

Class 10 Science – NCERT

Chapter 15 – “Our Environment

Q-1 : What are trophic levels? Give an example of a food chain and state the different trophic levels in it.

What are Trophic Levels?

Trophic levels are the **different steps or positions in a food chain** that show how energy flows from one organism to another.

Each level represents a group of organisms that obtain energy in a similar way.

Example of a Food Chain

Grass → Grasshopper → Frog → Snake → Eagle

Trophic Levels in this Food Chain

- 1. First Trophic Level (Producers)**
 - **Grass**
 - Plants make their own food using sunlight (photosynthesis).
- 2. Second Trophic Level (Primary Consumers)**
 - **Grasshopper**
 - Herbivores that eat plants.
- 3. Third Trophic Level (Secondary Consumers)**
 - **Frog**
 - Carnivores that eat herbivores.
- 4. Fourth Trophic Level (Tertiary Consumers)**
 - **Snake**
 - Carnivores that eat other carnivores.
- 5. Fifth Trophic Level (Top Consumers)**
 - **Eagle**
 - Apex predator (top of the food chain).

Simple Line to Remember

👉 Producers → Herbivores → Carnivores → Top predators

Q-2 What is the role of decomposers in the ecosystem?

Role of Decomposers in the Ecosystem

Decomposers are organisms (like bacteria and fungi) that **break down dead plants, animals, and organic waste** into simpler substances.

Main Roles

1. Breakdown of Dead Matter

- They decompose dead plants, animals, and waste into simple substances.

2. Nutrient Recycling

- They return nutrients (like nitrogen, carbon) back to the soil.
- This helps plants grow again.

3. Clean the Environment

- They prevent accumulation of dead bodies and waste in nature.

4. Maintain Balance in Ecosystem

- They complete the food cycle by recycling materials.

Examples of Decomposers

- Bacteria
- Fungi (mushrooms, molds)

Simple Line to Remember

👉 Decomposers **clean the earth and recycle nutrients** back to nature.

Q-3 : Why are some substances biodegradable and some non-biodegradable?

The difference depends on whether microorganisms (like bacteria and fungi) can break them down.

Biodegradable Substances

- These can be decomposed by microorganisms.
- They are usually natural materials with simpler structures.
- Microbes have enzymes that can break them into harmless substances.

Examples: food waste, paper, wood, leaves

Non-Biodegradable Substances

- These cannot be easily broken down by microorganisms.
- They are often man-made with complex chemical structures.

- Microbes do not have enzymes to decompose them quickly.

Examples: plastic, glass, metals, synthetic fibers

Main Reason (Simple Line)

☞ Substances are biodegradable if microorganisms can break them down, and non-biodegradable if they cannot.

Q-4 : Give any two ways in which biodegradable substances would affect the environment.

Answer : Ways biodegradable substances affect the environment (any two):

1. Positive effect – Nutrient recycling

- When biodegradable substances decompose, they return nutrients to the soil, improving soil fertility and helping plant growth.

2. Negative effect – Pollution if in excess

- Large amounts of biodegradable waste can produce foul smell and harmful gases (like methane), causing air pollution and health issues.

Short Answer (Exam Ready)

☞ They enrich soil by recycling nutrients and may cause pollution (bad smell, gases) when accumulated in large amounts.

Q-5 : Give any two ways in which non-biodegradable substances would affect the environment.

Answer : Ways non-biodegradable substances affect the environment (any two):

1. Cause long-term pollution

- They do not decompose easily, so they remain in the environment for years, leading to land and water pollution.

2. Harm living organisms

- Animals may eat or get trapped in them (like plastic), which can cause injury or death. Toxic substances can also enter the food chain.

Short Answer (Exam Ready)

☞ They cause persistent pollution and harm plants and animals.

Q-6 : What is ozone and how does it affect any ecosystem?

Answer : What is Ozone?

Ozone is a gas made of three oxygen atoms (O_3). It is mainly found in the upper atmosphere in a layer called the ozone layer.

How does it affect the ecosystem?

1. Protects life (Positive role)

- The ozone layer absorbs harmful ultraviolet (UV) rays from the Sun.
- This protects humans, animals, and plants from damage like skin cancer and crop loss.

2. Harmful when depleted (Negative effect)

- If the ozone layer becomes thin (ozone depletion), more UV rays reach Earth.
- This can harm living organisms, damage plants, and disturb ecosystems.

3. Ground-level ozone (Harmful)

- Ozone near the Earth's surface (pollution) can damage lungs, crops, and plants.

Short Answer (Exam Ready)

👉 Ozone (O_3) protects life by blocking harmful UV rays, but its depletion or presence at ground level can harm living organisms and ecosystems.

Q-7 : How can you help in reducing the problem of waste disposal? Give any two methods.

Answer : Ways to help reduce the problem of waste disposal (any two):

1. Reuse materials

- Use items again instead of throwing them away (e.g., reuse bags, bottles, containers).
- This reduces the amount of waste generated.

2. Recycle waste

- Separate waste like paper, plastic, glass, and metals so they can be recycled into new products.
- This helps reduce pollution and saves resources.

Short Answer (Exam Ready)

👉 We can reduce waste by reusing materials and recycling waste.

EXERCISES

Q-1. Which of the following groups contain only biodegradable items?

- (a) Grass, flowers and leather (b) Grass, wood and plastic
(c) Fruit-peels, cake and lime-juice (d) Cake, wood and grass

Answer : Correct Answer: (c) Fruit-peels, cake and lime-juice

Explanation:

- Biodegradable items are those that decompose naturally by microorganisms.

✓ (c) Fruit-peels, cake, and lime-juice are all organic and decompose easily.

✗ (b) contains plastic → non-biodegradable

✗ (a) leather is not considered easily biodegradable in school-level answers

✗ (d) though biodegradable, exams prefer clearly obvious decomposable waste → (c)

Final Answer: (c)

Q-2 : Which of the following constitute a food-chain?

- (a) Grass, wheat and mango (b) Grass, goat and human
(c) Goat, cow and elephant (d) Grass, fish and goat

Answer : Correct Answer: (b) Grass, goat and human

Explanation:

A food chain shows the transfer of food/energy from one organism to another.

✓ (b) Grass → Goat → Human

- Grass (producer)
- Goat (herbivore) eats grass
- Human (consumer) eats goat

- ✗ (a) all are plants (no chain)
- ✗ (c) all are herbivores (no feeding link)
- ✗ (d) fish does not eat grass, and goat does not eat fish (invalid chain)

Final Answer: (b)

Q-3 : Which of the following are environment-friendly practices?

- (a) Carrying cloth-bags to put purchases in while shopping
- (b) Switching off unnecessary lights and fans
- (c) Walking to school instead of getting your mother to drop you on her scooter
- (d) All of the above

Answer : Correct Answer: (d) All of the above

Explanation:

All options help protect the environment:

- (a) Cloth bags reduce plastic pollution
- (b) Switching off lights/fans saves energy
- (c) Walking reduces fuel use and air pollution

Final Answer: (d) All of the above

Q-4 : What will happen if we kill all the organisms in one trophic level?

Answer : What will happen if we kill all the organisms in one trophic level?

If all organisms in one trophic level are removed, it will disturb the entire food chain and ecosystem balance.

Effects:

1. Food shortage for next level
 - Organisms in the higher trophic level will not get food and may die.
2. Overpopulation of lower level
 - Organisms in the lower trophic level may increase rapidly due to lack of predators.

3. Ecosystem imbalance

- The natural balance gets disturbed, affecting many species.

Short Answer (Exam Ready)

☞ Removing one trophic level disrupts the food chain, causing imbalance, overpopulation of some organisms and death of others.

Q-5 : Will the impact of removing all the organisms in a trophic level be different for different trophic levels? Can the organisms of any trophic level be removed without causing any damage to the ecosystem?

Answer :

Yes, the impact will be different for different trophic levels.

- **If producers (plants) are removed:**
☞ The entire food chain collapses because all organisms depend on them for food.
- **If primary consumers (herbivores) are removed:**
☞ Plants will increase, but carnivores will starve and die.
- **If top consumers are removed:**
☞ The population of lower-level organisms will increase uncontrollably, disturbing balance.

Can any trophic level be removed without damage?

✗ No, removing organisms from any trophic level will harm the ecosystem.

- **Every trophic level is interconnected.**
- **Removing one level causes imbalance, overpopulation, or extinction of other organisms.**

Short Answer (Exam Ready)

☞ Yes, the impact differs for each trophic level, but no trophic level can be removed without damaging the ecosystem, as all are interdependent.

Q-6 : What is biological magnification? Will the levels of this magnification be different at different levels of the ecosystem?

Answer : What is Biological Magnification?

Biological magnification (biomagnification) is the increase in concentration of harmful chemicals (like pesticides, heavy metals) as they move up the food chain.

Example:

Pesticides enter plants → eaten by herbivores → eaten by carnivores → top predators get the highest concentration.

Will the levels differ at different trophic levels?

Yes, the levels are different.

- **At lower trophic levels → concentration is low**
- **At higher trophic levels → concentration increases progressively**
- **Top consumers have the maximum accumulation**

Why does this happen?

- **These chemicals are non-biodegradable**
- **They accumulate in the body and are not easily excreted**
- **Each level consumes many organisms from the level below → concentration increases**

Short Answer (Exam Ready)

👉 Biological magnification is the increase of toxic substances along a food chain, and its level increases at higher trophic levels, being maximum in top consumers.

Q-7 : What are the problems caused by the non-biodegradable wastes that we generate?

Answer : Problems caused by non-biodegradable wastes

- 1. Environmental pollution**
 - **They do not decompose, so they accumulate in land and water, causing long-term pollution.**
- 2. Harm to living organisms**
 - **Animals may eat plastic or get trapped, leading to injury or death.**
- 3. Biological magnification**
 - **Toxic substances enter the food chain and increase at higher trophic levels, affecting humans and animals.**
- 4. Soil and water contamination**
 - **Chemicals from these wastes can reduce soil fertility and pollute water sources.**

Short Answer (Exam Ready)

👉 Non-biodegradable wastes cause persistent pollution, harm to organisms, and biological magnification, affecting the entire ecosystem.

Q-8: If all the waste we generate is biodegradable, will this have no impact on the environment?

Answer : ✗ No, even if all waste is biodegradable, it will still impact the environment.

Explanation:

- 1. Excess waste causes pollution**
 - Large amounts of biodegradable waste can rot and produce foul smell.
- 2. Release of harmful gases**
 - Decomposition produces gases like methane and carbon dioxide, which can cause air pollution and contribute to global warming.
- 3. Oxygen depletion**
 - When dumped in water, decomposition can reduce oxygen levels, harming aquatic life.

Short Answer (Exam Ready)

👉 No, excess biodegradable waste can cause pollution, release harmful gases, and disturb ecosystems, so it still affects the environment.

Q-9 : Why is damage to the ozone layer a cause for concern? What steps are being taken to limit this damage?

Answer : Why is damage to the ozone layer a cause for concern?

- The ozone layer protects Earth by absorbing harmful ultraviolet (UV) rays from the Sun.
- If it gets damaged (ozone depletion), more UV rays reach Earth, causing:
 - Skin cancer and eye problems in humans
 - Damage to crops and plants
 - Harm to aquatic life and ecosystems

Steps taken to limit this damage:

- 1. Ban on harmful chemicals**
 - Chemicals like CFCs (chlorofluorocarbons) are being reduced or banned.

2. International agreements

- **Countries follow agreements like the Montreal Protocol to protect the ozone layer.**

3. Use of eco-friendly alternatives

- **Replacing CFCs with safer substances in refrigerators, ACs, and aerosols.**

4. Public awareness and regulations

- **Promoting awareness and strict laws to control ozone-depleting substances.**

Short Answer (Exam Ready)

👉 **Ozone layer damage allows harmful UV rays to reach Earth, affecting health and ecosystems. It is controlled by banning CFCs, using safer alternatives, and following international agreements like the Montreal Protocol.**