can be easily degraded by bacteria or other saprophytes are
 - (A) Biodegradable
 - (B) Non-ecofriendly
 - (C) Non-biodegradable
 - (D) None of these

5.3 ECOSYSTEM

What are its components?

All the interacting organisms in an area together with the non- living components of the environment form an ecosystem.

- Biotic component – living organism like plants
- Abiotic component – Physical factors like temperature, rainfall, wind, soil and minerals.

Ex. of ecosystem – (a) Natural – Forest, ponds and lakes.

(b) Artificial – garden, aquarium.

Role of Biotic component of an ecosystem.

(a) **Producer** - Organism making organic compound like sugar starch from inorganic substances using the radiant energy of the sun in the presence of chlorophyll.

(b) **Consumer** – Organism which consume the food produced, either directly from producers or indirectly by feeding on other consumers are the consumers. Like herbivores, carnivores, omnivores and parasites.

(c) **Decomposer** – The micro organisms like bacteria and fungi, they break-down the dead remains and waste products of organisms.

- Convert complex organic substance into simple inorganic substances.
- Help in natural replenishment.

Illustration 3

All the interacting organism in an area together with the non-living constituents of the environment forms

(A) *Food chain*

(B) *Food web*

(C) *Ecosystem*

(D) *None of these*

Solution

∴ (C)

Illustration 4

Ecosystem consist of

(A) *Biotic components*

(B) *Abiotic components*

(C) *Both (A) and (B)*

(D) *None of these*

Solution

∴ (C)

Illustration 5

Plants and Animals are

(A) *Biotic components*

(B) *Abiotic components*

(C) *Both (A) and (B)*

(D) *None of these*

Solution

∴ (A)

Try yourself

3. Temperature, rainfall, wind, soil and minerals are

(A) Abiotic components

(B) Natural components

(C) Biotic components

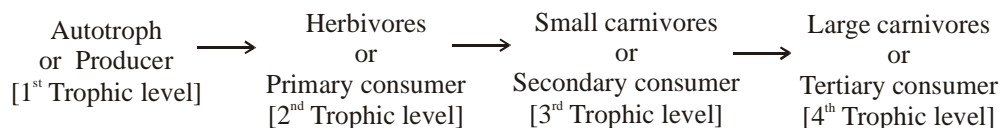
(D) None of these

4. Garden and crop-field are example of
 (A) Artificial ecosystem (B) Natural ecosystem
 (C) Aquatic ecosystem (D) None of these
5. Organisms which can prepare their own food are
 (A) Consumers (B) Producers (C) Parasites (D) None of these
6. By which process producers like plants and blue green algae produce their food
 (A) Photosynthesis (B) Digestion (C) Both (A) & (B) (D) None of these
7. Which of the following comes under consumers?
 (A) Herbivoroos (B) Carnivores (C) Parasite (D) All of these
8. The microorganisms that break down the complex organic substance into simple inorganic substance that go into the soil and are used up once more by plants are
 (A) Consumers (B) Producers (C) Decomposers (D) None of these

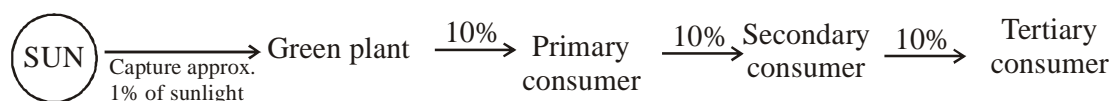
5.4 FOOD CHAINS AND WEBS

Food chain – The series of organisms feeding on one another constitute food chain.

Trophic level – Each step or level of the food chain forms a trophic level.



5.4.1 Flow of energy



Energy is lost as heat to the environments, some amount goes into digestion, some in doing work, some in growth and some in reproduction.

Food chains generally consist of only three or four steps because very less energy remains after four trophic levels.

The length and complexity of food chains varies greatly. Food web is inter-related food chain.

Flow of energy is unidirectional. It moves progressively through the various trophic levels. It is no longer available to the previous level.

Green house effect: Increase in temperature of earth due to green house gases. Like CO₂, H₂O(g), CH₄ etc.

5.4.2 Biomagnification

Harmful chemical entered in a food chain are not degradable, these get accumulated progressively at each trophic level.

The maximum concentration of these chemical get accumulated in our top consumer.

Illustration 6

Series of organism feeding on one another and taking part at various biotic level forms

- (A) *Ecosystem* (B) *Food web* (C) *Food chain* (D) *Ecology*

Solution

∴ (C)

Illustration 7

Each step or level of the food chain forms a trophic level. The autotrophs comes at which trophic level

- (A) First (B) Second (C) Third (D) Fourth

Solution

∴ (A)

Illustration 8

Is there is some loss of energy in environment occurs when energy is transferred from autotrophs to heterotrophs.

- (A) Yes, 90% energy is lost (B) 10% energy is lost
(C) Energy is gained (D) None of these

Solution (A)**Illustration 9**

When green plants are eaten by primary consumers, energy is lost as

- (A) Heat to environment (B) Goes into digestion
(C) In doing work, growth and reproduction (D) All of the above

Solution

∴ (D)

Try yourself

9. What percent can be taken as an average value for the amount of energy that reaches the next level of consumers.
(A) 30% (B) 20% (C) 10% (D) 50%
10. Each step in food chain is called
(A) trophic level (B) Consumer level (C) Food web (D) Producer
11. Each organism is generally eaten by several other organism. So instead of a straight line food chain, the relationship can be shown as a series of branching lines called
(A) World web (B) Consumers web (C) Food web (D) Decomposers web
12. The energy that is captured by the autotrophs does not revert back to the solar input and the energy which passes to the herbivores does not come back to autotrophs. hence the flow of energy is
(A) Multidirectional (B) Bidirectional (C) Unidirectional (D) None of these
13. The process by which the chemicals in the environment get accumulated in our body is
(A) Biological degradation (B) Biological magnification
(C) Biological absorption (D) None of these
14. Which of the following constitute a food-chain?
(A) Grass, wheat and mango (B) Grass, deer and Lion
(C) Goat, cow and elephant (D) Grass, fish and goat

5.5 HOW DO OUR ACTIVITIES AFFECT THE ENVIRONMENT?

Over exploitation of environment causes pollution and depletion of resources.

Pollution

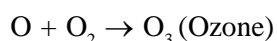
Ozone layer depletion.

Ozone (O₃) – three atoms of oxygen

– deadly poisonous

– shields the surface of the earth from UV from sun, that causes skin cancer.

Formation of Ozone –



Ozone depletion – (Ozone Hole)/thinning of ozone

– amount of ozone dropping

– Ozone drop mainly because CFC is banned due to chlorofluoro carbon (CFC_s) used in refrigerants and in fire extinguishers.

UNEP – United Nations Environment Programme. (1987)

– This program succeeded in making an agreement to freeze CFC production.

Managing the Garbage we produce.

– Divide the garbage into biodegradable and non - biodegradable waste.

– Check on life - style .

– Check on packaging materials.

Illustration 10

With how many atoms of oxygen one molecule of ozone is formed

(A) Two

(B) Three

(C) Four

(D) Eight

Solution

∴ (B)

Illustration 11

Ozone shields the surface of earth from

(A) Gamma radiations

(B) Infra red Radiation

(C) Ultra violet radiations

(D) Nuclear radiations

Solution

∴ (B)

Illustration 12

The higher energy UV radiations split apart some molecular oxygen (O₂) into free oxygen (O) atoms. These atoms combine with the molecular oxygen to form

(A) Stratosphere

(B) Lithosphere

(C) Ozone

(D) None of these

Solution

∴ (C)

EXERCISE-I

1. Define term biogeochemical cycle.
2. What are enzymes?
3. Why few food item consumed do not produce energy?
4. Name two ambient conditions necessary for degradation?
5. Define a biotic community?
6. Define an ecosystem?
7. Name various component of an ecosystem?
8. Give two examples of natural & two artificial ecosystem.
9. Name any two insectivorous plant.
10. Name the process by which organic compound is formed in plants in presence of sunlight.
11. To which mode of nutrition do cyanobacteria belong?
12. Why CFC_s should be banned?
13. Name one parasitic plant and animal?
14. What is trophic level?
15. An organism having 35 J of energy will transfer how much energy to next trophic level?
16. What are heterotrophs?
17. What are pyramids?
18. Define a food chain?
19. Draw a food web with 3 food chain?
20. Define following terms ;
 - (A) Global warming
 - (B) Bio - accumulation
 - (C) Biological magnification
 - (D) Green house effect
21. Why food web is more stable than food chain.

EXERCISE-II

1. How is carbon recycled in nature?
2. Why are milk packet as a kitchen waste are more harmful than spoilt residual food.
3. Write 2 important characteristic of a non bio-degradable waste with 2 example.
4. Name all the biotic & abiotic components of an ecosystem.
5. Explain that aquarium is an artificial ecosystem.
6. Why an ecosystem is regarded as self sustaining entity.
7. What is starch?
8. Differentiate between a parasite & a saprophyte. Give two example of each.
9. What are decomposer. Give two example. How are they helpful to environment.
10. An artificial ecosystem having all the producer and no consumer was formed. What will happen to this ecosystem.

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11. Describe 10% law of transfer of energy within a grassland ecosystem.
12. Why is it beneficial to be a vegetarian?
13. How will you justify the statement that, "The tertiary consumers, form the fourth trophic level".
14. "Flow of energy is unidirectional". Explain.
15. 10 mango trees were sapling with 10 gram of pesticide each. If all the sapling were eaten by a cow and later on by a tiger, than calculate the biological magnification of pesticide in tiger. Define the phenomenon.
16. How is Ozone both good & bad. How is it produced in atmosphere.
17. What does UNEP stands for? How is it protecting our environment.

EXERCISE-III

SECTION-A

● **Fill in the blanks**

1. The biodegradable substances were broken down by the activity of _____ secreted by _____.
2. Increase in temperature of earth due to green house gases is called _____.
3. The series of organism feeding on one another is called _____.
4. UNEP stands for _____.
5. The process by which producers prepare their own food in presence of sunlight is called _____.
6. All interacting organism in an area together with abiotic components of an environment forms an _____.
7. Ozone is getting depleted due to _____ used in refrigerants and in fire extinguishers.
8. The process by which the harmful chemicals entered in food chain are not degradable and get accumulated progressively at each level is called _____.
9. Herbivores, carnivores, omnivores and parasites are examples of _____.
10. _____ can be taken as average value for the amount of organic matter that is present at each step and reaches the next level of consumers.

SECTION-B

● **Multiple choice question with one correct answers**

1. The best source of energy is
 (A) Water (B) Soil (C) Plants (D) Ponds
2. Ozone hole means
 (A) Hole in the stratosphere (B) Same concentration of ozone
 (C) Decrease in concentration of ozone (D) Increase in concentration of ozone
3. As a biologist, if you become very intrested in the study of the interaction of organism with each other and the environment your subspeciality will be
 (A) Zoology (B) Ecology (C) Protany (D) Herpetology
4. As energy is passed from one trophic level to another, the amount of usable energy
 (A) Increases
 (B) Decreases

- (C) Remains same
(D) Energy is not passed from one trophic level to another
5. In the biosphere which of the following is the ultimate source of energy
(A) Carbon (B) Water (C) Sunlight (D) Nitrogen
6. Individual of any species at a place form
(A) Biotic community (B) Ecosystem (C) Population (D) Biome
7. Pyramid of energy are
(A) always upright (B) always inverted
(C) mostly upright (D) mostly inverted
8. The maximum energy is stored at the following trophic level in an ecosystem
(A) Producers (B) Herbivores (C) Carnivores (D) Top carnivores
9. Sun gives radiations in form of
(A) Infra-red radiation (B) Visible light
(C) Ultra-violet (D) All of the above
10. Minimum energy is transferred in step:
(A) Grass → deer (B) Deer → lion (C) Grass → Lion (D) Sun → Plant

SECTION-C

• **Multiple choice question with one or more than one correct answers**

1. Ozone depletion can lead to
(A) Skin cancer (B) Eye cataract (C) Blood cancer (D) Brain cancer
2. The abiotic factors include
(A) Temperature (B) Water (C) Soil (D) Bacteria
3. Organisms which produce their own food are called
(A) autotrophs (B) herbivores (C) producers (D) decomposers
4. Which of the following is correct for decomposers?
(A) help in natural replenishment
(B) convert complex organic substances into simple organic substance
(C) synthesize organic compound from inorganic substances
(D) comprising of microorganisms like bacteria and fungi

SECTION-D

• **Assertion & Reason**

Instructions: In the following questions as Assertion (A) is given followed by a Reason (R). Mark your responses from the following options.

- (A) Both Assertion and Reason are true and Reason is the correct explanation of 'Assertion'
(B) Both Assertion and Reason are true and Reason is not the correct explanation of 'Assertion'
(C) Assertion is true but Reason is false
(D) Assertion is false but Reason is true
1. **Assertion:** Each step or level of the food chain forms a trophic level. Generally there are four trophic level in a food chain.
Reason: Very less energy remains after fourth trophic level.

2. **Assertion:** The length and complexity of food chain vary greatly
Reason: It food web is more stable.
3. **Assertion:** Increase in temperature of earth is due to green house gases.
Reason: Ozone increase due to chlorofluoro carbon used in refrigerants and in fire extinguishers.
4. **Assertion:** Supersonic jet cause pollution as they thin out ozone.
Reason: Depletion of ozone cause cataract.
5. **Assertion:** Each ecosystem contain only biotic components
Reason: The autotrophs synthesize food material while heterotrophs utilise and resynthesize it.

SECTION-E

- **Match the following (one to one)**

Column-I and **column-II** contains **four** entries each. Entries of column-I are to be matched with some entries of column-II. Only One entries of column-I may have the matching with the some entries of column-II and one entry of column-II Only one matching with entries of column-I

- | | |
|--|--|
| <ol style="list-style-type: none"> 1. Column I
(A) Autotroph
(B) Ozone
(C) UNEP
(D) CFC | Column II
(P) Chlorofluoro carbon
(Q) United Nations environment programme
(R) Ist Tropic level
(S) Three atoms of oxygen (O ₃) |
| <ol style="list-style-type: none"> 2. Column I
(A) Abiotic factor
(B) Natural ecosystem
(C) Ozone protects us from
(D) Trophic level | Column II
(P) Food chain
(Q) Forest, Ponds and Lakes
(R) Physical factors
(S) Ultraviolet radiation |

SECTION-F

- **Comprehension**

Every thing that surrounds the organism and influences its like in somway or the other is called environment. When we add waste to the environment it get polluted. There are two types of waste one those are biodegradable which can be broken down by the action of enzymes produced by bacteria while other area non-biodegradable which may be inert and simply persist in the environment for a long or may harm the various members of the ecosystem.

An ecosystem consist of biotic components and abiotic-components. Ponds, lakes and forest are examples of natural ecosystem while garden and crop-fields are examples of artificial ecosystem.

1. Define ecosystem
2. Difference between biodegradable and non-biodegradable substances.
3. Name the two components of ecosystem.
4. The study of the interactions of living organism and their environment is called
(A) Biology (B) Ecology (C) Histology (D) Embryology

SECTION-G

• **Match the following (one to many)**

Column-I and **column-II** contains **four** entries each. Entries of column-I are to be matched with some entries of column-II. One or more than one entries of column-I may have the matching with the some entries of column-II and one entry of column-II may have one or more than one matching with entries of column-I

1. Column I	Column II
(A) Biodegradable	(P) Producers
(B) Ecofriendly	(Q) Decomposers
(C) Trophic level's	(R) Bioplastics
(D) Fungi	(S) Paper bags

Answers

Knowledge base questions

- | | | | | |
|--------|--------|--------|--------|---------|
| 1. (B) | 2. (A) | 3. (B) | 4. (B) | 5. (A) |
| 6. (C) | 7. (A) | 8. (A) | 9. (C) | 10. (B) |

Try Yourself

- | | | | | |
|---------|---------|---------|---------|---------|
| 1. (B) | 2. (A) | 3. (A) | 4. (A) | 5. (B) |
| 6. (A) | 7. (D) | 8. (C) | 9. (C) | 10. (A) |
| 11. (C) | 12. (C) | 13. (B) | 14. (B) | 15. (A) |
| 16. (A) | 17. (D) | 18. (A) | | |

Exercise-III

Section-A

- | | |
|------------------------------|---|
| 1. Enzyme, Microorganism | 2. Green house effect |
| 3. Food chain | 4. United Nations environment programme |
| 5. Photosynthesis | 6. Ecosystem |
| 7. Chlorofluoro carbon (CFC) | 8. Biomagnification |
| 9. Consumers | 10. 10% |

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Section-B

- | | | | | |
|--------|--------|--------|--------|---------|
| 1. (C) | 2. (C) | 3. (B) | 4. (B) | 5. (C) |
| 6. (D) | 7. (A) | 8. (A) | 9. (D) | 10. (D) |

Section-C

- | | | | |
|----------|------------|----------|------------|
| 1. (A,B) | 2. (A,B,C) | 3. (A,C) | 4. (A,B,D) |
|----------|------------|----------|------------|

Section-D

- | | | | | |
|--------|--------|--------|--------|--------|
| 1. (A) | 2. (B) | 3. (C) | 4. (B) | 5. (D) |
|--------|--------|--------|--------|--------|

Section-E

- (A)-(R), (B)-(S), (C)-(Q), (D)-(P)
- (A)-(R), (B)-(Q), (C)-(S), (D)-(P)

Section-F

- (B)

Section-G

- (A)-(RS),(B)-(RS),(C)-(PQ),(D)-(Q)