CLASS : VIII
SUBJECT : BIOLOGY
TOPIC : HOW NATURE WORKS IN HARMONY

NCERT FOLDERS
I.VERY SHORT ANSWER TYPE:

1. Diagram Question

Correct Option: C) An ecosystem is part of a community

- **Reason:** The correct hierarchy of ecological organization from smallest to largest is **Population \(\rightarrow \) Community \(\rightarrow \) Ecosystem**. Therefore, a community is a part of an ecosystem, making statement C factually incorrect.

2. What is the top trophic level in a food chain?

The top trophic level in a food chain is occupied by **quaternary consumers or apex predators** (top carnivores). These are organisms at the very end of a food chain that have no natural predators, such as eagles, lions, or sharks.

3. What role do decomposers play in an ecosystem?

Decomposers (like bacteria and fungi) break down complex organic matter from dead plants and animals into simpler inorganic substances. This process **recycles essential nutrients** back into the soil, making them available again for primary producers (plants).

4. Name two ecosystem services provided by mangroves.

- **Coastal Protection:** They act as natural shock absorbers, protecting coastlines from storm surges, tsunamis, and soil erosion.
- **Biodiversity Support:** They serve as critical breeding grounds and nurseries for a wide variety of fish, crabs, and marine organisms.

5. What caused the decline of frogs in India during the 1980s?

The severe decline of frogs in India during the 1980s was primarily caused by the **indiscriminate and massive export of frog legs** to Western countries for culinary purposes, combined with the heavy use of chemical pesticides in agricultural fields.

6. What is an ecological pyramid, and what does it show?

An ecological pyramid is a graphical representation designed to show the biomass, productivity, or total number of organisms at each trophic level in a given ecosystem. It shows how **energy, biomass, or population numbers decrease** progressively from the producers at the base to the top carnivores at the apex.

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7. Explain the difference 6. What is an ecological pyramid, and what does it show?

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7. Explain the difference between a food chain and a food web.

- **Food Chain:** A linear, single pathway that shows how nutrients and energy flow from one organism to another (e.g., Grass \(\rightarrow \) Deer \(\rightarrow \) Tiger).
- **Food Web:** A complex, interconnected network of multiple food chains that reflects the real-world feeding relationships within an entire ecosystem.

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II.SHORT ANSWER TYPE:

1. How Mangrove Forests Protect Villages from Tsunamis

Mangrove forests act as highly effective natural barriers against coastal disasters like tsunamis.

- **Wave Energy Absorption:** Mangroves have dense, complex networks of aerial roots (pneumatophores) and thick stilt roots. When massive tsunami waves hit these roots, the physical friction significantly slows down the flow of water and diminishes the wave's destructive energy.

2. Disappearance of Frogs from the Food Chain

Grass \(\rightarrow \) Grasshopper \(\rightarrow \) Frog \(\rightarrow \) Snake

If frogs disappear entirely from this ecosystem, the following consequences will occur:

- **Population of Grasshoppers will increase rapidly:** Since frogs are the primary predators of grasshoppers, a lack of frogs means there is no control over the grasshopper population. They will multiply quickly and overconsume the grass, leading to habitat degradation.
- **Population of Snakes will decrease:** Frogs are a primary food source for snakes. Without them, snakes will face acute food shortages, leading to starvation, lower reproduction rates, or forcing them to migrate elsewhere to find food.

3. Decline of Butterflies and Solutions

Possible Reasons for Decline:

- Excessive use of chemical pesticides or weedicides in or around the school garden kills caterpillars and adult butterflies.
- Loss of host plants (flowering plants) due to seasonal changes or clearing of weeds/wildflowers that butterflies rely on for nectar and egg-laying.
- General habitat loss, pollution, or changes in local climate conditions.

Steps Students Can Take:

- **Plant a Pollinator Garden:** Grow a mix of native flowering plants that bloom across different seasons to provide a continuous supply of nectar.

- **Create Caterpillar Host Habitats:** Include specific plants (like milkweed or curry leaf plants) where butterflies can safely lay eggs and feed during their larval stage.
- **Go Chemical-Free:** Avoid chemical pesticides and switch to natural or organic pest control methods .

4. Difference Between a Community and an Ecosystem

Feature	Community	Ecosystem
Definition	An assemblage of **interacting populations of different species** living together in a defined area.	A functional system comprising **both living organisms and non-living components** interacting with each other.
Components	Includes **biotic (living) factors only** (e.g., plants, animals, microbes).	Includes **both biotic and abiotic components** (e.g., air, water, soil, sunlight).
Scope	Focuses strictly on biological interactions like predation, competition, and symbiosis.	Focuses on energy flow and chemical/nutrient cycling between organisms and their environment

5. Effects of Overuse of Synthetic Fertilizers on Soil?

- **Loss of Natural Soil Fertility:** Over time, heavy reliance on synthetic chemicals disrupts the natural nutrient balance, turning the soil overly acidic or alkaline, which destroys long-term fertility.
- **Destruction of Soil Microorganisms:** Chemical fertilizers harm beneficial soil organisms such as earthworms and nitrogen-fixing bacteria, which are crucial for natural decomposition and aeration.
- **Soil Compactation and Erosion:** These fertilizers do not add organic matter (humus) to the soil. As a result, the soil loses its crumbly structure, its water-retaining capacity drops, and it becomes prone to erosion.

6. Reasons for Banning Frog Leg Exports

The Government of India banned the export of frog legs in 1987 to protect ecological balance and agricultural productivity.

- **Disruption of Food Chains:** Mass harvesting of frogs drastically reduced their population in the wild, breaking a vital link in both terrestrial and aquatic food webs.
- Frogs feed heavily on crop-destroying insects (like grasshoppers and beetles). Their absence triggered an explosion in pest populations, forcing farmers to rely dangerously on toxic chemical pesticides.
- Frogs consume mosquito larvae in stagnant water. The drop in frog populations led to a sharp increase in mosquitoes, multiplying outbreaks of diseases like malaria and dengue.

7. Refer text book for the question.

Connections between animals and their food:

- **Buffalo** - Grass
- **Lion** - Goat / Buffalo
- **Lizard** - Insects / Spider
- **Insects** - Grass / Grains
- **Rat** - Grains
- **Spider** - Insects
- **Snake** - Rat / Lizard
- **Goat** - Grass

III. LONG ANSWER TYPE

1. If all decomposers suddenly disappeared from a forest ecosystem, what changes do you think would occur? Explain why decomposers are essential.

- **Expected Changes:**
    - **Accumulation of waste:** Dead bodies of plants and animals, leaves, and animal waste would pile up indefinitely without breaking down.
    - **Loss of soil fertility:** The supply of essential nutrients (like nitrogen, phosphorus, and potassium) to the soil would stop completely.
    - **Disruption of the food chain:** Without nutrients, plants would fail to grow, causing herbivores and eventually carnivores to starve and die.

- **Why Decomposers are Essential:**
    - Decomposers (like bacteria and fungi) act as nature's recycling agents. They break down complex organic matter into simple minerals, returning them to the soil to sustain new plant life and keep the ecosystem clean.

2. If the Indian hare population drops because of a disease, how would it affect the number of other organisms?

- **Effect on Predators (Tigers, Jackals, Eagles):**
    - Their immediate food source decreases. This will lead to increased competition among predators, causing their populations to drop or forcing them to rely heavily on other prey.
- **Effect on Other Prey (Deer):**
    - Predators will hunt more deer to compensate for the lack of hares, which can cause the deer population to decrease.
- **Effect on Producers (Plants):**
    - The green plants and grasses specifically eaten by the Indian hare will experience less grazing pressure, leading to an initial increase in their growth.

3. Refer text book for the question.

Fish Presence and Seed Production Observation

The primary reason for this observation is an ecological chain reaction (trophic cascade) involving fish, dragonflies, and pollinators:

- **In Pond A (With Fish):** Fish prey on dragonfly larvae in the water. This keeps the adult dragonfly population low. Since dragonflies hunt pollinators (like bees and butterflies), fewer dragonflies mean more pollinators survive. More pollinators lead to increased pollination of nearby terrestrial plants, resulting in more flowers and higher seed production.
- **In Pond B (Without Fish):** Due to the absence of fish, dragonfly larvae survive in large numbers, leading to an overpopulation of adult dragonflies. These dragonflies heavily prey on bees and butterflies. With fewer pollinators available,

the nearby plants experience poor pollination, leading to fewer flowering plants and reduced seed production.

4. Structure and Importance of a Food Web

Structure

- **Interconnected Network:** A food web is a complex network of multiple interconnected food chains within an ecosystem.
- **Trophic Levels:** Energy flows across multiple pathways through producers (plants), primary consumers (herbivores), secondary/tertiary consumers (carnivores), and decomposers.
- **Multiple Options:** Unlike a linear food chain, an organism in a food web can occupy more than one trophic level and feed on multiple types of organisms.

Importance

- **Ecosystem Stability:** It provides alternative food sources. If one prey population decreases, predators can switch to another, preventing the collapse of the ecosystem.
- **Population Control:** It checks the overpopulation of any single species, maintaining a natural balance.
- **Nutrient Cycling:** It ensures the continuous flow of energy and recycling of nutrients among biotic components.

Example

- Grass is eaten by both rabbits and grasshoppers.
- Grasshoppers are eaten by frogs and lizards.
- Hawks can prey on rabbits, frogs, and lizards alike, forming a web of interconnected feeding lines.

5. Refer text book for the question.

Ecological Consequences of the Green Revolution & Sustainable Alternatives

Ecological Consequences

- **Soil Degradation:** Excessive use of synthetic chemical fertilizers killed beneficial soil microbes and earthworms, leading to loss of natural fertility.
- **Groundwater Depletion:** Intensive cultivation of water-heavy crops (like rice and wheat) caused a drastic drop in water tables due to over-pumping.
- **Toxic Bioaccumulation:** Chemical pesticides entered the food chain, polluting water bodies and harming wildlife and human health.
- **Loss of Crop Diversity:** Practicing monoculture (growing only one crop repeatedly) reduced agricultural biodiversity and made fields vulnerable to massive pest outbreaks.

Sustainable Alternatives

- **Organic Farming:** Using natural compost, green manure, and bio-fertilizers instead of chemical additives.
- **Crop Rotation and Mixed Cropping:** Growing leguminous crops alternately to naturally restore nitrogen levels in the soil.
- **Integrated Pest Management (IPM):** Employing biological predators (like ladybugs to eat aphids) and natural repellents (like neem extract) instead of chemical pesticides.
- **Drip and Sprinkler Irrigation:** Adopting water-efficient irrigation methods to conserve groundwater resources.

6. Refer text book for the question.

Sustainable Practices for Restoring Soil Health

Practice 1: Application of Organic Manure and Compost

- **Benefits:** Manure adds rich organic matter (humus) to the soil, which loosens compacted ground, restores aeration, and improves water retention. It also serves as an organic food source that naturally attracts and multiplies the earthworm population.

Practice 2: Crop Rotation with Leguminous Plants

- **Benefits:** Planting legumes (like peas, beans, or lentils) fixes atmospheric nitrogen into the soil naturally via root nodule bacteria (*Rhizobium*). This replaces missing nutrients, breaks the pest cycle, and prevents the soil from hardening without the need for synthetic chemical additives.

7. Refer text book for the question

Ans :

Inner Ring (Animal)	Second Ring (Type of Food Eaten)	Outermost Ring (Feeding Category)
Goat *(Example)*	Grass, Leaves, Small plants	**Herbivore**
Eagle	Small animals, Fish, Flesh of prey	**Carnivore**
Crocodile	Fish, Frogs, Flesh of other animals	**Carnivore**
Elephant	Grass, Leaves, Fruits, Bark	**Herbivore**
Crow	Grains, Insects, Seeds, Small dead animals	**Omnivore**

Lion	Flesh of other animals (Deer, Zebra)	**Carnivore**