

CHAPTER -15

SUMMARY NOTES

OUR ENVIRONMENT

INTRODUCTION:

Biodegradable and Non-biodegradable Wastes, Ecosystem, Components of Ecosystem. The environment includes our physical surroundings like air (or atmosphere), water bodies, soil (land and all the organisms such as plants, animals, human beings and micro-organisms like bacteria and fungi (called decomposers). The waste materials produced by the various activities of man and animals are poisonous to some extent and can be divided into two main groups

1. Biodegradable Wastes: Substances that are broken down by the biological processes are said to be biodegradable. These substances are decomposed through the actions of fungi, bacteria, and other living organisms. Temperature and sunlight also play an important role in the decomposition of biodegradable substances.

For Examples: Food waste, trees leaves, urine and fecal matter, sewage agricultural residue, paper, wood, cloth, cow-dung etc.

2. Non-Biodegradable Wastes: Substances that are not broken down by biological processes. These substances may be in solid, liquid or gaseous form. These substances are inert and simply persist in the environment for a long time or may harm the various members of the ecosystem.

For Examples: These includes DDT (Di-chloro-di phenyl trichloro ethane-in-phenyle the cheoro ethane), insecticides, pesticides, mercury, lead, arsenic aluminum, plastics, polythene bags, glass, radioactive wastes. These non-biodegradable wastes are major pollutants of the environment.

Harmful effects of biodegradable and Non-Biodegradable Substance

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

Difference between Biodegradable and Non-Biodegradable wastes

Biodegradable wastes	Non-Biodegradable wastes
1. The wastes that are broken down naturally by microbial action.	1. The wastes that are not broken down by the microbes.
2. Biodegradation forms harmless and non-poisonous products.	2. No such action is possible.
3. They release raw materials back to nature.	3. They do not release raw materials.
4. They pollute the environment only when they are produced in quantity beyond the capacity of the environment to degrade them.	4. Non-biodegradable wastes pollute the environment even in small quantity.
5. Bioconcentration does not occur.	5. Bioconcentration or biomagnifications occurs when wastes enter food chains.

6. Recycling is possible both naturally or through human efforts.

6. Recycling is possible only through human efforts.

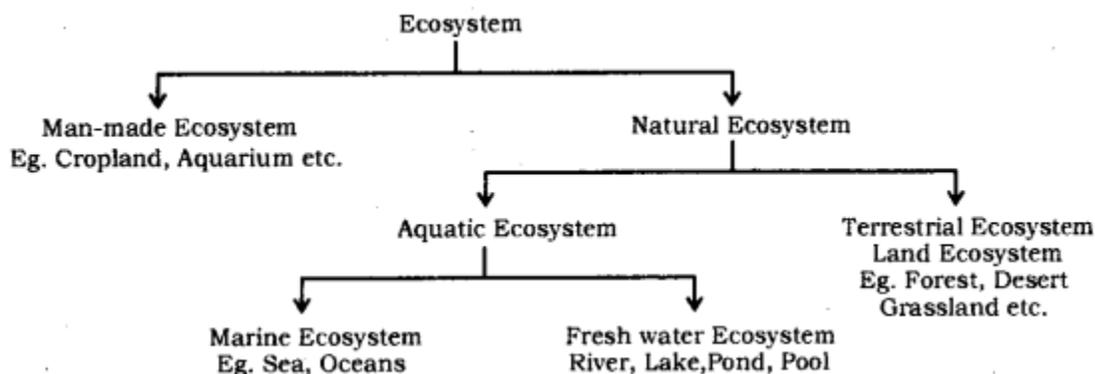
Ecosystem: An ecosystem is a self-contained unit of living things (plants, animals and decomposers), and their non-living environment (soil, air and water). For example; a forest, a pond, a lake, a green land etc.

In an ecosystem, energy and matter are continuously exchanged between living and non-living components.

An ecosystem can be both natural or man-made. Some examples of natural ecosystems are grass land, forest, sea, river, desert, mountain, pond, lake etc.

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

The ponds, rivers, lakes and sea represent the aquatic ecosystem (water-based ecosystem). Man-made artificial ecosystems are garden, crop fields, park, aquarium, etc.



Components of Ecosystem: There are two components of an ecosystem : (i) biotic component and (ii) abiotic component.

1. Biotic component: It includes three types of organisms :

(a) Producers: All green plants, blue green algae can produce their food (Sugar and starch) from inorganic substance using light energy (Photosynthesis). Therefore, all green plants are called producers. They are also called autotrophs.

Planktons are very minute or microscopic organisms freely floating on the surface of water in a pond, lake, river or ocean. Planktons are of two types : Phytoplanktons and Zooplanktons.

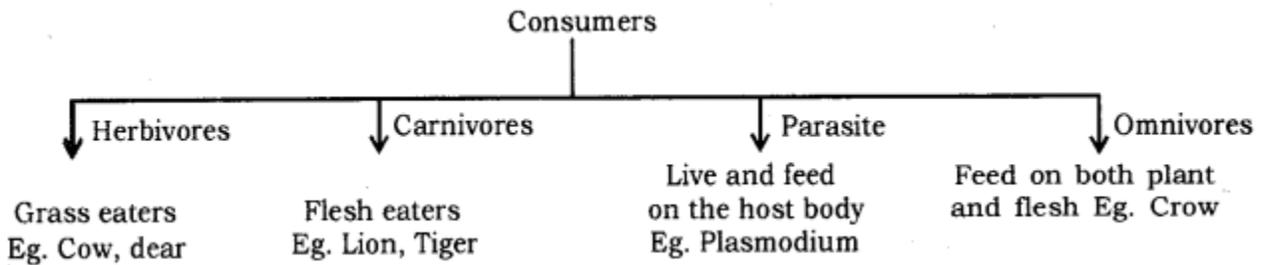
The microscopic aquatic plants freely floating on the surface of water are called phytoplanktons.

The microscopic aquatic animals freely floating on water are called zooplanktons. The freely floating protozoa are an example of zooplankton.

(b) Consumers: They are organisms which consume other organisms or their products as their food. All animals belong to this category. The consumers depend upon producers for their food directly or indirectly. They get their food by eating other organisms or their products. For example, man, goat, deer, fish, lion, cow, buffalo, etc., are common consumers.

The consumers can be classified into the following types :

- Herbivores.
- Carnivores.
- Parasite.
- Omnivores.



(i) Herbivores: These are organisms (animals) which get their food by eating the producers (or plant) directly. Herbivores are also called first order consumers. Some common examples of herbivores are : deer, rabbit, rat, squirrel, goat, cattle, etc.

(ii) Carnivores: These are organisms (animals) which consume other animals. Therefore, carnivores feed on the flesh of herbivores. These are also called primary carnivores or second order consumers. Some common examples are snake, wild cat, jackal, frog, some birds, fishes, etc.

There are animals which prey upon primary carnivores. They are called second order consumers or third order consumers. For example, owl, peacock, tiger, lion, etc., are some second order carnivores and may be eaten by third order carnivores. The carnivores which are not preyed upon further are called top carnivores. For example, lion is a top carnivore.

(iii) Omnivores: The organisms which feed on both plants and animals are called omnivores. Human beings are common example of omnivores because they eat both plants (For example; pulses, grams, oilseeds, fruit, etc.) and animal products (milk, meat, egg, etc.).

(c) Decomposers: Fungi and bacteria which break down (decompose) the dead plants, animals complex compounds into the simpler one. The decomposers help in the replenishment of natural resources. These are also known as microorganism or saprotrophs. These are also called reducers.

Importance of Decomposers

- Decomposers help in disposing of the wastes and dead bodies of plants and animals. Therefore, they clean the environment and create space for a living of newer generations of organisms.
- 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.
- The decomposers produce some acids which are useful in solubilization of some minerals.
- Decomposers help in recycling the materials in the biosphere so that, the process of life may go on and on like an unending chain.

2. Abiotic Components: These are non-living components of an ecosystem. These include the physical environment.

- Edaphic factors like soil texture, topography, water, and air.
- Inorganic substances like carbon dioxide, nitrogen, oxygen, water, phosphorus, sodium, potassium, and calcium. These are involved in the cyclic of materials in the ecosystem.
- Organic compounds like proteins, carbohydrates, and lipids. These largely form the living body and link the abiotic and biotic components.

Climatic factors: These are sunlight temperature, pressure humidity, moisture, rainfall, etc. these factors affect the distribution of the organisms.

Functions of an Ecosystem

- Ecosystem indicates available solar energy and the efficiency of an ecosystem to trap the same.
- It gives information about the available essential minerals and their recycling periods.
- It provides knowledge about the web of interactions and inter-relationship among the various population as well as between the population and the abiotic environment.
- It helps human beings to know about conservation of resources, protection from pollution and inputs required for maximizing productivity.
- In the ecosystem, two processes of energy flow and biogeochemical cycles (nutrients movement) proceed side by side. The energy flow is unidirectional while the movement of nutrients is cyclic.

Food chain, Food web, Trophic levels. Flow of energy ten percent law, Depletion of the ozone layer, Biological magnification. Mode of waste disposal.

Food Chain: The sequence of living organisms in a community in which one organism consumes another organism to transfer food energy, is called a food chain.

A food chain is unidirectional where transfer of energy takes place in only one direction.

OR

Food chain is sequential process which represents “who eats whom”.

OR

Food chain refers to an arrangement of different biotic groups in a sequence of energy transfer. These biotic groups are producer herbivores, carnivores.

For example, T1(Grass) → T2(Deer) → T3(Lion)

Examples of Food Chains: Simple food chain operating in a grass land or forest
Grass(Producer) → Deer(Herbivore) → Lion(Carnivore)

In this food chain, grass represent the producers (first trophic level). Grass synthesize their own food by the process of photosynthesis. Grass is eaten up by deer, which represents the herbivores or the primary consumers. Deer in turn is consumed by lion, the carnivores or the secondary consumers.

A food chain in grassland which has four steps is :

Grass(Producers) → Insect(Herbivores) → Frog(Carnivores) → Eagle(Secondary Carnivore)

Significance of Food Chains

- 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.
- The food chains transfer energy and materials between various living components in an ecosystem or biosphere.
- The food chains give dynamicity to an ecosystem or biosphere.
- The movement of toxic substances like pesticides, weedicides, etc., through food chains, can prove very harmful.

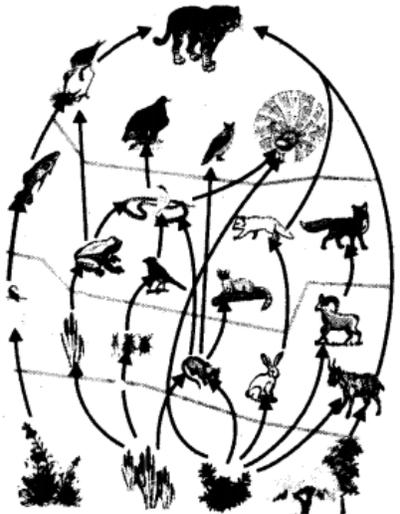
Characteristics:

- A food chain helps in understanding the food relationship and interactions among various organisms in an ecosystem.
- There is a progressive decline in the amount of energy available as we move from one trophic level to another in a food chain.

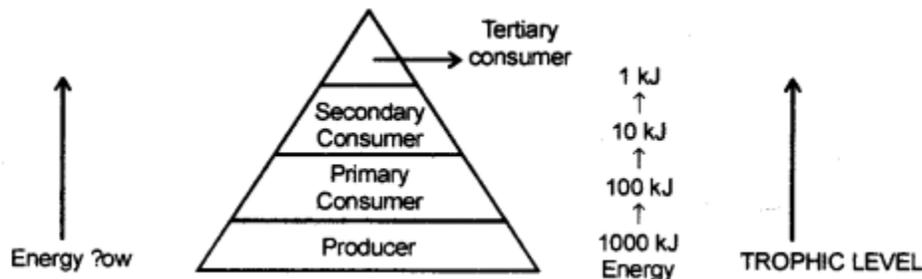
Food Web: The inter-connected food chains operating in an ecosystem which establish a network of relationship between various species, are called a food web.

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.



Trophic Levels: The various steps in the food chain at which the transfer of food (or energy) takes place is called trophic levels. There is a gradual decrease in the amount of energy transfer from one trophic level to the next trophic level in a food chain.



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.

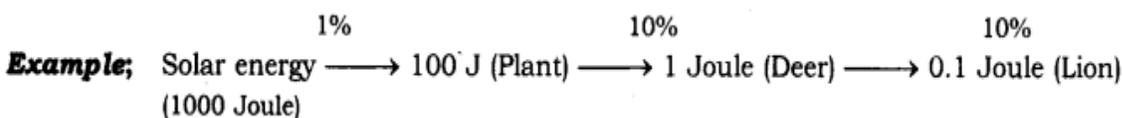
The various trophic levels are given below :

- 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.

Flow Open Energy

Energy is used and conveyed from one trophic level to another in a food chain. This is called flow of energy. Green plants capture about 1% of the solar energy incident on the Earth through the biochemical process of photosynthesis. A part of this trapped energy is used by plants in performing their metabolic activities and some energy is released as 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. The process of energy transferred is similarly repeated with carnivores and so on.

Ten percent law: Ten percent law states that only 10 percent of the energy entering a particular trophic level of organisms is available for transfer to the next higher trophic level.

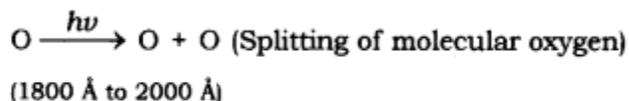


For example, Suppose 1000 J of solar energy is received by green plants, then only 1% of solar energy available on earth is utilized by plants. So only 10 J (1% of 1000 J) is trapped by plants and the rest 990 J of energy is lost to the environment. So, plants utilizes only 10 J of energy. Next, only 10% of the 10 J energy of plant, that is, 1 J, is available to the herbivore animal while 9 J is lost to the environment. Again, just 10% of the 1 J of energy of herbivore animals is utilized by carnivore animals. Thus, carnivore animals have only 0.1 J of energy while 0.9 J is lost to the environment.

Environmental Problems: Changes in the environment affect us and our activities change the environment around us. This led to the slow degradation of the environment that arose many environmental problems. For Example; depletion of the Ozone Layer and waste disposal.

Depletion of Ozone Layer: Ozone (O₃) layer is largely found in the stratosphere which is a part of our atmosphere from 12 km -50 km above sea level. This region is called ozonosphere. Ozone is deadly poisonous at the ground level.

Ozone is formed as a result of the following photochemical reaction.

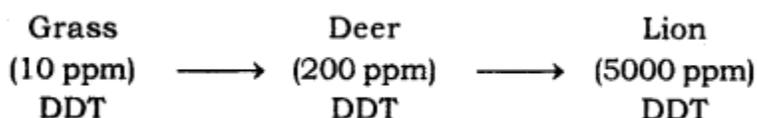


Ozone layer is a protective blanket around earth which absorbs most of the harmful U.V. (Ultraviolet) radiation of the Sun, thus, protecting the living beings of the Earth from health hazards like skin cancer, cataract in eyes, weaken immune system, destruction of plants etc. The decline of Ozone layer thickness in Antarctica was first discovered in 1985 and was termed as OZONE HOLE.

Steps taken to limit damage of ozone layer: Excessive use of CFCs (Chloro Fluoro Carbon) a synthetic, inert chemical. For example; Freon which are used as refrigerants and also in fire extinguishers caused Ozone depletion in the upper atmosphere. A single chlorine atom can destroys 1,00,000 Ozone molecules. U.N.E.P. (United Nation Environment Programme) did an excellent job in forging an agreement to freeze CFC production at 1986 levels (KYOTO Protocol) by all countries.

Biological Magnification: The increase in concentration of harmful chemical substances like pesticides in the body of living organisms at each trophic level of a food chain is called biological magnification.

Example:



Maximum concentration of such chemicals gets accumulated in human bodies.

Garbage Disposal: Industrialization and rise in demand of consumer goods have created a major problem in the form of wastes/garbage accumulation and its disposal especially in urban areas.

The disposal of waste should be done in a scientific way. There are different methods of waste disposal. The method to be used depends on the nature of the waste. Some of the important modes of waste disposal are :

- **Incineration:** Burning of waste on high temperature to form ash is called incineration. This process is carried out in an incinerator. Incineration is used to destroy household, chemical and biological wastes.
- **Open dumping:** A conventional method in which solid waste are dumped in selected areas of a town. It actually cause pollution
- **Land fillings:** Wastes are dumped in low living areas and are compacted by rolling with bulldozers
- **Composting:** Organic wastes are filled into a compost pit (2m × 1m × 1m). It is then covered with a thin layer of soil. After about three months the same garbage filled inside the pit changes into organic manure.
- **Recycling:** The solid wastes is broken down into its constituent simpler materials. These materials are then used to make new items. Even non-bio degradable solid wastes like plastic, metal can be recycled.
- **Reuse:** A very simple conventional technique of using an item again and again. For example; paper can be reused for making envelopes, etc...

Harmful effects of agricultural practices on the environment.

- Excessive use of fertilisers changes the chemistry of soil and kills useful microbes.
- Excessive use of non-biodegradable chemical pesticides leads to biological magnification.
- Extensive cropping causes loss of soil fertility.
- Excess use of groundwater for agriculture lowers the water table.
- Agricultural practices lead to some amount of damage to the natural ecosystem/habitat.

Intext Questions

Page 257

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

Answer: Substances that are broken down by biological processes are said to be biodegradable. In our environment, many of the substances are broken easily by decomposers (bacteria and fungi) as they possess specific enzymes for such activity. However, there are other substances also which are not broken down in this manner and are known as non-biodegradable substances. Since these substances are not degraded by bacteria and fungi, so they persist for a long time. These non-biodegradable substances will be acted upon by physical processes like heat and pressure.

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

Answer:

1. They may produce foul smell during decomposition process.
2. They may produce some harmful gases such as ammonia, methane, carbon dioxide, etc., which can further-cause global warming.

-

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

Answer:

1. These inert substances simply persist in the environment. This means that these substances require land area for dumping.
2. Excess of fertilizers, pesticides and other chemicals changes soil chemistry and also affects aquatic life.
3. Most of these chemicals and heavy metal are easily absorbed by the organisms. This causes biological magnification.

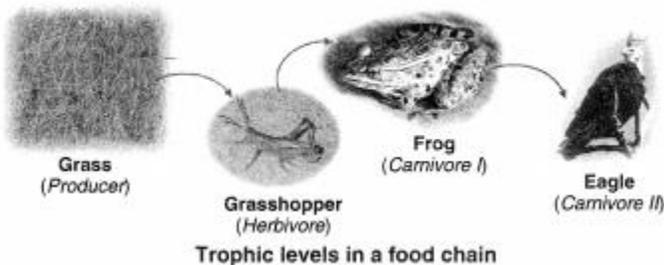
Page Number: 260

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

Answer: Trophic Levels : The various steps in a food chain at which the transfer of food (or energy) takes place are called trophic levels.

Example : A food chain operating in a grassland is given below :

Grass → Insects → Frog → Birds



In this food chain

1. Grass represents first trophic level.
2. Grasshopper represents second trophic level.
3. Frog represents third trophic level.
4. Eagle represents fourth trophic level.

Question 2. What is the role of decomposers in the ecosystem ?

Answer:(i) Decomposers help in decomposing the dead bodies of plants and animals and hence act as cleansing agents of the environment.

(ii) Decomposers also help in putting back the various elements of which dead plants and animals are made, back into the soil, air and water for reuse by the producers like crop plants.

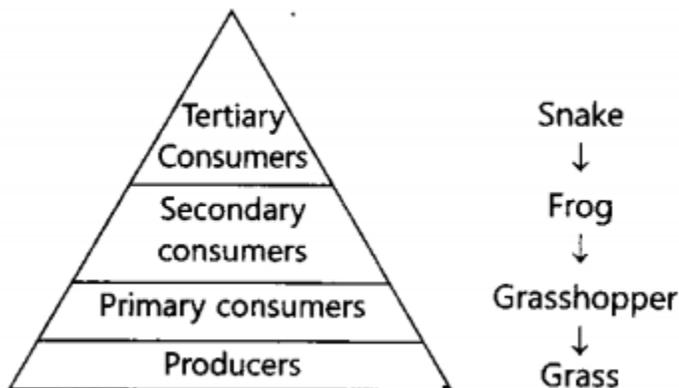
(iii) They help in recycling of the nutrients.

(iv) They decompose dead remains thereby providing space for new life to settle in the biosphere.

Page : 261

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

Answer: Each step or level of the food chain forms a trophic level. Consider the following food chain:



Question 2. What is the role of decomposers in the ecosystem?

Answer: Role of decomposers in the ecosystem :

1. They help in breaking down the complex organic into simple inorganic that go into the soil and are used up by the plants.
2. They the nutrient pool of the putting In this way, ad as cleansing agents of nature.
3. They help in maintaining the fertility of by adding humus content to it.

Page Number: 262

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

Answer: The microorganism like bacteria and other decomposer organisms (called saprophytes) present in our environment are specific in their action. They break down the materials or products made from natural materials (say, paper) but do not break down man-made materials such as plastics. So, it is due to the property of decomposer organisms of being specific in their action that some waste materials are biodegradable, whereas others are non-biodegradable.

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

Answer: (i) Biodegradable substances are decomposed by the action of microorganisms and decomposed materials are recycled through geo-chemical cycle.

(ii) These substances keep the environment clean.

Question 3. Give any two ways in which non-biodegradable substances would effect the environment.

Answer: (i) They cause air, water and soil pollution.

(ii) They may cause bio-magnification in the food chain and end up in humans.

Page Number: 264

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

Answer: Ozone (O_3) is an isotope of oxygen, i.e., it is a molecule formed by three atoms of oxygen.

At the higher levels of the atmosphere, ozone performs an essential function. It shields the surface of the earth from ultraviolet (UV) radiations from the sun. These radiations are highly damaging to organisms. Ultraviolet rays can cause skin cancer.

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

Answer: (i) Recycling : The solid wastes like paper, plastics and metals, etc. are

recycled.

(ii) Preparation of Compost: Biodegradable domestic wastes such as left over food, fruit and vegetable peels and leaves of potted plants, etc. can be converted into compost by burying in a pit dug into ground.

Chapter End Questions

Question 1. Which of the following groups contain only biodegradable item ?

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

Answer:(a) Grass, flowers and leather.

Question 2. Which of the following constitutes a food-chain ?

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

Answer:(b) Grass, goat and human.

Question 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 on her scooter
- (d) All of the above

Answer:(d) All of the above.

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

Answer:The food chain would end and ecological balance would be affected.

1. If the herbivores are killed, then the carnivores would not be able to get food and would die.
2. If carnivores are killed, then the population of herbivores would increase to unsustainable level.
3. If producers are killed, then the nutrient cycle in that area would not be completed.

Question 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 ?

Answer:Yes, the impact of removing all the organisms in a trophic level will be different for different trophic levels. For example, on removing producers; herbivores would not be able to survive or they would migrate and ecosystem would collapse. If herbivores are removed, producers would grow unchecked and carnivores would not get food. If carnivores are removed, herbivores would increase to unsustainable levels and could destroy the producers. If decomposers are removed, the dead animals would pile up due to which the environment would become polluted. In addition to this, if dead animals will not decompose, the recycling of nutrients in the soil will be stopped and its fertility will be reduced. As a result the green cover of the earth will be lost. Thus to maintain the balance of the ecosystem the presence of organisms is necessary at each trophic level.

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

Answer: Biological magnification : The increase in concentration of harmful chemical substances like pesticides in the body of living organisms at each trophic level of a food chain is called biological magnification.

Yes, levels of bio-magnification would increase as the trophic level increases and would be the highest for topmost trophic level. It would affect their biological process such as growth, reproduction, etc.

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

Answer: The problems caused by the non-biodegradable wastes are :

1. If the quantity of non-biodegradable matter increases in the nature then bio-magnification of poisonous chemicals in our body increases.
2. If the non-biodegradable waste keeps on increasing there will not be left any substance for new organisms.
3. The increasing quantity of non-biodegradable waste will cause imbalance of ecosystem.

Question 8. If all the waste we generate is biodegradable, will this have no impact on the environment ? [CBSE 2011, 2013]

Answer: If all the waste we generate is biodegradable, it will also have impact on the environment. If it is disposed off properly, the problem of air, water and soil pollution can be lessened to an extent. There would be less health problems and humans would be disease-free.

But if it is not disposed off properly, it will affect the environment adversely.

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

Answer: The damage to the ozone layer is a cause for concern because if the ozone layer in the atmosphere disappears completely, then all the extremely harmful ultraviolet radiations coming from the sun would reach the earth. These ultraviolet radiations would cause skin cancer and other ailments in men and animals and also damage the plants. In an attempt to protect the ozone layer, the United Nations Environment Programme (UNEP) unanimously forged an agreement among its member countries to freeze CFC production at 1986 levels.