CHAPTER 13: OUR ENVIRONMENT

Introduction

The environment includes all living and non-living components that surround us and interact with each other. Living organisms depend on the environment for food, shelter, and survival, and their activities also affect the environment.

For example, plants require sunlight, water, and soil to make food, while animals depend on plants or other animals for their food.

Ecosystem

An **ecosystem** is a system formed by the interaction of living organisms with their physical surroundings. It is a self-sustaining unit where organisms and the environment continuously exchange energy and materials.

Examples of ecosystems include forests, ponds, lakes, and aquariums.

Components of Ecosystem

1. Biotic Components (Living)

These include all living organisms present in the ecosystem:

- Plants
- Animals
- Microorganisms

All living organisms are interdependent and affect each other's survival.

2. Abiotic Components (Non-living)

These include physical factors of the environment:

- Temperature
- Water
- Air
- Soil
- Sunlight

These factors influence the growth, reproduction, and survival of living organisms.

Types of Ecosystems

1. Natural Ecosystem

These occur naturally and maintain themselves without human intervention.
Examples: Forest, pond, lake

2. Artificial Ecosystem

These are created and maintained by humans.
Examples: Aquarium, crop field, garden

Artificial ecosystems require regular maintenance to remain balanced.

Components Based on Nutrition

1. Producers (Autotrophs)

Producers are organisms that prepare their own food using sunlight through the process of photosynthesis. They convert solar energy into chemical energy.

Examples:

- Green plants
- Algae

2. Consumers (Heterotrophs)

Consumers depend on producers or other organisms for food.

Types:

- Herbivores: Plant-eating animals (e.g., goat)
- Carnivores: Meat-eating animals (e.g., lion)
- Omnivores: Eat both plants and animals (e.g., humans)

3. Decomposers

Decomposers break down dead plants, animals, and waste into simpler substances.

Examples:

- Bacteria
- Fungi

Functions:

- Recycle nutrients back to the soil
- Maintain balance in the ecosystem
- Prevent accumulation of waste

Without decomposers, dead matter would keep accumulating and nutrients would not return to the soil.

Food Chain

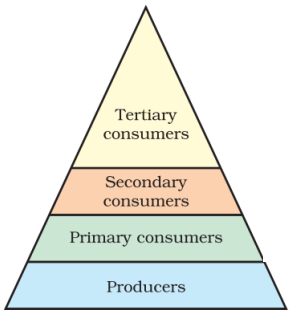
A **food chain** is a sequence of organisms in which one organism consumes another.

Example:
Grass → Goat → Lion

Each organism depends on another for food, forming a chain of energy transfer.

Trophic Levels

Each step in a food chain is called a trophic level.



1. Producers (plants)
2. Primary consumers (herbivores)
3. Secondary consumers (small carnivores)
4. Tertiary consumers (top carnivores)

The number of organisms decreases as we move to higher trophic levels.

Energy Flow in Ecosystem

Energy flows from the Sun to producers and then to consumers.

- Plants capture only a small fraction of solar energy
- Only about 10% of energy is transferred to the next trophic level

- The remaining energy is lost as heat and in life processes

Important points:

- Energy flow is unidirectional (one-way)
- Energy does not return to the previous level
- Food chains are usually short because energy decreases at each level

Food Web

A **food web** is a network of interconnected food chains.

In nature, an organism may be eaten by more than one organism, so food chains are not isolated but interconnected.

Importance:

- Provides stability to the ecosystem
- Offers multiple food sources to organisms

Biological Magnification

Biological magnification is the gradual increase in the concentration of harmful substances (like pesticides) at each trophic level of a food chain.

These chemicals enter plants and then pass to animals and humans through food.

As humans are at the top of the food chain, the concentration of harmful chemicals is highest in their bodies.

Environmental Problems

Human activities are disturbing the natural balance of the environment.

Major problems include:

- Pollution
- Ozone depletion
- Waste accumulation

Ozone Layer

Ozone is a gas made of three oxygen atoms (O_3) present in the upper atmosphere.

Function:

- Protects the Earth from harmful ultraviolet (UV) radiation coming from the Sun

UV radiation can damage living organisms and cause diseases like skin cancer.

Ozone Depletion

Ozone depletion refers to the thinning of the ozone layer.

Causes

- Chlorofluorocarbons (CFCs)
- Found in refrigerators, air conditioners, and aerosol sprays

These chemicals break down ozone molecules in the atmosphere.

Effects

- Increased UV radiation reaching Earth
- Skin cancer and eye damage in humans
- Damage to plants and marine life

Prevention

- Use of CFC-free products
- Following environmental protection rules
- International agreements to control harmful gases

Waste Production

Human activities produce large amounts of waste every day.

Types of waste:

- Household waste
- Industrial waste
- Agricultural waste
- Plastic waste

Improper disposal of waste leads to pollution and health problems.

Biodegradable Substances

Biodegradable substances are those that can be broken down by microorganisms into simpler substances.

Examples:

- Vegetable peels
- Paper
- Cotton

Effects:

- Do not accumulate in the environment
- Help in recycling nutrients
- Improve soil fertility

Non-Biodegradable Substances

Non-biodegradable substances cannot be broken down by microorganisms.

Examples:

- Plastic
- Glass
- Metals

Effects:

- Persist in the environment for a long time
- Cause pollution
- Harm plants, animals, and humans
- Enter food chains and cause biological magnification

Waste Management

Waste management involves proper handling and disposal of waste to reduce environmental damage.

Methods

1. Reduce

Minimize the use of resources to produce less waste

2. Reuse

Use items again instead of throwing them away

3. Recycle

Convert waste materials into new useful products

Managing Garbage

Problems

- Land pollution
- Water pollution
- Spread of diseases
- Unpleasant surroundings

Solutions

- Segregation of biodegradable and non-biodegradable waste
- Composting organic waste
- Recycling materials like plastic, glass, and metal
- Proper disposal systems by local authorities

Impact of Human Activities

Human activities such as:

- Deforestation
- Excessive use of resources
- Pollution

lead to imbalance in ecosystems.

Result:

- Disturbance in food chains
- Loss of biodiversity

- Environmental degradation

Key Understanding

- All components of ecosystem are interdependent
- Removal of one trophic level affects the whole system
- Energy decreases at each level, limiting food chain length
- Human activities are the main cause of environmental imbalance