Chap 13: Our Environment

1. What is an ecosystem? What are its components?

An ecosystem is made of all the living organisms in an area together with the non-living things around them, all interacting with each other.

Biotic components - Living organisms: plants, animals and microorganisms.

Abiotic components - Non-living factors: sunlight, temperature, rainfall, wind, soil and minerals.

eg: Forest, pond, lake, grassland.

2. What are natural and artificial ecosystems?

Natural ecosystem	Artificial ecosystem
Formed by nature.	Created and maintained by humans.
Has many kinds of organisms.	Has only a few kinds of organisms.
Maintains itself.	Needs human care.
eg: Forest, pond, lake	eg: Garden, crop field, aquarium

3. What are producers, consumers and decomposers?

Producers - Organisms that make their own food from simple substances using sunlight, by photosynthesis. eg: Green plants, blue-green algae.

Consumers - Organisms that depend on producers, directly or indirectly, for food. They can be herbivores (deer), carnivores (lion), omnivores (humans) or parasites.

Decomposers - Microorganisms that break down dead plants and animals into simple substances. eg: Bacteria and fungi.

4. What is a food chain? Give an example.

A food chain is a series of organisms in which each one feeds on the one before it. It shows how food and energy pass from one organism to the next.

eg:

Grass --> Deer --> Lion

Grass --> Grasshopper --> Frog --> Snake --> Eagle

In a pond: Algae --> Small fish --> Big fish

5. What is a food web? How is it different from a food chain?

A food web is a network of many food chains joined together. In nature, an organism is eaten by more than one kind of organism, so food chains are linked.

Food chain	Food web
A single straight series.	A network of many food chains.
Energy flows along one path.	Energy flows along many paths.
Breaking one link affects the whole chain.	More stable. If one chain breaks, other paths remain.

6. What are trophic levels?

Each step or level of a food chain is called a trophic level.

- 1st trophic level - Producers (plants)
- 2nd trophic level - Herbivores or primary consumers (deer)
- 3rd trophic level - Small carnivores or secondary consumers (frog)
- 4th trophic level - Large carnivores or tertiary consumers (snake)

Food chains usually have only 3 or 4 trophic levels.

7. What is the 10 percent law?

Green plants capture about 1% of the sunlight that falls on their leaves and change it into food energy.

At each trophic level, only about 10% of the energy is passed on to the next level. The rest is used for the organism's own life processes or lost as heat.

eg: If plants have 1000 J, the herbivore gets 100 J, and the carnivore gets 10 J.

This is why food chains have only 3 or 4 trophic levels. After that, very little energy is left.

8. Why is the flow of energy in an ecosystem unidirectional?

Energy flows in only one direction: Sun --> Producers --> Herbivores --> Carnivores.

Energy that passes to the next level does not come back to the earlier level.

At each level, part of the energy is lost as heat, which organisms cannot use again.

So energy flows only one way. Nutrients, on the other hand, are used again and again, because decomposers return them to the soil.

9. Why are decomposers important in an ecosystem?

• Decomposers break down dead plants and animals into simple substances.
• They return nutrients to the soil, which plants use again.
• They clean the environment by removing dead bodies and waste.

Without decomposers, dead matter would pile up and the soil would lose its nutrients.

10. What is biological magnification?

Biological magnification is the increase in the concentration of harmful chemicals at each higher level of a food chain.

Pesticides like DDT used on crops are washed into the soil and water. Plants and water animals absorb them. These chemicals are not broken down, so they collect in the body.

Each animal eats many organisms from the level below, so the chemical gets more concentrated at each level.

Humans are at the top of many food chains, so the largest amount of these chemicals collects in our bodies.

11. What are biodegradable and non-biodegradable substances?

Biodegradable	Non-biodegradable
Broken down by bacteria and fungi.	Not broken down by bacteria and fungi.
Do not stay in the environment for long.	Stay in the environment for a long time and harm it.
eg: Vegetable peels, paper, cotton, wood	eg: Plastic, glass, DDT, metal cans

12. How is ozone formed? Why is the ozone layer important?

Ozone (O_3) is formed high in the atmosphere. Ultraviolet (UV) rays from the sun split oxygen molecules (O_2) into single oxygen atoms (O). These atoms combine with oxygen molecules to form ozone.

O_2 ---> O + O

O + O_2 ---> O_3

The ozone layer absorbs the harmful UV rays from the sun and protects living things. UV rays can cause skin cancer in humans.

13. What causes the ozone layer to deplete? What steps were taken?

The amount of ozone began to fall sharply in the 1980s. This was mainly caused by chlorofluorocarbons (CFCs), which are used in refrigerators and fire extinguishers. CFCs rise to the upper atmosphere and destroy ozone.

In 1987, the United Nations Environment Programme (UNEP) got countries to agree to freeze CFC production at 1986 levels. Making CFC-free refrigerators is now required throughout the world.

14. How can we reduce the problem of waste disposal?

• Separate biodegradable and non-biodegradable waste before throwing it away.
• Turn kitchen waste into compost.
• Use cloth or jute bags instead of plastic bags.
• Follow the 3Rs - Reduce what we use, Reuse things, and Recycle materials like paper, plastic and metal.
• Avoid single-use plastic items.