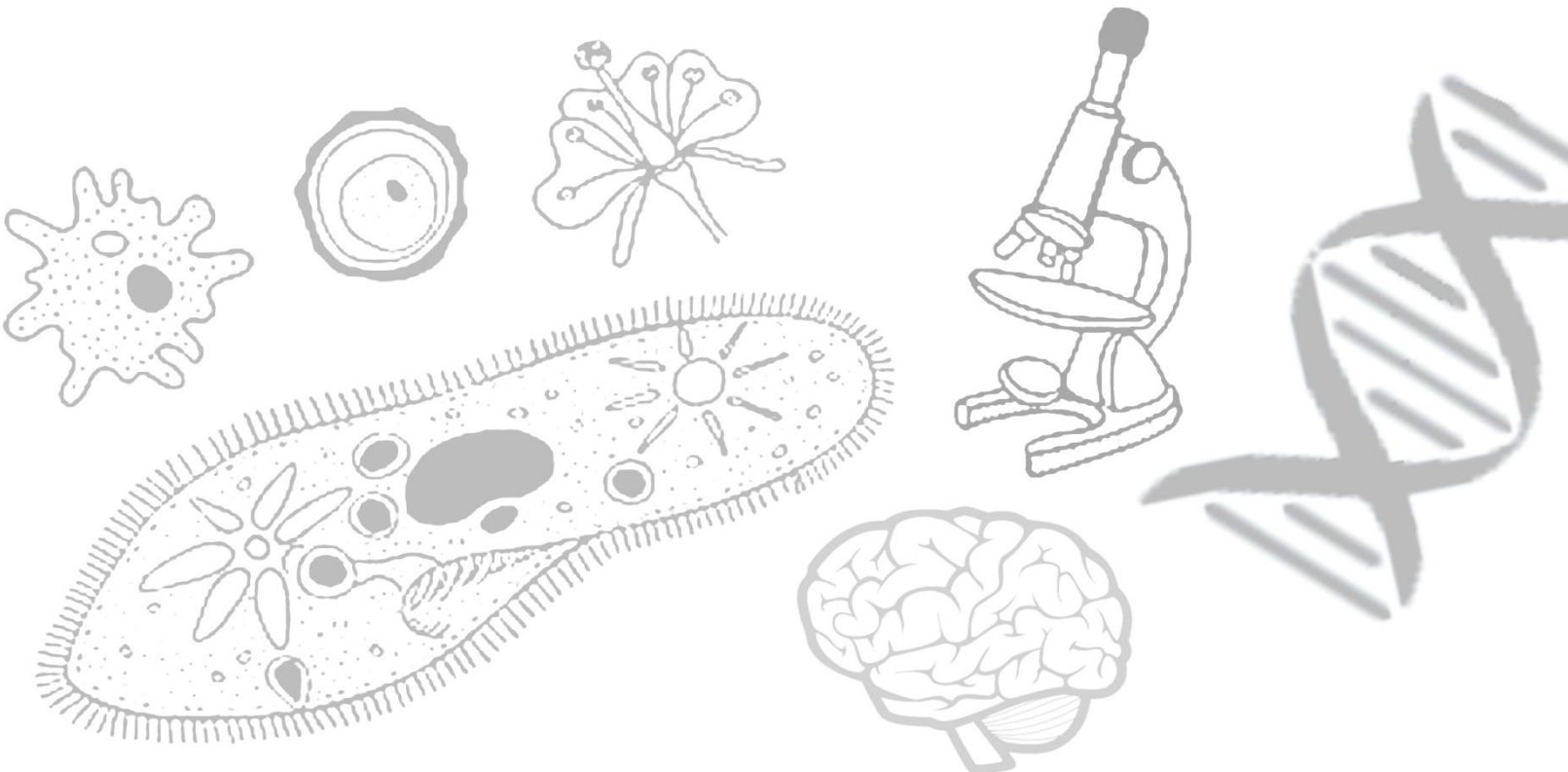
BIOLOGY



Our Environment

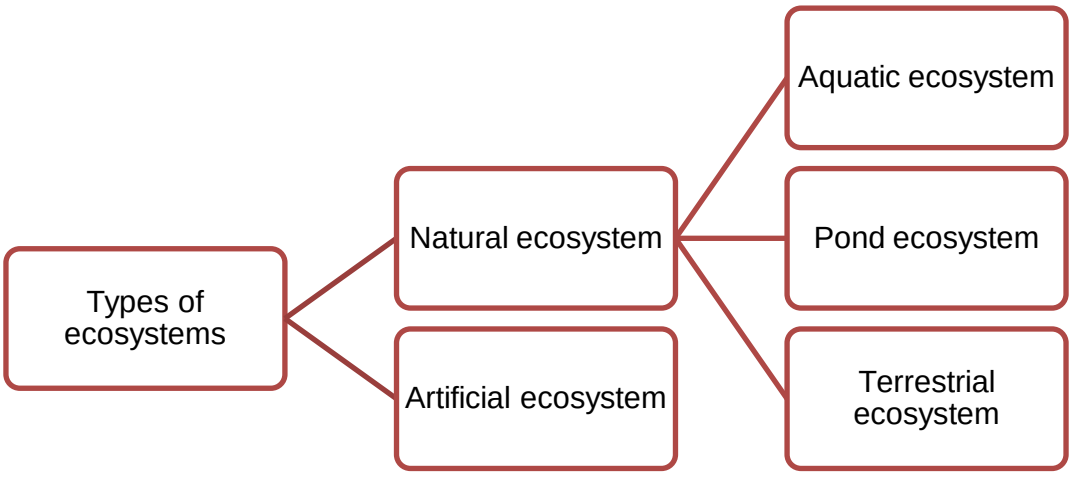
Biodegradable and Non-biodegradable Wastes

BIODEGRADABLE WASTES	NON-BIODEGRADABLE WASTES
•They can be broken down into non-poisonous substances by the action of microorganisms. •They change their form and structure over time and become harmless. •They do not pollute the environment. •Examples: Spoilt food, vegetable peels, paper, leather etc.	•They cannot be broken down into harmless substances by any biological processes. •They remain unchanged over a long period of time. •They continue to pollute the environment. •Examples: Glass bottles, metal cans, polythene bags, synthetic fibres etc.

Ecosystem

- An **ecosystem** is a self-contained area composed of different kinds of organisms which interact with each other as well as with the physical conditions such as sunlight, air, water, soil and climatic factors prevailing in the area.

Types of Ecosystem



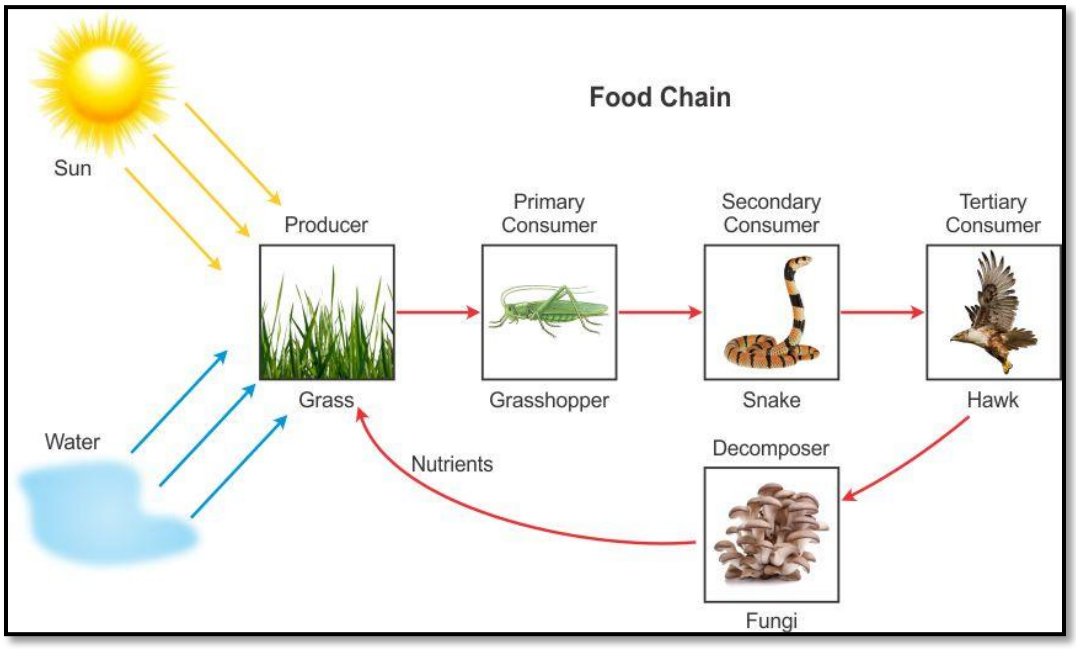
Components of an Ecosystem

- An ecosystem consists of two main components: biotic components and abiotic components.

Biotic Components The biotic components are the living components of an ecosystem. They constitute the food-obtaining steps or trophic levels of the ecosystem.	
Trophic level I (Green plants/Autotrophs)	• They produce food through the process of photosynthesis. • These include trees, bushes and grasses.
Trophic level II (Herbivores/ Primary consumers)	• They directly eat plants or their products such as leaves, grains, etc. for food or suck plant sap from their leaves or stems. • These include animals such as deer, rabbits, rats, pigeons, parrots, grasshoppers, bees etc.
Trophic level III (Carnivores/ Secondary consumers)	• They capture their prey and eat it. • These include tigers, wolves, snakes, lizards, certain birds etc.
Trophic level IV (Large carnivores/ Tertiary consumers)	• They capture smaller carnivores and eat them. • These include peacock, eagle etc.
Parasites	• They live inside or on the body surface of another organism, called the host, and obtain their food or nourishment from the host. • Worms which live in the guts of animals and fleas which live on the skin of animals such as dogs are examples of parasites.
Decomposers/ Microconsumers/ Detritivores	• They breakdown the complex organic compounds present in these dead organisms into simpler substances. • These include certain bacteria and fungi, vultures, kites, crows, some insects etc.
Abiotic Components The abiotic components are the non-living components of an ecosystem.	
Sunlight	• The energy obtained from sunlight is essential for the production of food by photosynthesis.
Air	• Oxygen from the air is essential to animals for respiration. • Carbon dioxide is useful to plants for photosynthesis.
Water	• Water is the chief constituent of protoplasm in cells. • It is required for various biochemical reactions which occur in organisms.
Temperature	• Temperature affects the distribution of living organisms in the environment. • It affects the enzymatic activities in organisms.
Soil	• Soil provides the substratum for the growth of plants. • It contains water and mineral nutrients such as sodium and potassium required by plants.

Food Chain

- The sequential process of eating and being eaten is called a **food chain**.
- A food chain represents the unidirectional transfer of energy.



Energy Flow in a Food Chain

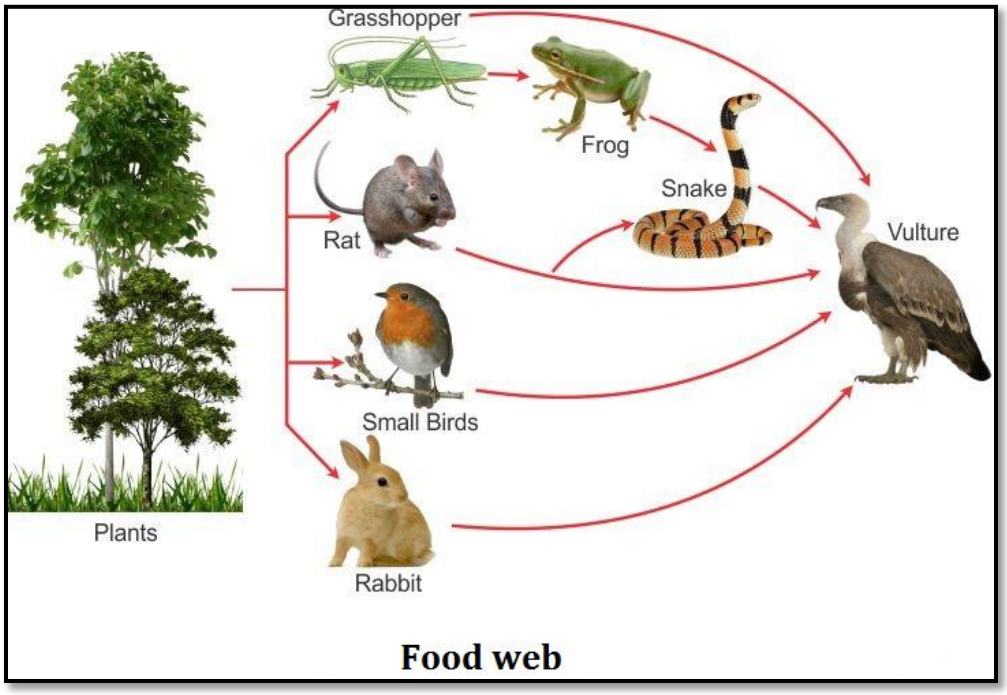
- In a food chain, along with food, transfer of energy also occurs from one trophic level to the other. The flow of energy which occurs along a food chain is called **energy flow**.
- All the energy used by a living organism is obtained from the Sun. Solar energy enters the living components through the autotrophs or green plants. However, only 1% of the total energy is actually captured by green plants.
- The amount of energy gradually declines as one moves up to the next higher trophic level, because at each level, energy is lost in the form of heat.
- The loss of energy in food chains and the transfer of energy from one trophic level to the other can be explained by the **Ten Percent Law** which states that, 'Only 10% of the energy entering a particular trophic level of organisms is available for transfer to the next higher trophic level'.

Significance of Food Chain

- Food chain maintains a check on the population and a balance in the ecosystem.
- Energy in the form of food is continuously transferred between different food chains. This helps to maintain the equilibrium in an ecosystem.
- Food chains help us to understand the interaction and the interdependence of different organisms in an area.

Food Web

- A network of interconnecting food chains in a natural community of different organisms is called a **food web**.



Significance of Food Web

- Food webs permit alternative foods.
- They ensure a better chance of survival for an organism if any of its food sources is scarce.

Food Pyramid

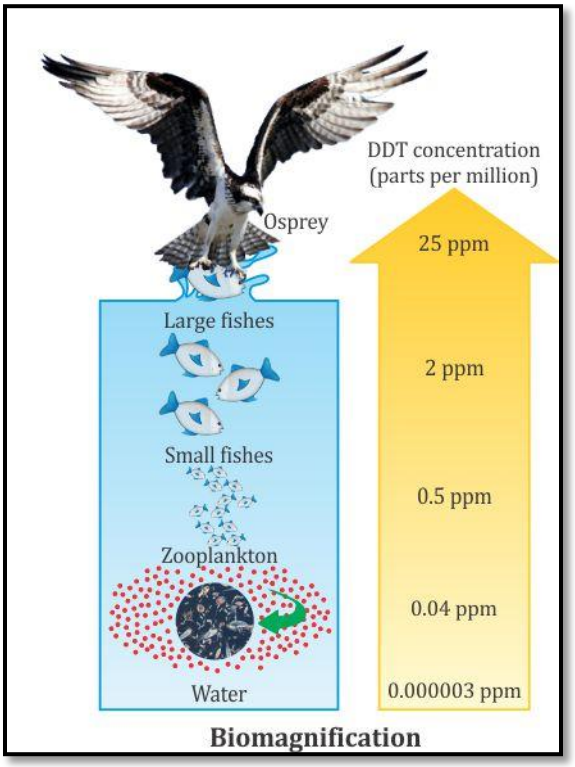
- A graphical representation of various trophic levels of a food chain in an ecosystem is called an ecological pyramid or a **food pyramid**.
- Ecological pyramids are of three types:
  - Pyramid of numbers
  - Pyramid of biomass
  - Pyramid of energy

Significance of Food Pyramid

- The trophic levels in a food chain can be explained by a food pyramid.
- The ecological pyramids help us to understand the structure, functional diversity and energy conversion efficiency of ecosystems.

Biomagnification

- **Biomagnification** or food chain magnification is the phenomenon of increase in the concentration of toxic substances in the bodies of living organisms at each trophic level of a food chain.
- Dichlorodiphenyltrichloroethane (DDT), an organochlorine pesticide, cannot be removed by washing or by other means and tends to accumulate in the environment causing biomagnification.



Environmental Problems

Depletion of the Ozone Layer

About the Ozone Layer
• Ozone is a product of ultraviolet radiations acting on the oxygen molecule and splitting it into free oxygen atoms. These atoms combine with molecular oxygen to form ozone. • The ozone layer extends to about 16–50 km above the Earth's surface.
Reasons for Ozone Depletion
• The drop in ozone levels is due to certain synthetic chemicals such as chlorofluorocarbons (CFCs), which are used as refrigerants and in air conditioners and fire extinguishers.
Effects of Ozone Depletion
• In the absence of the ozone layer, the ultraviolet rays reach the Earth's surface. They are highly harmful to organisms and can even cause skin cancer and other diseases in human beings.
Control Measures for Ozone Depletion
• As per the agreement, The United Nations decided to freeze the production of CFCs at levels which existed in 1986.

Disposal of Wastes

- Disposal of waste means to get rid of waste.

Recycling
• Solid wastes such as paper, plastic and metals can be sent to paper mills, plastic processing factories and metal industries respectively. • They can be recycled and used again.
Composting
• Household garbage such as fruit and vegetable peels, egg shells, waste food, tea leaves as well as farmland wastes such as dried leaves, husk and parts of crop plants from fields after harvesting can all be converted into useful compost by rotting. • The use of compost improves the fertility of soil as it provides nutrients to the soil.
Incineration
• Hazardous bio-medical wastes such as discarded medicines, toxic drugs, human anatomical wastes, blood and pus, microbiological and biotechnological wastes are usually disposed of by incineration by burning at very high temperatures. • Electricity can be generated from the heat released during burning.
Landfills
• Large-scale disposal of solid waste can be done by putting it in low areas of the ground and then covering it with Earth.
Sewage Treatment
• Waste water or sewage from houses, offices and hospitals enters a channel of pipelines which finally reach the wastewater treatment plant. • Physical, biological and chemical processes are carried out for the treatment of sewage.

Role of an Individual in Management of Wastes

- In order to save our environment and maintain ecological balance in nature, the **3R approach** should be implemented while using resources. The 3R's imply reduce, reuse and recycle.

Reduce

•We have to reduce the excess use of resources, when not required, in order to avoid their wastage.

Reuse

•We have to use the same resources again and again so that the demand for new resources is reduced and it will also conserve the resources.

Recycle

•We have to recycle the used resources rather than throwing them away.