🟦 Chapter 13: Our Environment

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🔷 13.1 Ecosystem – What Are Its Components?

🟦 **Environment:**
The sum of all living (biotic) and non-living (abiotic) things around us.

🟦 **Ecosystem:**
A system where living organisms interact with each other and their physical surroundings. It includes:

- **Biotic components**: plants, animals, microorganisms
- **Abiotic components**: sunlight, air, water, temperature, soil

🟩 **Natural Ecosystems:** forests, lakes, ponds
🟦 **Artificial Ecosystems:** gardens, aquariums, crop fields

🟦 **Producers:**
Organisms that produce their own food via photosynthesis (e.g., green plants, algae).

🟦 **Consumers:**
Organisms that depend on producers for food. These include:

- Herbivores (e.g., deer, goat)
- Carnivores (e.g., lion, tiger)
- Omnivores (e.g., humans, bear)
- Parasites (e.g., lice, leech)

🟦 **Decomposers:**
Microorganisms (bacteria, fungi) that break down dead organisms and recycle nutrients back into the soil.

🧪 **Activity 13.1 – Design an Aquarium:**
Includes aquatic plants, animals, water, oxygen. It is a human-made self-sustaining ecosystem.

🧪 **Activity 13.2 – Food Chain in Aquarium:**
Group discussion on who eats whom. Form chains like:
Algae → Fish → Big Fish

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🔷 13.1.1 Food Chains and Food Webs

🟦 Food Chain:

A series of organisms where each one feeds on the one below it.

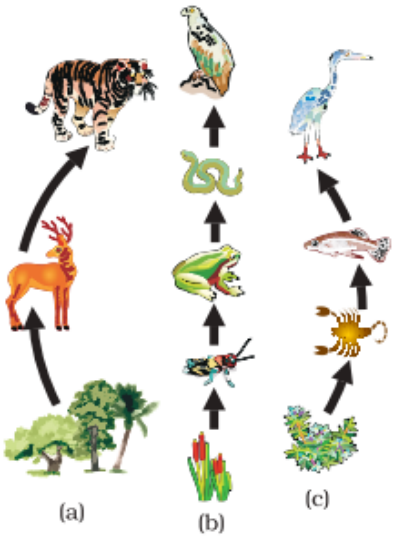

Figure 13.1
Food chain in nature (a) in forest, (b) in grassland and (c) in a pond

🟦 Trophic Levels:

Each step in a food chain:

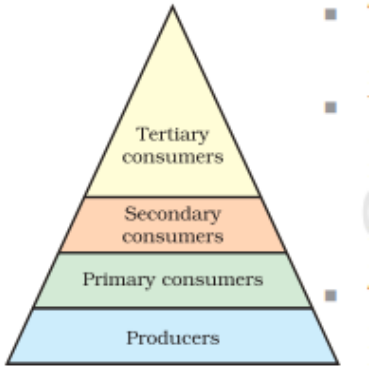

Figure 13.2
Trophic levels

1. **Producers (T_1)** – make food using sunlight
2. **Primary consumers (T_2)** – herbivores
3. **Secondary consumers (T_3)** – small carnivores
4. **Tertiary consumers (T_4)** – large carnivores

🟦 Energy Transfer Rule (10% Law):

Only 10% of the energy gets passed to the next level; the rest is lost as heat.

🧠 Important:

- Energy flow is unidirectional (one-way)
- Energy decreases as it moves up the food chain
- Most energy is at producer level

🟦 Food Web:

A network of interconnected food chains. Shows that one organism can be eaten by many others.

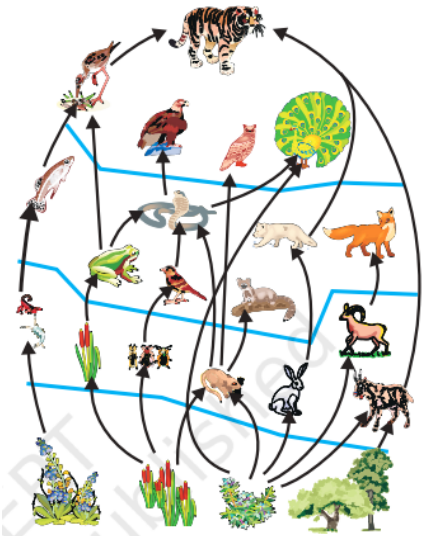

Figure 13.3
Food web, consisting of many food chains

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🔷 13.1.2 Biological Magnification

🟦 Biological Magnification:

The increase in concentration of harmful chemicals (like pesticides) at each trophic level of a food chain.

🧠 Example:
Pesticides used in crops → absorbed by plants → eaten by herbivores → eaten by humans
➡ Humans at the top of the food chain get maximum concentration.

🧪 Activity 13.3 – Explore harmful chemical entry into the food chain
🧪 Activity 13.4 – Newspaper research on pesticide levels in food

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🔷 13.2 How Do Our Activities Affect the Environment?

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🔸 13.2.1 Ozone Layer and Its Depletion

🟦 Ozone (O_3):

A molecule of three oxygen atoms. Found in the upper atmosphere (stratosphere), where it absorbs harmful ultraviolet (UV) radiation from the sun.

🟦 Importance of Ozone Layer:

- Protects Earth from harmful UV rays
- Prevents skin cancer and crop damage

🟦 **Ozone Formation:**

$O_2 + UV \rightarrow O + O$
$O + O_2 \rightarrow O_3$

🟦 **Ozone Depletion:**

Caused by man-made chemicals, especially:

- Chlorofluorocarbons (CFCs) used in refrigerators, air conditioners, and fire extinguishers.

🧠 **Action Taken:**

- 1987: Montreal Protocol (UNEP) — agreement to reduce CFC usage
- Now, CFC-free appliances are used worldwide

🧪 **Activity 13.5** – Research on ozone depletion chemicals

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🔸 13.2.2 Managing the Garbage We Produce

🟦 **Waste Types:**

- Biodegradable: decomposed by microorganisms (e.g., food waste, paper)
- Non-Biodegradable: not broken down easily (e.g., plastic, metal)

🟦 **Problems from Non-Biodegradable Waste:**

- Soil and water pollution
- Kills animals (when ingested)
- Long-lasting in the environment

🧪 Activity 13.6 – Bury home waste, observe changes over 15 days
🧪 Activity 13.7 – Track household and classroom waste
🧪 Activity 13.8 – Investigate sewage treatment and industry waste
🧪 Activity 13.9 – Research on e-waste and recycling plastic

🟦 **Current Issues:**

- Disposable items like plastic cups and packaging are increasing waste.
- Biodegradable alternatives like paper cups are better but need evaluation (e.g., soil usage for clay cups).

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✅ What You Have Learnt:

- Ecosystems consist of interdependent biotic and abiotic components.
- Food chains and webs transfer energy from one trophic level to the next, losing energy at each step.
- Decomposers recycle nutrients by breaking down dead organisms.
- Human activities like pesticide use and CFC emissions affect environment.
- Ozone layer protects life; reducing CFCs is essential.
- Proper waste management, especially of non-biodegradables, is crucial.