OUR ENVIRONMENT

CONTENTS

ENVIRONMENT

It is the sum total of all external factors, substances, living beings and conditions that surround an organism & effect the same without becoming its part.

WASTE

Waste are useless left over or discarded materials. They can be gaseous, liquid or solid.

◈ **Biodegradable Wastes**

- They are wastes which are broken down and disposed of naturally by saprophytes or decomposers.
- Biodegradable wastes generally organic wastes, *e.g.*, garbage, sewage, livestock waste, used tea leaves.
- They can also be diposed of through waste treatment plants or converted into an agricultural resource of manure and compost.

◈ **Non-biodegradable wastes :**

- They are the wastes which cannot be broken down by decomposers because they do not have enzymes for the same.
- Most of the nonbiodegrable wastes are human made, e.g., plastic, crockery, metallic cans, glass articles, polythene bgas, synthene fibres, silver foil, many pesticides (e.g., BHC, DDT).
- Some of the soluble but nonbiodegradable chemicals enter food chains, persists, undergo biomagnification and harm the consumers of various levels includings humans.

ECOSYSTEM

Ecosystem is a self contained ecological system which consists of a distinct biotic community and the physical environment, both interacting and exchanging material between them.

◈ **Natural Ecosystem.**

They are ecosystems which develop in nature without human support. Natural ecosystems are of two types, terrestrial and aquatic.

◈ **Terrestrial Ecosystems :**

Occurs over land. They are of three major types desert, grassland and forest. Aquatic ecosystems are found in water bodies, e.g. ponds, lakes, rivers (fresh water), estuaries, marine (salt water)

◈ **Artificial Ecosystems.**

They are ecosystem which have been created and are maintained by human beings.

➢ ECOSYSTEM STRUCTURE

Ecosystem consists of two types of components, biotic and abiotic.

◈ **Biotic components:**

They incluce all the living organisms present in the ecosystem. The assemblage of populations of different living organisms present in an ecosystem is also called biotic community. Autotrophs are also called producers. All other organisms which are unable to manufacture their own food are called heterotrophs. Heterotrophs are of two types, consumers and decomposers.

- **Producers :** They are green plants, blue-green algae (= cyanobacteria), some bacteria and minute free floating autotrophic organisms called phytoplankton. All of them possess chlorophyll. The energy contained in food is chemical energy. It is the transformed form of solar energy that has been absorbed with the help of chlorophyll of producers. Because of it, the producers are also called transducers or converters.

- **Consumers :** They are organisms which feed on other organisms. Consumers are of four types – herbivores, carnivores, omnivores and parasites.

  (i) Herbivores – They are animals which directly feed on plants. Herbivores are also called primary or first order consumers. As they convert plant matter into animal matter, the herbivores are often called key industry animals.

  (ii) Carnivores – They are animals which prey upon other animals and feed on their flesh. The carnivores which feed on herbivores are named as primary carnivores or second order consumers, e.g., frog, wild cat, jackal, fox, snake, some birds and fishes.

  (iii) Omnivores – They are animals which feed on both plant and animal diets, e.g., human beings, cockroach, dog, bear, crow, ant. Human food consists of plant food (e.g., grains, pulses, vegetables, fruits, oil seeds) as well as animal products (e.g., milk, meat, fish, egg).

- **Decomposers :** They are saprophytes which obtain their nourishment from organic remains. Decomposers secrete enzymes over the organic remains. It causes breakdown of organic remains into simpler and soluble substances that are absorbed by saprophytes. In the process various inorganic raw materials are released. The phenomenon is called mineralisation. They are also known as microconsumers because they are small sized heterotrophs, e.g., many bacteria many fungi.

  Detrivores (Scavengers) : They are animals which feed on dead bodies, e.g., vultures, kites, detrivores help in quick disposal of corpses.

➢ FOOD CHAINS

Food chain is a sequence of organisms in a biotic community through which food passes with members of a step becoming food of the members of the next step of the sequence. In other words, it is a list of who eats whom in a biotic community. A food chain usually consists of producers, various levels of consumers and decomposers. Each step or division in food chain which is characterized by a particular method of obtaining food is called trophic level.

◈ **Producers :**

They constitute the base or beginning of a food chain. They constitute the first trophic level (T_1) of a food chain.

◈ **Herbivores or first order consumers (Primary consumers) :**

They are animals which feed on plants or plant products. e.g., Grasshopper, Rabbit, Deer Elephant. Herbivores constitute second trophic level (T_2).

◈ **First order (Primary) carnivores or second order consumers (secondary consumers) :**

They are animals which prey upon herbivores, e.g., Frog, Wild Cat, Fox. These animals form the third trophic level (T_3).

➢ CHARACTERISTICS OF FOOD CHAIN

◈ **Producers based:**
All sustainable food chains are producer based.

◈ **Energy :**
Producers obtain energy from sun. All others (consumers) obtain the energy from food originally built up producers. There is unidirectional flow of energy.

◈ **Biogenetic Nutrients :**
Inorganic nutrients must keep on circulating with the help of decomposers. Otherwise, food chains cannot be sustained.

◈ **Straight :**
Unless linked with another, food chain runs straight.

◈ **Size :**
Food chains are generally short with 3-5 trophic levels.

◈ **Populations :**
Size of populations decreases with the rise in trophic level. Top carnivores are always very few.

◈ **Operation at different trophic levels :**
An organism can operate at more than one trophic level, e.g., snake feeds on herbivorous rat as well as carnivorous frog.

➢ OZONE DEPLETION

The amount of ozone in ozonosphere began to drop in 1980s. A spring time ozone hole (area of extreme thinness of ozone) was discovered over Antarctica in 1985 by Farman *et al*. Its area has been spreading subsequently. An ozone reduction of 1% increases the amount of high energy UV–B radiations reaching the earth by 2%. It means that there has been increase in UV–B radiations reaching the earth by 15–20%.

◈ **ODS :**
Ozone depleting substances or ODS are those substances which react with ozone present in the stratosphere and destroy the same. The main ozone depleting substances are chlorofluorocarbons (CFCs), halons, nitrous oxide, methane, carbon tetrachloride and chlorine. Chlorofluorocarbons are highly stable, odourless, synthetic gaseous substance used as aerosol propellants, coolants, refrigerants, blowing agents, etc.

$$CCl_2F_2 \xrightarrow{\text{UV-radiations}} CClF_2 + Cl$$

$$2Cl + O_3 \longrightarrow Cl_2O + O_2$$

$$2Cl_2O \longrightarrow 4Cl + O_2$$

◈ **Effects of Ozone Depletion :**

(i) **Cancers** – The incidence of skin cancer and herpes would increases.

(ii) **Eye Sight** – There will be dimming of eye sight, photoburning and higher incidence of cataracts.

(iii) **Immune system** – It will be impaired resulting in increasing number of diseases.

(iv) **Mutations** – More mutations will occur. Most of them would be harmful.

(v) **Photosynthesis** – 10–25% decline in photosynthesis would occur.

(vi) **Global warming** – Reduced photosynthesis will increase CO_2 concentration causing global warming.

(vii) **Damage to Articles**

➢ MANAGEMENT OF GARBAGE

Garbage is refuse of food, vegetables and fruit articles along with other domestic wastes. Every household produces garbage. Garbage management is the nonpollutant disposal of the waste. It consists of three steps.

(i) Collection of garbage.

(ii) Transport of garbage from collection sites to disposal sites.

(iii) Disposal of garbabe

The noncombustible waste is used in landfill.

- **Pig and Cattle Feeding :**

  Pigs and stray cattle feed on garbage and reduce its bulk.

- **Rag Picking :**

  Rag pickers remove various recyclable articles like rags, polythene, plastic articles, glass pieces, cans, paper, cardboard, etc.

- **Recycling :**

  Articles salvaged by rag pickers are recycled. Waste paper yields cardboard while waste cotton textiles are used to produce paper.

- **Composting :**

  Garbage is shredded and mixed with sewage sludge and other organic remains. It is converted into compost or vermicompost.

- **Biogas and Manure :**

  Organic wastes can also be decomposed anaerobically to yield biogas and manure.

- **Burning :**

  The solid combustible waste is burnt. It, however, causes air pollution.

- **Incineration :**

  Organic waste is aerobically burnt at 850ºC inside incinerator. Ash and unburnt matter is disposed off in land filling.

- **Pyrolysis :**

  It is anaerobic combustion of organic waste at a temperature of 1650ºC.

- **Land-filling or Dumping :**

  Solid waste is pulverised and dumped into a low lying area.