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SOLUTIONS BOOK

CLASS 8

Science · Curiosity

CHAPTER 12

How Nature Works in Harmony

Complete In-text Questions, Activities and Exercises Solutions

In-text Questions | Exercises | Discover, Design and Debate

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Every question is followed by its answer. Question numbers above are clickable and the PDF bookmarks panel lets you jump to any exercise set or question. Figures are reproduced from the NCERT textbook (© NCERT) for educational use.

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12.1

CLASS 8 SCIENCE · CHAPTER 12

In-text Questions

Solutions · 28 questions

Directions (Questions 1–28): These are the questions and activities that appear inside the chapter (Probe and Ponder, Activities 12.1–12.10 and the discussion and in-text questions), numbered in the order in which they appear. Many are open-ended; model answers based on the chapter are given, and you may add examples from your own surroundings.

QUESTION 1 *Probe and Ponder · p. 190*

How might the loss of forest cover and changes in rainfall patterns lead to elephants to enter human farms and villages?

ANSWER

The chapter opens with a chain of events that links changes in the environment to elephants entering farms and villages.

a The chain of events

- Changes in rainfall and temperature affect vegetation, and cutting down trees for roads and buildings makes it worse.
- Forests dry up and shrink; vegetation becomes scarce and waterholes dry up in the elephants' natural habitat.
- Because of loss of habitat, elephants wander into nearby farms or plantations in search of food like bananas and sugarcane.
- This can cause crop damage and at times even harm people and domestic animals.

b A way to reduce the conflict

Wildlife ecologists have identified and marked corridors that connect forest habitats, so that elephants can travel safely between large forest areas without coming into conflict with human settlements.

Therefore, loss of forest cover and changes in rainfall reduce food and water in the forest, so elephants move into farms and villages.

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QUESTION 2 *Probe and Ponder · p. 190*

Imagine you are a tree in a dense forest. What kind of relationships would you have with water, sunlight, other animals, and other components of the forest?

ANSWER

A tree is a producer. It depends on non-living components and also interacts with many living beings of the forest.

a Relationships of a tree with other components

Component	Relationship with the tree
Water	Roots take up water, which the tree needs for photosynthesis and for its life processes.
Sunlight	The leaves use sunlight, with carbon dioxide and water, to make food.
Soil	Provides a medium and essential nutrients; roots hold the soil in place and prevent erosion.
Air	The tree takes in carbon dioxide and releases oxygen during photosynthesis, which other organisms use.
Animals	Animals eat its leaves and fruits, and birds and insects visit it; pollinators help in the formation of fruits and seeds.
Decomposers	Fungi and bacteria break down fallen leaves and dead matter and return nutrients to the soil for the tree.

Therefore, a tree depends on water, sunlight, soil and air, and also supports and depends on the animals and decomposers of the forest.

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QUESTION 3 *Probe and Ponder · p. 190*

Do you think the Earth can thrive without humans? Can humans survive without the Earth?

ANSWER

This question asks us to compare how nature depends on humans and how humans depend on nature.

a Can the Earth thrive without humans?

Ecosystems work through producers, consumers and decomposers, which interact with the non-living components and recycle nutrients. These interactions do not depend on humans; many of the disturbances to ecosystems come from human activities such as pollution and deforestation.

b Can humans survive without the Earth?

No. Humans benefit from ecosystems: forests provide fresh air, fertile soil, food, fibres, timber and medicines, and aquatic ecosystems provide water and food.

Therefore, nature can go on working without humans, but humans cannot survive without the Earth and its ecosystems.

QUESTION 4 *Probe and Ponder · p. 190*

If two kinds of birds compete for the same fruit, how might their way of living change over time?

ANSWER

Organisms compete for common resources like food, water, physical space or sunlight.

a Possible changes over time

- Competition for the same fruit can limit the number of birds of each kind, because the food available is limited.
- Over time, one kind of bird may turn to other food, or use the habitat in a different way, so that the two kinds depend less on the same fruit.
- If one kind is better at getting the fruit, its population may increase while the other may decrease.

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b Role of competition

Competition helps control population size and keeps the ecosystem balanced. Without it, one species could multiply too much, causing an imbalance.

Therefore, competition for the same fruit may make the two kinds of birds change their food or way of living, or change their numbers, over time.

QUESTION 5 *Probe and Ponder · p. 190*

Can human actions cause natural disasters?

ANSWER

The chapter shows that human activities disturb the way ecosystems work, and ecosystems also protect us.

a How human actions can add to disasters

- Mangrove forests slow down strong winds and waves during storms and floods; when mangroves are cut for fuelwood and farming, this protection is lost.
- Roots of plants hold soil in place and prevent erosion; cutting down trees makes soil prone to erosion.
- Deforestation, pollution, habitat loss and climate change are listed as human activities that threaten ecosystems.

Therefore, human actions can make natural disasters more harmful, because they destroy ecosystems that protect us.

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QUESTION 6 *Activity 12.1 · pp. 191–192*

Activity 12.1: Identify two habitats in your surroundings (for example a pond, a forest, an agricultural farm or a large tree), list the living beings and non-living things you observe and record them in Table 12.1.
What common characteristics do you observe in the two habitats in Activity 12.1?

ANSWER

A pond and a forest (Fig. 12.1) are taken as the two habitats. Model entries are given; your own habitats may differ.

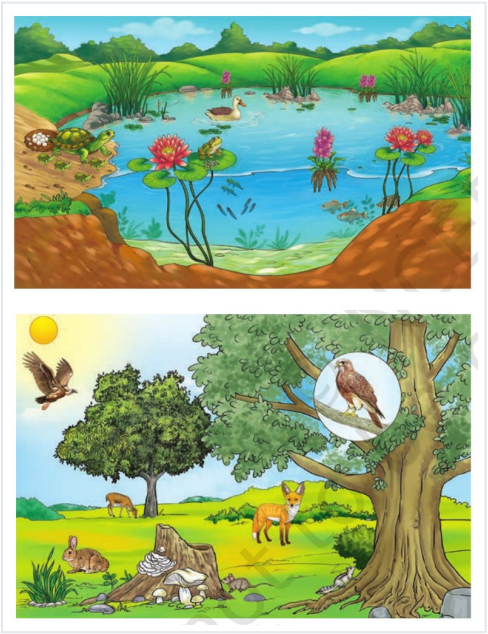

Fig. 12.1: Two types of habitats — (a) pond habitat, (b) forest habitat

a Table 12.1: Different components of two habitats

Habitat	Living beings	Non-living things
Pond	Fish, frogs, turtles, snakes, dragonflies, mosquitoes, snails, ducks; algae, diatoms, duckweeds, lotus	Water, air, sunlight, soil, stones
Forest	Grass, trees, birds, deer, fox, hare	Soil, air, sunlight, water, stones

b Common characteristics

- Both habitats have **living beings** as well as **non-living things**.
- The types of living beings are different in the two habitats, and the non-living things also vary.

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- The living beings are the **biotic components** and the non-living things are the **abiotic components** of a habitat.

Therefore, every habitat has biotic and abiotic components, but the kinds of components differ from habitat to habitat.

QUESTION 7 *In-text Question · p. 192*

Have you wondered why some organisms live on land while others live in water?

ANSWER

The answer lies in what each organism needs in order to survive.

a Answer

- Every organism needs **specific conditions** to survive.
- Different habitats offer different living conditions, so organisms live in the habitat that gives them the conditions they need — some on land and others in water.

Therefore, some organisms live on land and others in water because each needs specific conditions, and different habitats offer different conditions.

QUESTION 8 *In-text Question · p. 192*

In Activity 12.1, you listed fish as a biotic component of the pond. How do fish survive in a pond?

ANSWER

A pond meets the needs of fish through both its living and its non-living components.

a What the pond provides

A pond provides **food, oxygen, shelter and space to grow** — conditions essential for the survival of organisms.

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b Biotic and abiotic needs of fish

Type of need	Example for a fish
Biotic need	Food, obtained from small plants and animals in the pond
Abiotic need	Oxygen, obtained from water

Therefore, fish survive in a pond because it gives them food from small plants and animals, oxygen from water, shelter and space.

QUESTION 9 *Activity 12.2 · p. 193*

Activity 12.2: Mark an area of 1 m × 1 m in your school garden, identify four organisms in this area, count their numbers and record them in Table 12.2.
In the given example, there is a population of 20 _____ plants and is only 5 _____ plants in the same 1 × 1 m^2 area.

ANSWER

The number of individuals of a kind of organism at a given place and time is its population.

a Table 12.2: Number of particular organisms at a given space and time

Name of organism	Population (number of individual organisms)
Plant 1: grass (example)	20
Plant 2: any second plant (example)	05
Animal 1: e.g. ants	Your count
Animal 2: e.g. earthworm or snail	Your count

The names and the numbers for the animals depend on your own school garden. Group data are then compiled.

b Filling the blanks

Write the name of the first plant in the first blank and the name of the second plant in the second blank: for example, a population of 20 **grass** plants and only 5 **tulsi** plants in the same 1 × 1 m^2 area (use the plants you actually counted).

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c What we conclude

The **population** is a group of the same type of organisms in a habitat at a given time.

Therefore, a population is a group of the same type of organisms in a habitat at a given time; it is found by counting them in a marked area.

QUESTION 10 *In-text Question · p. 194*

Can a habitat have only one type of living organism? What might happen then? ... What else do you think could happen?

ANSWER

If all organisms in a habitat were of one type, they would all have the same requirements.

a What might happen

- All organisms would need the same **food, water and space**, leading to **competition** and possible **scarcity of resources**.
- There would be no other organisms to interact with or depend on; organisms in a habitat normally interact and depend on one another for survival.
- If one single problem (such as a shortage of food) affected that one type, the whole habitat would be affected.

b Community

In reality, a habitat has different populations living together. A **community** comprises different populations sharing the same habitat; the plants, animals and microorganisms together form the community.

Therefore, a habitat cannot work well with only one type of organism, because of competition for the same resources and lack of interactions.

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QUESTION 11 *Activity 12.3 · pp. 194–195*

Researchers observed two ponds — A with fish and a large number of flowering plants around it; B without fish and fewer flowering plants around it (Fig. 12.3). Think of a reason for these observations. Compare the number of dragonflies, bees, and butterflies in both the ponds. Do you find any relationship between the number of dragonflies and bees/butterflies? In Pond A (with fish) the number of dragonflies were less as compared to Pond B. Why?

ANSWER

The fish in Pond A affect the plants around it indirectly, through a chain of feeding relationships.



Fig. 12.3: Pond A with fish and Pond B without fish

a Reason for the observations

- **Fish eat dragonfly larvae**, so ponds with fish had fewer dragonflies.
- Dragonflies usually eat flies, bees and butterflies; with **fewer dragonflies, more bees, flies and butterflies** were found.
- These insects help **pollinate** flowers, moving pollen from one flower to another, which helps plants produce seeds.

b Relationship between dragonflies and bees/butterflies

When the number of dragonflies is less (Pond A), the number of bees and butterflies is more; when the number of dragonflies is more (Pond B), the number of bees and butterflies is less.

Therefore, Pond A has fewer dragonflies because fish eat dragonfly larvae, and this leads to more pollinators and more flowering plants around it.

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QUESTION 12 *Activity 12.3 · p. 195*

What does this study show? How does the population of fish in a pond affect the seed production in nearby plants?

ANSWER

The study connects fish, dragonflies, pollinators and plants, and also non-living components such as water and nutrients.

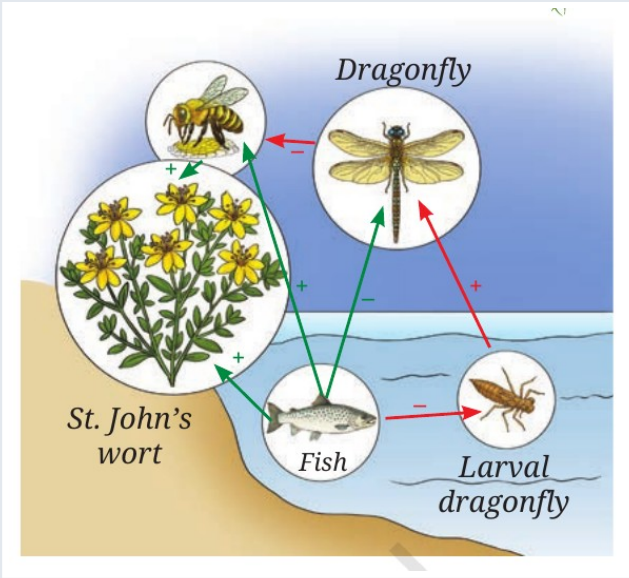

Fig. 12.4: The red arrows represent the direct effect, and the green arrows represent the indirect effect

a What the study shows

It shows how **biotic components** (fish, dragonflies, pollinators, plants) and **abiotic components** (temperature, water, nutrients) interact with and affect each other.

b Effect of fish on seed production

More fish → fewer dragonfly larvae → fewer dragonflies

Fewer dragonflies → more bees and butterflies → more pollination

More pollination → more seed production in the nearby plants

Therefore, a larger fish population indirectly increases seed production in nearby plants, through its effect on dragonflies and pollinators.

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QUESTION 13 *Activity 12.3 · p. 195*

Similarly, can overfishing by humans change this balance? How do you think it may affect the living and non-living parts of the habitat?

ANSWER

Overfishing removes fish from the pond, which reverses the chain of effects described in the study.

a Effect on the living parts

- With fewer fish, fewer dragonfly larvae are eaten, so **dragonflies increase**.
- More dragonflies eat more bees and butterflies, so **pollinators decrease** and the flowering plants may produce **fewer seeds**.
- The small plants and animals that fish eat may increase in number.

b Effect on the non-living parts

Since biotic and abiotic components affect each other, the changes in living beings can also change non-living parts of the pond, such as the nutrients and the quality of water.

Therefore, yes — overfishing can upset the balance of the pond by changing the numbers of many organisms and the abiotic conditions linked with them.

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QUESTION 14 *Activity 12.4 · pp. 195–196*

Activity 12.4: Based on the given criteria, identify and describe the interactions between biotic and abiotic components shown in Fig. 12.5 and record them in Table 12.3.
Criterion 1: Interactions between abiotic and biotic components.
Criterion 2: Interaction between two abiotic components.
Criterion 3: Interaction among the biotic components.

ANSWER

Each interaction in the picture is placed under the criterion it fits. The examples already given in Table 12.3 are included.



Fig. 12.5: Biotic and abiotic interactions

a **Table 12.3: Interactions of biotic and abiotic components in a habitat**

Criterion 1: biotic and abiotic components	Criterion 2: two abiotic components	Criterion 3: among biotic components
Earthworms live in moist soil.	The day temperature is high due to the bright sunlight.	A frog eats insects.
Many microbes are present in the pond.	Water is evaporating fast due to the sunlight.	A water snake eats fish.
A fish lays eggs in water.	Air current is blowing slowly on the water surface creating gentle waves.	Frogs and fish may compete for small insect larvae.
Fish take oxygen from the water.	The soil near the pond is moist.	A fish lays eggs in water near vegetation to protect them from other fish or frogs.

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b Why the interactions matter

Criterion 1 interactions influence life processes like nutrition, respiration and reproduction. Criterion 2 interactions influence the physical characteristics of a habitat. Criterion 3 interactions influence the availability of resources needed for life processes.

Therefore, interactions between biotic and abiotic components, between two abiotic components and among biotic components are all important for survival in a habitat.

QUESTION 15 *In-text Question · p. 197*

Hence, ecosystems can be large or small. Can you find overlapping ecosystems in Fig. 12.6?

ANSWER

Fig. 12.6 shows several ecosystems that touch and interact with each other.

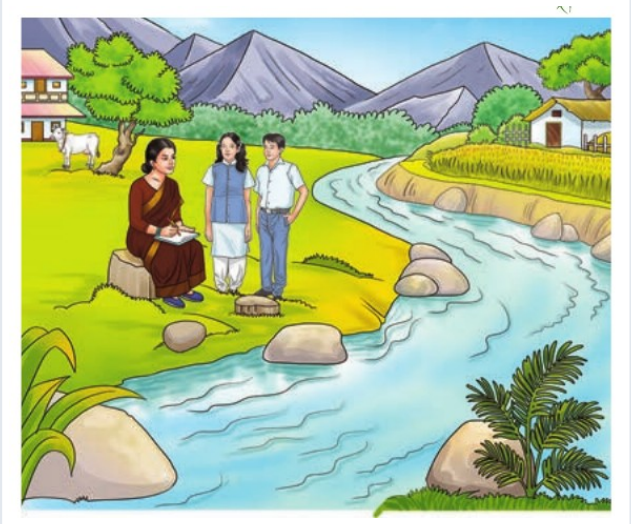

Fig. 12.6: Overlap of terrestrial and aquatic ecosystems

a Ecosystems seen in the figure

Type	Examples in Fig. 12.6
Aquatic ecosystem	A small river
Terrestrial ecosystems	Mountains, forests, grassland and farmland (farmland is a human-made ecosystem)

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These ecosystems are interacting with each other at any given point; for example, the river flows through the grassland and farmland.

Therefore, yes — the river (aquatic) overlaps with the mountains, forests, grassland and farmland (terrestrial) in Fig. 12.6.

QUESTION 16 *Activity 12.5 · pp. 197–198*

Activity 12.5: Observe Fig. 12.1b, which illustrates a forest ecosystem. Spot the organisms listed in Table 12.4, find out what they eat and record whether each feeds only on plants and plant products, only on animals, or on both.
List the heterotrophs from Table 12.4.

ANSWER

Plants make their own food and are producers (autotrophs); organisms that depend on others for food are consumers (heterotrophs).

a **Table 12.4: Eating habits of different organisms**

Name of the organism	Performs photosynthesis	Feeds on plants and plant	Feeds on animals	Feeds on both plants and animals
Deer	No	Yes — grass and leaves of plants	No	No — only on plants
Hare	No	Yes — grass and plants	No	No — only on plants
Vulture	No	No	Yes — dead animals	No
Bengal Fox	No	No	No	Yes
Bird (Shikra)	No	No	Yes — small animals	No
Squirrel	No	Yes — fruits, seeds and nuts	No	No — mainly on plants
Mouse	No	No	No	Yes
Mushroom	No	No	No	No — feeds on dead organic matter
Tree	Yes	No — makes its own food	No	No

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b Heterotrophs in Table 12.4

Organisms that cannot produce their own food are heterotrophs: **deer, hare, vulture, Bengal fox, shikra, squirrel, mouse and mushroom**. The tree is the autotroph (producer).

Therefore, all organisms in Table 12.4 except the tree are heterotrophs, because they depend on other organisms for their food.

QUESTION 17 *Activity 12.6 · p. 199*

Activity 12.6: Consider the following organisms in a grassland ecosystem: grass, frog, hare, grasshopper, snake and eagle. In Fig. 12.8 a relationship of who eats whom is shown among some of the organisms. Draw the feeding relationships for the remaining organisms by adding arrows, similar to those in Fig. 12.8.
Which is another food chain that can be drawn for the organisms given in this activity?

ANSWER

An arrow points from the organism that is eaten to the organism that eats it.

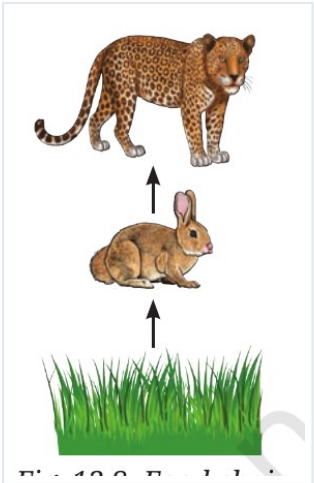

Fig. 12.8: Food chain (grass → hare → leopard)

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a Feeding relationships (arrows)

Grass → Hare
Grass → Grasshopper
Grasshopper → Frog
Frog → Snake
Snake → Eagle
Hare → Eagle

b Food chains

Grass → Grasshopper → Frog → Snake → Eagle
Grass → Hare → Eagle

The first chain is the example given in the chapter; the second is another food chain from the same organisms. A **food chain** is a simple sequence showing ‘who eats whom’ in an ecosystem.

Therefore, another food chain is Grass → Hare → Eagle; a food chain shows who eats whom, with the arrow pointing to the eater.

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QUESTION 18 *Activity 12.7 · pp. 199–200*

Activity 12.7: Fig. 12.10a represents a crop field with millets, mouse and eagle. Count the number of each type of organism in Fig. 12.10a. Make a table and set a number against each organism. Arrange the numbers in ascending order, with the highest number at the base and the lowest at the top. Place the mouse, millet and eagle appropriately in Fig. 12.10b.
What figure do you get? Complete the pyramid in Fig. 12.10b.

ANSWER

Counting the organisms in the picture shows that the numbers fall sharply from the producer to the top consumer.



Fig. 12.10: (a) Food chain of millet, mouse and eagle in a crop field

a Counting (approximate)

Organism	Approximate number in Fig. 12.10a	Place in the pyramid
Millet	About 50 plants (a few are hidden by the tree)	Base (highest number)
Mouse	About 15	Middle
Eagle	1	Top (lowest number)

Exact counts may differ slightly between students; what matters is the order: millet > mouse > eagle.

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b The figure obtained

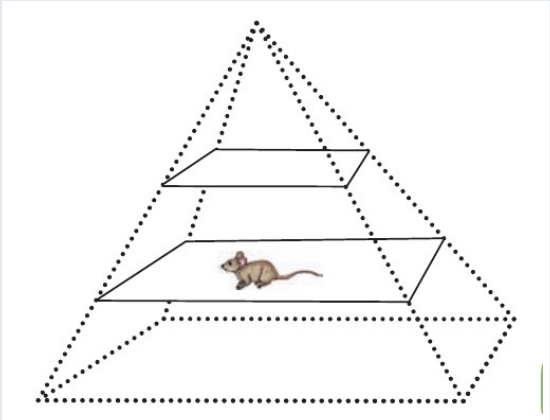

Fig. 12.10: (b) Food chain represented as a pyramid

Millet is placed at the base, the mouse in the middle and the eagle at the top. The figure looks like a **pyramid**.

c Trophic levels

Each organism in a food chain has a specific position called a **trophic level**: producers (like millet) at the first level, herbivores at the second, small carnivores at the third, and large carnivores at the next level.

Therefore, the numbers form a pyramid with millet at the base, mouse in the middle and eagle at the top.

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QUESTION 19 *Activity 12.8 · p. 200*

Activity 12.8: Look at Fig. 12.11. Put more arrows for the missing relationship of 'who eats whom'.
How many other organisms might be connected to one organism through a feeding relationship in an ecosystem?

ANSWER

In Fig. 12.11 each arrow points from the organism that is eaten to the one that eats it. Some arrows are already drawn; others can be added.

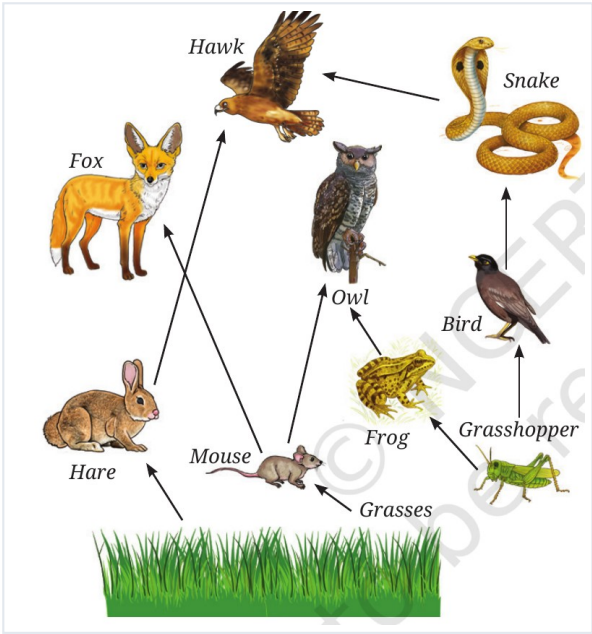

Fig. 12.11: Food web

a Relationships already shown

Grasses → Hare, Grasses → Mouse, Hare → Hawk, Mouse → Fox, Mouse → Owl, Fox → Hawk, Grasshopper → Frog, Grasshopper → Bird, Frog → Owl, Bird → Snake and Snake → Hawk.

b Missing arrows that can be added

Grasses → Grasshopper
Hare → Fox
Frog → Snake
Mouse → Snake
Mouse → Hawk

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c How many organisms can be connected to one organism?

More than one. Each organism may be eaten by two or more types of organisms; for example, the mouse is eaten by the fox, the owl and the snake, and grasses are eaten by the hare, the mouse and the grasshopper.

So the food chains are interlinked with each other to form a network, called a **food web**.

Therefore, a food web is a network of interlinked food chains, and one organism can be connected to several others through feeding relationships.

QUESTION 20 *In-text Question · p. 201*

In nature, nothing is wasted — everything is reused. Does nature really waste anything?

ANSWER

Organisms produce dead matter and waste during their life cycle, but this is not wasted in nature.

a Answer

- Microorganisms like **fungi and bacteria** break down complex substances in dead plants and animals into simpler ones, which returns important nutrients to the soil.
- Tiny insects, such as beetles and flies, break down animal droppings like elephant dung and recycle nutrients back into the environment.
- This process is called **decomposition**, and the organisms are called **decomposers** or **saprotrophs**; many nutrients in the soil come from it, and plants grow in this soil.

Therefore, nature does not waste anything — decomposers recycle dead matter and waste into nutrients that are used again.

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QUESTION 21 *Ever Heard of ... · p. 201*

Do you know which birds in your area are seen only during winter?

ANSWER

Some birds visit an area only in winter. They are called migratory birds.

a Answer

The answer depends on your area. The chapter gives one example: the **Demoiselle Crane** visits the water body of Khichan village in Jodhpur district during the winter months. The stamps shown in the chapter are of the garganey teal, white stork, forest wagtail and rosy pastor.

b Why birds migrate

Migratory birds travel from different parts of the world to avoid harsh climate and in search of food. They act as pollinators or seed dispersers, and as predators of insect pests, they help farmers.

Therefore, birds seen only in winter are migratory birds; ask local bird watchers or check stamps and bird lists for your own area.

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QUESTION 22 *Activity 12.9 · pp. 201–202*

Activity 12.9: In the 1980s, India was a significant exporter of frog legs, especially of the Indian bullfrog. This large-scale harvesting led to a decline in frog populations. Read the case with Fig. 12.13. What happens when we intervene in nature?

ANSWER

A small change in one component can lead to many other changes, as in Fig. 12.13 and in the frog-legs example.

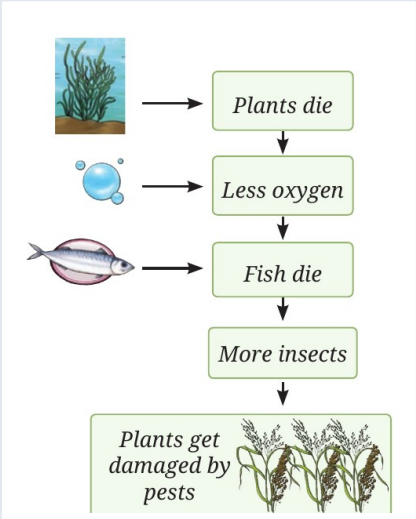

Fig. 12.13: One change leads to another

a Chain of events in the frog-legs example

Large-scale harvesting → decline in frog populations
Frogs eat insects → fewer frogs → rise in agricultural pests
More pests → farmers use more synthetic pesticides
Pesticides harm the environment, soil and water quality, and human health

The Government of India banned the export of frog legs to prevent further ecological damage.

Therefore, when we intervene in nature, one change leads to many others and may cause ecological damage; an ecosystem's balance is dynamic and can be disrupted by human-made changes.

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QUESTION 23 *In-text Question · p. 202*

There are other types of relationships too. Based on the example given in Fig. 12.16, what do you observe?

ANSWER

Fig. 12.16 shows three types of relationships, in which the two organisms are affected in different ways.

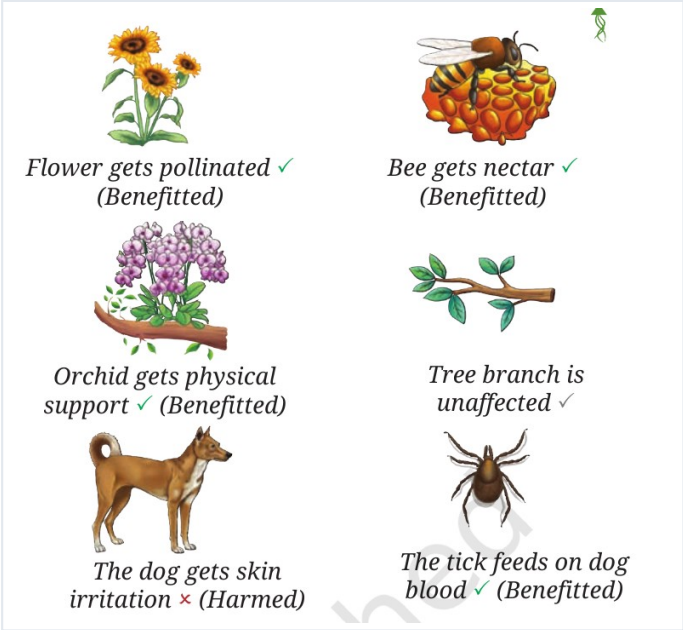

Fig. 12.16: Different types of interactions between organisms

a What we observe

Relationship	Example	Effect on the organisms
Mutualism	Honeybee and flower	Both benefit: the flower gets pollinated and the bee gets nectar.
Commensalism	Orchid on a tree	The orchid benefits (gets physical support); the tree branch is unaffected.
Parasitism	Tick on a dog	The tick benefits (feeds on blood); the dog is harmed (skin irritation).

Therefore, organisms live in relationships such as mutualism (both benefit), commensalism (one benefits, other unaffected) and parasitism (one benefits, other harmed).

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QUESTION 24 *In-text Question · p. 204*

How can we stop damaging forests, rivers, and wetlands? Think about what actions you and your community can take to protect these important places.

ANSWER

The chapter lists the causes of damage; actions to protect these places follow from them.

a Causes of damage mentioned in the chapter

Deforestation, overuse of natural resources, the spread of invasive species, unsustainable land use, and pollution (for example industrial waste and untreated sewage in rivers).

b Actions we and our community can take

- Avoid cutting trees and plant and protect trees; do not misuse forest resources.
- Do not throw waste, industrial waste or untreated sewage into rivers and wetlands.
- Use natural resources carefully and avoid overuse.
- Support protected areas such as national parks and sanctuaries, and avoid illegal hunting.

Therefore, we can protect forests, rivers and wetlands by reducing pollution and overuse, protecting trees and wildlife, and supporting protected areas.

QUESTION 25 *In-text Question · p. 205*

Humans have created artificial ecosystems like fish ponds, farms, and parks to meet their needs. Can you name any human made ecosystem in your area?

ANSWER

Human-made ecosystems need human care and management, unlike natural ecosystems.

a Examples

- **Fish pond**, **farm** (agricultural field) and **park** are the examples given in the chapter.
- Other examples from your area may be a school garden or a kitchen garden.

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When well designed, these can help reduce pollution, support biodiversity and provide recreational spaces.

Therefore, farms, fish ponds and parks are human-made ecosystems; name the ones found in your own area.

QUESTION 26 *In-text Question · p. 205*

These farming methods are now considered unsustainable because of the overuse of synthetic chemicals, excessive groundwater extraction, and growing only one type of crop for commercial gain. How do these practices harm both the environment and human health?

ANSWER

Farming methods of the Green Revolution increased food production, but some of them cause problems over time.

a Harm caused

- **Overuse of synthetic chemicals:** pesticides and fertilisers harm the environment, soil and water quality, and affect environmental and human health.
- **Excessive groundwater extraction:** heavy irrigation can disturb soil organisms such as earthworms and snails, which are important for ecological balance.
- **Growing one type of crop (monoculture):** reduces biodiversity and affects pollinators, which are crucial for food production; growing the same crop repeatedly leads to soil degradation.

Therefore, these practices harm soil, water and biodiversity, and thereby the environment and human health.

NCERT ARCHIVE

QUESTION 27 *Activity 12.10 · pp. 205–206*

Activity 12.10: Visit a nearby farm or interact with farmers to find out about the farming practices they adopt, using questions such as: How have your farming practices changed over time? And why? What effects do you notice when using synthetic fertilisers and pesticides? Have you seen any changes in soil health after using these? Prepare a report.
What inference do you draw from your interactions with farmers?

ANSWER

The findings depend on the farm visited. A model inference based on the chapter is given.

a Model inference

- Farmers began using synthetic fertilisers and pesticides to increase crop production.
- Their long-term use can affect the environment and soil health: it can reduce soil fertility by decreasing friendly microorganisms and organic matter (humus), make soil prone to erosion, and reduce natural predators of pests.
- Some pests may develop resistance to pesticides, making them difficult to control.
- Some farmers are turning to organic and natural farming to reduce synthetic chemicals.

Therefore, synthetic inputs helped food production but their long-term use can harm soil and the environment, so farming should become more sustainable.

NCERT ARCHIVE

QUESTION 28 *In-text Question · p. 206*

Based on your learning, what practices do you think can help farmers protect the soil, the environment, and our food security for the future?

ANSWER

Sustainable farming protects the soil and the environment while still producing enough food.

a Practices that can help

- Use **organic manure and compost** to nourish the soil continuously; the ancient text *Vrikshayurveda* advocates organic manure like Kunapa Jala.
- Reduce the use of synthetic fertilisers and pesticides, as in **organic and natural farming**.
- Avoid **monoculture**; grow different crops to support biodiversity and pollinators.
- Use **natural control of pests** by predators (Fig. 12.18) instead of heavy use of pesticides.
- Avoid heavy irrigation and repeated ploughing that disturb soil organisms.

Therefore, organic manure, mixed cropping, natural pest control and careful use of water and chemicals can protect soil, environment and food security.

NCERT ARCHIVE

12.2

CLASS 8 SCIENCE · CHAPTER 12

Exercises

Keep the Curiosity Alive · 9 questions

Directions (Questions 1–9): These are the exercise questions given at the end of the chapter under Keep the Curiosity Alive, numbered as in the textbook. Each question, including all its sub-parts, is answered step by step.

QUESTION 1

Keep the Curiosity Alive 1 · p. 207

Refer to the given diagram (Fig. 12.19) and select the wrong statement.
(i) A community is larger than a population.
(ii) A community is smaller than an ecosystem.
(iii) An ecosystem is part of a community.

ANSWER

In Fig. 12.19 the circles are placed one inside the other: population, then community, then ecosystem.

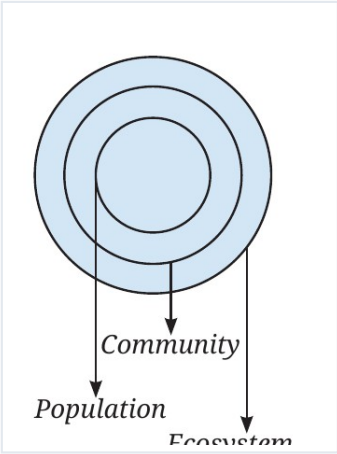

Fig. 12.19: Population, community, and ecosystem

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a Checking each statement

Statement	Correct?	Reason
(i) A community is larger than a population.	Correct	A community has different populations.
(ii) A community is smaller than an ecosystem.	Correct	An ecosystem includes the community and the abiotic components.
(iii) An ecosystem is part of a community.	**Wrong**	A community is part of an ecosystem, not the other way round.

Therefore, the wrong statement is (iii): an ecosystem is not part of a community; a community is part of an ecosystem.

QUESTION 2 *Keep the Curiosity Alive 2 · p. 207*

A population is part of a community. If all decomposers suddenly disappear from a forest ecosystem, what changes do you think would occur? Explain why decomposers are essential.

ANSWER

Decomposers (fungi and bacteria) break down dead plants, dead animals and waste.

a Changes that would occur

- Dead plants and animals and waste would **pile up** because nothing would break them down.
- Nutrients would **not be returned to the soil**, so the soil would slowly lose its nutrients.
- Plants would grow poorly, so herbivores and then carnivores would also be affected.

b Why decomposers are essential

Decomposers break down complex substances in dead matter into simpler ones and return nutrients to the soil. Many of the nutrients in soil come from decomposition, so decomposers play an important role in recycling nutrients.

Therefore, without decomposers dead matter would accumulate and nutrients would not be recycled, so the whole forest ecosystem would suffer.

NCERT ARCHIVE

QUESTION 3 *Keep the Curiosity Alive 3 · p. 207*

Selvam from Cuddalore district, Tamil Nadu, shared that his village was less affected by the 2004 Tsunami compared to nearby villages due to the presence of mangrove forests. This surprised Sarita, Shabnam, and Shijo. They wondered if mangroves were protecting the village. Can you help them understand this?

ANSWER

The chapter describes how mangrove forests, such as those of the Sundarbans, protect the land.

a How mangroves protect

- Mangrove forests protect us by **slowing down strong winds and waves** during storms and floods.
- Their dense trees and roots stand between the sea and the village, so the force of the waves reaching the village is reduced.

b Applying it to Selvam’s village

Because the village had mangrove forests, the waves of the tsunami were slowed down before they reached it, so it was less affected than nearby villages without mangroves.

Therefore, yes — the mangroves protected the village by slowing down the strong waves.

NCERT ARCHIVE

QUESTION 4 *Keep the Curiosity Alive 4 · p. 208*

Look at this food chain:
Grass → Grasshopper → Frog → Snake
If frogs disappear from this ecosystem, what will happen to the population of grasshoppers and snakes? Why?

ANSWER

In this chain the frog eats grasshoppers and is eaten by the snake.

a Effect on grasshoppers

Frogs eat grasshoppers. If frogs disappear, fewer grasshoppers are eaten, so the population of **grasshoppers will increase** (they may then eat more grass).

b Effect on snakes

Snakes eat frogs. With no frogs, the snakes lose their food, so the population of **snakes will decrease** (unless they feed on other organisms of the ecosystem).

Therefore, grasshoppers will increase because they are no longer eaten by frogs, and snakes will decrease because their food source is lost.

QUESTION 5 *Keep the Curiosity Alive 5 · p. 208*

In a school garden, students noticed fewer butterflies the previous season. What could be the possible reasons? What steps can students take to have more butterflies on campus?

ANSWER

Butterflies depend on flowering plants and on a safe habitat, and they are eaten by other organisms such as dragonflies.

a Possible reasons

- Fewer flowering plants in the garden, so less food (nectar) for butterflies.
- Use of pesticides, which harm insects.
- An increase in organisms that eat butterflies, such as dragonflies.
- Loss of habitat, pollution or changes in weather.

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b Steps students can take

- Grow more flowering plants of different kinds.
- Avoid synthetic pesticides and use natural methods of pest control.
- Keep the garden clean and free from litter and pollution, and leave some area with natural vegetation.

Therefore, fewer butterflies may be due to fewer flowers, pesticides or more predators, and students can increase them by growing flowering plants and avoiding pesticides.

QUESTION 6 *Keep the Curiosity Alive 6 · p. 208*

Why is it not possible to have an ecosystem with only producers and no consumers or decomposers?

ANSWER

The organisms of an ecosystem interact and depend on one another for survival.

a Reasons

- Without **decomposers**, dead plants and waste would not be broken down and nutrients would not be recycled to the soil, so the producers would run out of nutrients.
- Without **consumers**, animals such as pollinators that help flowers form fruits and seeds would be absent, and there would be no food chains or food webs.
- In nature the three groups — producers, consumers and decomposers — are linked, and nothing is wasted.

Therefore, an ecosystem needs producers, consumers and decomposers together, since they depend on one another for food and for recycling nutrients.

NCERT ARCHIVE

QUESTION 7 *Keep the Curiosity Alive 7 · p. 208*

Observe two different places near your home or school (e.g., a park and a roadside). List the living and non-living components you see. How are the two ecosystems different?

ANSWER

The observations depend on the places chosen. A model answer for a park and a roadside is given.

a Model observations

Place	Living components	Non-living components
Park	Grass, trees, flowering plants, birds, butterflies, insects, earthworms, microorganisms	Soil, sunlight, air, water, stones, benches
Roadside	Weeds, a few trees, ants, stray animals, birds, microorganisms	Soil, sunlight, air, tar road, dust, smoke from vehicles, litter

b How they differ

- The park has more kinds of plants and animals, while the roadside has fewer kinds.
- The roadside has more pollution and human-made things; the park is better managed and has more moist soil and shade.

Therefore, both places have biotic and abiotic components, but they differ in the kinds and numbers of organisms and in the physical conditions.

NCERT ARCHIVE

QUESTION 8 *Keep the Curiosity Alive 8 · p. 208*

‘Human-made ecosystems like agricultural fields are necessary, but they must be made sustainable.’ Comment on the statement

ANSWER

Farms are human-made ecosystems that provide our food, but the way they are managed affects the environment.

a Why they are necessary

Humans have been practising farming for thousands of years to grow food, and our dependence on agriculture increased with the population. Synthetic fertilisers and pesticides helped countries like India become food secure.

b Why they must be sustainable

- Overuse of synthetic chemicals, excessive groundwater extraction and monoculture lead to soil degradation and harm the environment.
- Unlike natural ecosystems, they need human care; using organic manure, mixed cropping and natural pest control keeps them productive in the future.

Therefore, the statement is correct: farms are needed for food, but they must be managed sustainably to protect soil, environment and future food security.

NCERT ARCHIVE

QUESTION 9 *Keep the Curiosity Alive 9 · p. 208*

If the Indian hare population (Fig. 12.20) drops because of a disease, how would it affect the number of other organisms?

ANSWER

In Fig. 12.20 the grass is eaten by the hare and the deer, the hare is eaten by the fox, and the deer is linked to the eagle.

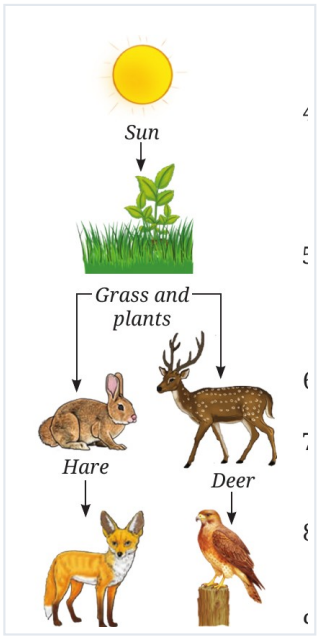

Fig. 12.20: Parts of a food web

a Likely effects

- **Grass** — fewer hares eat it, so grass may increase.
- **Fox** — loses a food source, so its number may decrease (or it may depend more on other food).
- **Deer** — with less competition for grass, deer may increase, which can give more food to the eagle.

Therefore, a fall in the hare population would cause the fox to decrease and grass (and possibly deer) to increase, showing how organisms in a food web are linked.

NCERT ARCHIVE

12.3

CLASS 8 SCIENCE · CHAPTER 12

Discover, Design and Debate

Solutions · 5 questions

Directions (Questions 1–5): These are the activities given under Discover, Design and Debate. They are activity-based, so model outcomes and answers are given; your own observations may differ.

QUESTION 1

Discover, Design and Debate 1 · p. 208

Plan a clean-up day at school or a nearby park. Wearing gloves and using bags, collect the litter you find. Discuss the kinds of waste you found. Which was the most common? How can we reduce such waste?

ANSWER

This is an activity, so a model plan and outcome are given; your findings will depend on the place.

a Plan

- Choose the day and place, form groups, and wear gloves and carry bags (with a teacher's guidance).
- Collect litter, then sort it into kinds such as plastic, paper, food waste, glass and metal and count each kind.

b Discussion

- The most common waste is usually plastic wrappers and paper; record your own count.
- Waste can be reduced by using cloth bags, reusing and recycling, using dustbins and not littering.

Therefore, sorting the litter shows which waste is most common, and we can reduce it by reusing, recycling and not littering.

NCERT ARCHIVE

QUESTION 2 *Discover, Design and Debate 2 · p. 208*

In Arunachal Pradesh, the Nyishi and Mishmi tribes treat the Tiger as sacred. In Chhattisgarh, the Baiga tribe worships the Bagesur Dev and believes the Tiger is the protector of the forest. Find out about other Indian tribes that have a special connection with animals.

ANSWER

This is a research task. A starting point is given; confirm details from books, the library or the internet.

a Starting points for research

- The Bishnoi community of Rajasthan is well known for protecting wildlife such as blackbuck and trees such as khejri.
- Many communities in different parts of India keep sacred groves and treat particular animals and trees as sacred.
- Ask elders in your area and note the animal, the community, the belief and how it helps protect nature.

Therefore, many Indian communities link their beliefs with animals and forests, and such beliefs often help protect wildlife.

NCERT ARCHIVE

QUESTION 3 *Discover, Design and Debate 3 · p. 208*

Pick a tree near your home or school. Observe it once a week for 4 weeks. Note any new leaves, flowers, fruits, or visiting birds and insects. Record your observations. You may even upload your findings to www.seasonwatch.in and become a young citizen scientist.

ANSWER

This is an observation project; the record below is a format to fill with your own observations.

a Observation record

Week	New leaves	Flowers	Fruits	Visiting birds and insects
1				
2				
3				
4				

Observe the same tree on the same day each week, write what you see in each column, and compare the changes over the four weeks.

Therefore, weekly observation of one tree shows how it changes and which organisms depend on it.

NCERT ARCHIVE

QUESTION 4 *Discover, Design and Debate 4 · p. 208*

Interact with farmers and record indigenous practices followed by them for sustainable farming. Create a sustainable herbal garden/natural farm at home or at school. It could be a group activity with students from different grades.

ANSWER

This is an activity based on your local area. Examples of the kind of practices to record are given.

a Examples of practices to record

- Using organic manure and compost made from animal and plant waste, such as Kunapa Jala mentioned in the Vrikshayurveda.
- Growing different crops instead of the same crop again and again.
- Using natural predators and traditional methods to control pests.

b Herbal garden or natural farm

Choose herbs suited to your area, prepare soil with compost, water carefully, avoid synthetic chemicals, and share the work between students of different grades.

Therefore, recording local practices and making a herbal garden shows how sustainable farming works in practice.

NCERT ARCHIVE

QUESTION 5 *Discover, Design and Debate 5 · p. 209*

Look at Fig. 12.21 to understand the different farming practices adopted by farmers or you may also visit a nearby farm with an elderly person to observe the same. List a few suggestions in your notebook to improve farming practices by adopting eco-friendly and sustainable techniques.

ANSWER

Fig. 12.21 shows a farm with crops, an orchard, a vegetable plot, animals and ploughing with bullocks.



Fig. 12.21: Farming Practices

a Suggestions for eco-friendly and sustainable farming

- Use organic manure and compost (for example from animal dung and plant waste) in place of synthetic fertilisers.
- Grow different crops, vegetables and fruit trees together instead of a single crop.
- Control pests naturally and reduce pesticides.
- Use water carefully and avoid excessive groundwater extraction.
- Make posters or models for the school function, science fair or Krishi Mela to share these ideas.

Therefore, using organic manure, mixed crops, natural pest control and careful use of water makes farming eco-friendly and sustainable.

NCERT ARCHIVE