



Biological Magnification: Producers like plants and algae take in nutrients from their surroundings. Sometimes they also take in harmful chemicals along with the other nutrients. These harmful chemicals include compounds of mercury, and chemicals like DDT, which is widely used to kill mosquitoes. These chemicals cannot be broken down by plants and other organisms. So, they accumulate in their bodies. Since organisms at a higher trophic level eat many lower-level organisms, the amount of chemicals entering their bodies increases. Thus, as the chemicals pass on from one level to the next in the food chain, the amount of chemicals accumulated in organisms at each level increases. The progressive increase in the accumulation of a harmful substance in organisms at successively higher trophic levels is called biological magnification or bio-magnification.

How we affect the environment: Human activities can have a harmful effect on the environment. A large number of environmental problems arise due to the wastes we generate and the substances, like CFCs (chlorofluorocarbons), that we release into the environment.

Human-generated Waste: A thing which is of no use to us or which we throw away is called waste. Waste includes sewage and garbage. Used water and the waste materials produced by human bodies are carried away through underground pipes as sewage. Garbage refers to the solid household waste that we throw away regularly. For example, we are using more paper for newspapers, coupons, posters, and so on. This results in more waste paper. We are also buying more appliances, clothes, etc. Each of these comes with packing materials, which we are throwing out as waste.

Biodegradable and non-biodegradable materials: Waste materials can be classified on the basis of whether they can be degraded, or broken down, by biological processes. Materials that get broken down by living organisms are called biodegradable materials. These are substances of plant or animal origin such as paper, wood, cotton, food materials and sewage. So, bio-degradable wastes can be broken down into simpler, natural substances by decomposers (saprophytes) such as bacteria and fungi. These substances are harmless and nontoxic.

Materials that cannot be broken down by living organisms are called non-biodegradable materials. Metals, plastics, DDT, detergents, certain dyes, etc., are some examples of non-biodegradable substances. Non-biodegradable materials are major pollutants. They may be chemically less active. So they remain unchanged in the environment for a long time. You have already seen how harmful materials like DDT and mercury can be. Plastic bags, bottles, etc., often find their way to drains, etc. Since they do not decompose, they keep on adding up and finally, they choke the drains. Non-biodegradable detergents, dyes, etc., get into the soil and water bodies and harm the organisms living there.

In general, we should try to use biodegradable materials wherever possible to reduce the harmful effects of non-biodegradable materials. For certain things, we have a choice between biodegradable and non-biodegradable materials. For example, disposable cups can be made from non-biodegradable plastics or from paper (biodegradable) or clay. We should weigh the environmental impact of using a certain material. Although paper is biodegradable, using more paper means cutting more trees. Some may say that good quality clay can be put to better uses like agriculture. But since non-biodegradable plastic is not a good choice, we have



to choose between clay and paper. In future we can perhaps use biodegradable plastics. Such plastics are already being used to make disposable cutlery, capsule covers, etc.

Management of garbage and sewage: Management of garbage and sewage involves collecting, transporting and disposing waste. Garbage is collected by municipal bodies or private agencies. In many cities, garbage-disposal bins are provided in each neighbourhood. There may be separate bins for biodegradable kitchen wastes and for recyclable materials like paper, glass, metals and plastics. When separate bins are not provided, ragpickers pick out plastics, paper, etc., from the garbage and sell them to people who recycle the material.

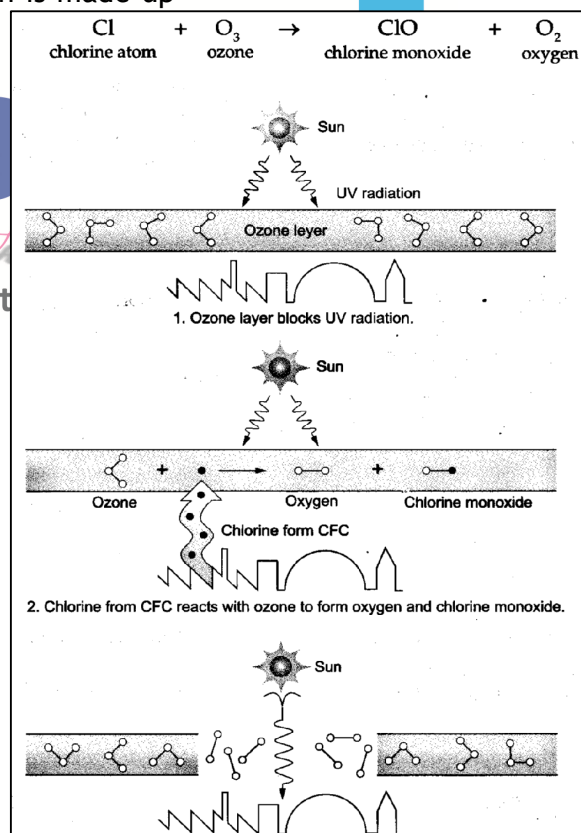
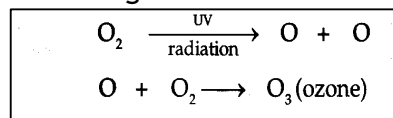
Collected garbage is transported to disposal sites by special trucks or tractors. Recyclable solid waste is sent for recycling. The rest is used to fill up land at landfill sites. Sometimes, the solid waste is burnt. This is especially so for hospital wastes and wastes that can pollute the soil.

Sewage is carried by pipes to sewage-treatment plants. Here the sewage is filtered and the organic material in the sewage is allowed to settle down and decompose in large tanks. The water coming out of these tanks is clean and is released into water bodies. In some places, sewage is used to produce biogas used for cooking and electricity generation.

CFCs and the Ozone Hole: High above the surface of the earth, there is a layer in the atmosphere that is rich in ozone (O₃). Ozone, which is made up

of three atoms of oxygen, affects our respiratory system. However, the layer of ozone in the atmosphere protects us by absorbing the ultraviolet (UV) radiation from the sun. This prevents the harmful UV radiation from reaching the surface of the earth. Ultraviolet radiation can cause skin cancer and cataract. It also affects plants. Ozone is formed at the higher levels of the atmosphere. When UV radiation falls on oxygen molecules, the high energy of UV radiation splits molecular oxygen (O₂) into free oxygen (O) atoms. These atoms then combine with molecular oxygen to form ozone.

Unfortunately, the amount of ozone in the ozone layer is being depleted due to the release of certain chemicals into the atmosphere. Among these chemicals are chlorofluorocarbons (CFCs), which are made of carbon, fluorine and chlorine. CFCs are used in air-conditioners, refrigerators, aerosol sprays, shaving





foam, fire extinguishers, etc. These compounds rise up high in the atmosphere and break down to form chlorine atoms. These chlorine atoms react with the ozone to form oxygen.

As ozone gets converted to oxygen, the amount of ozone in the ozone layer decreases. Over time this has created an ozone-deficient area in the atmosphere. This area is called the ozone hole. This is most noticeable over Antarctica. To stop the damage to the ozone layer, the United Nations Environment Programme (UNEP) brought forward an agreement in 1987 to freeze the CFC production at the 1986 level. Most countries have signed this agreement. As a result, there has been a slight decrease in the rate of depletion of the ozone layer.

Points to remember

- An ecosystem is a functional unit consisting of all the living beings of an area and the nonliving components of their environment, interacting to form a stable system.
- An ecosystem consists of abiotic (nonliving) and biotic (living) components. The biotic component includes plants and animals, whereas the abiotic component includes the physical environment, nutrients and climatic factors.
- Organisms which make their own food are called producers or autotrophs. Green plants and certain blue-green algae are producers. Organisms that depend on other organisms for food are called consumers or heterotrophs. Consumers can be classified as herbivores (plant-eaters), carnivores (flesh-eaters) and omnivores (eat both plants and flesh). Organisms which feed on dead plants and animals are called decomposers. Decomposers include bacteria, fungi and worms.
- A food chain in an ecosystem is a series of organisms in which each organism feeds on the one below it in the series. A level or position in a food chain is called a trophic level.
- A food web is a series of interconnected food chains representing the feeding relationship of the organisms within an ecosystem.
- For an ecosystem to work there has to be a flow of energy and a cycling of nutrients. The flow of energy is unidirectional, from a lower to a higher trophic level. Only about 10% of the energy available to a trophic level is transferred to the next higher level.
- The progressive increase in the accumulation of a harmful substance in organisms at successively higher trophic levels is called biological magnification or bio-magnification.
- Materials that get broken down by living organisms are called biodegradable materials. These are substances of plant or animal origin. Materials that cannot be broken down by living organisms are called non-biodegradable materials, e.g., metals, plastics, DDT. Non-biodegradable materials are major pollutants.
- Chemicals like CFCs have damaged the protective ozone layer, which absorbs the harmful ultraviolet radiation.