7 Interdependence of Plants and Animals

We'll cover the following key points:

- Environment and its Components
- Interdependence of Plants and Animals
- Food Chain and Food Web
- Maintaining Balance in Nature

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Learning Outcomes

By the end of this chapter, students will be able to:

- Understand the concept of interdependence between plants and animals in nature and their unique roles in the ecosystem.
- Identify and explain how plants and animals depend on each other for survival, including the exchange of oxygen and carbon dioxide.
- Explore examples of interdependence, such as plants providing food and shelter to animals, and animals helping in pollination and seed dispersal.
- Learn how maintaining a balance between plants and animals is crucial for a healthy and sustainable environment.

Guidelines for Teachers

The teacher can start the chapter by introducing the concept of interdependence between plants and animals, encouraging students to observe real-life examples in their surroundings or nature. Discussions can focus on the mutual exchange of oxygen and carbon dioxide, pollination, seed dispersal, and the food chain. The teacher can also emphasize how plants and animals together maintain ecological balance, helping students appreciate the importance of protecting the environment.

Warm Up

Put these animals in a sequence as they make a simple food chain. You can give numbers 1 to 5.

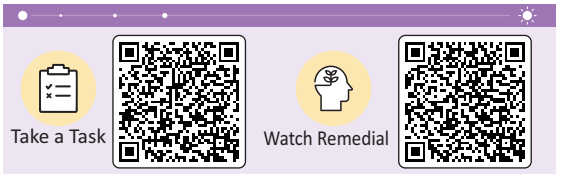




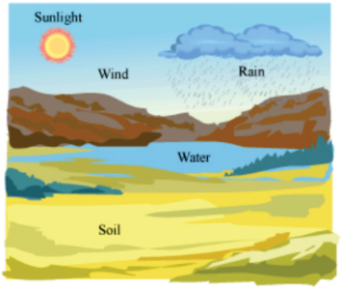
Fun Fact

Plants and animals form a team that keeps ecosystems thriving. Plants produce oxygen and food, while animals like bees and birds help with pollination and seed dispersal. Even carnivores indirectly depend on plants because their prey eats plants. Forests act as carbon sinks, absorbing CO_2 exhaled by animals, which helps regulate the planet's climate. This beautiful cycle shows how life on Earth is interconnected!

Environment and its Components



The things that surround us such as air, water, land, sky, plants, animals etc. which in turn affect our lives is called our environment. Everything that surrounds and affects the life of an organism are called its environment. The environment consists of two factors:



1. **Abiotic factors:** These are the non-living things that constitute the environment such as air, water, soil, warmth, sunshine, minerals etc.

2. **Biotic factors:** These are the living things that affect us such as plants and animals including microorganisms such as bacteria and fungi etc.

All these biotic and abiotic components interact and depend upon each other for their existence.

Interdependence of Plants and Animals

Both plants and animals have been living together from the very early phase of evolution to form the biotic component of the environment. The various factors for which they depend on each other include nutrition, reproduction, protection, shelter etc. This interdependence can be seen very well in a forest ecosystem where both plants and animals co-exist with the support of each other. Plants provide food, and shelter to the animals which, on the other hand, help the plants in processes like seed dispersal and pollination etc.

Let's read about this in detail.

Dependence of Plants on Animals

Plants are mostly dependent on animals for the following reasons:

1. **Carbon Dioxide:** Green plants require carbon dioxide to prepare their food by a process called Photosynthesis. Carbon dioxide is released by animals during the process of respiration where they breathe in oxygen and release carbon dioxide in order to get the energy for various life activities.
2. **Pollination (in reproduction):** In plants, for reproduction, pollen grains have to be transferred from the male part of a plant to the female part of the plant which results in fertilization the formation of seeds. This seed in turn gives rise to a new plant.
3. **Seed Dispersal:** Seed dispersal is the movement of seeds away from the parent plant. Since plants cannot move from one place to another, they depend on animals and various other agents that help them disperse their seeds. Seed dispersal is important because if all seeds fall in one place there will be competition for space, nutrients etc. and they will not be able to grow.
4. **Decomposition of Dead Plants and Plant Parts:** When a plant or a plant part dies, it falls to the ground. These are then acted upon by micro-organisms and decomposed to form humus which in turn mixes with the soil thus increasing the fertility of the soil.

Dependence of Animals on Plants

Animals are also dependent on plants for various reasons. Some of them are listed below:

1. **Oxygen:** Animals are dependent on plants for oxygen which is produced by the plants as a result of photosynthesis. Oxygen is used by animals for breathing without which they cannot survive.
2. **Food:** Plants are the ultimate source of food for all organisms. It is so because plants are the only living things that can make their own food with the help of carbon dioxide, water and sunlight by a process called photosynthesis.

3. **Shelter:** Plants provide shelter to many animals including microorganisms, insects, reptiles, birds etc.

Did you know ?

1. The Amazon Rainforests are known as the “Lungs of our planet” as it continuously recycles carbondioxide into oxygen. It is estimated that 20% of the world's oxygen is produced in the Amazon Rainforest.
2. It is believed that about 80% of the world's diet originated in the Amazon Rainforest which includes fruits like orange, grapefruit, coconut, guavas, pineapples, mangoes etc. and vegetables such as potatoes, corns, yams etc. grains such as rice and spices such as pepper, turmeric, cinnamon, cloves etc.
3. Many of the prescription drugs sold worldwide are derived from plant sources. About 25% of the ingredients of the Western Pharmaceuticals are derived from Rainforests.

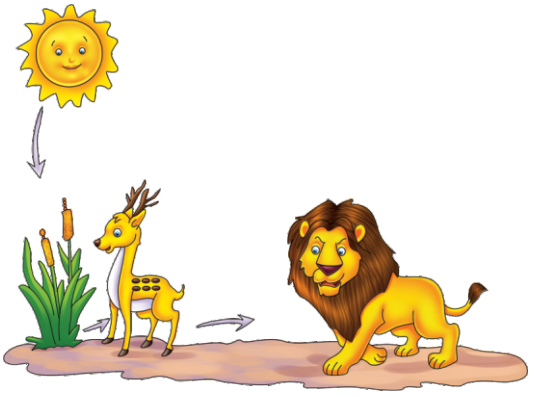
Food Chain and Food Web

Take a Task

Watch Remedial

In an ecosystem, plants and animals are dependent on each other for survival. This interdependence can be very well described with the help of a food chain or a food web. The organisms in an ecosystem need energy and there should be flow of energy within an ecosystem. The Sun is the ultimate source of energy. This energy is used by green plants to prepare food. They are therefore called producers. These plants are eaten by herbivores. These are therefore called primary consumers. Herbivores in turn, are eaten by carnivores that are called the secondary consumers. The carnivore when dies lies on the ground and the decomposers then act upon it and mixes it with the soil.

Food chain is the transfer of energy in the form of food from one organism to another in an environment starting with the green plants or producers and ending in decomposers.



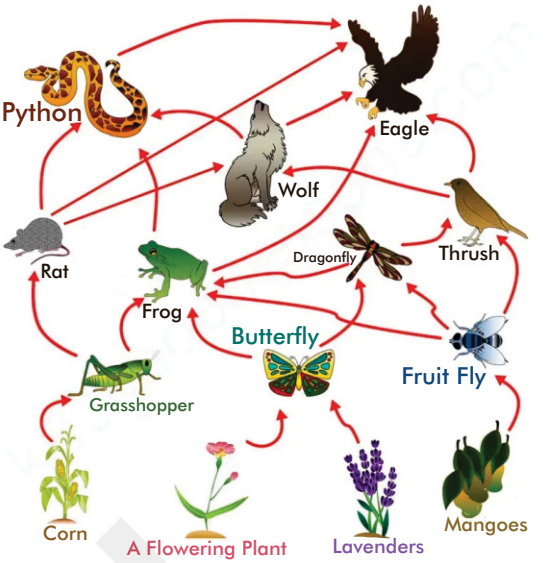
Food chain

Components of a Food Chain

Producers: Green plants are called producers. They are called so because they are the only living things that can produce their own food using sunlight, carbon dioxide, water and minerals and with the help of a green pigment called chlorophyll present in them. Thus light energy from the Sun is converted into chemical energy and is stored in the plants. So the plants make the first level in a food chain.

Consumers: Plants are eaten by herbivores. Animals cannot make their own food. Therefore all animals depend on plants directly or indirectly for their food and thus energy from plants is transferred to them. Thus herbivores make the second level in a food chain. They are therefore called the primary consumers. These primary consumers are in turn, eaten by carnivores. These

are called secondary consumers and form the third level in a food chain. At times, this secondary consumer is eaten by another carnivore of higher order. This is then called a tertiary consumer. Thus, there is a transfer of energy from the primary consumers to the secondary and then to tertiary consumers.



Food web

Decomposers: When the consumers die, their bodies are acted upon by microorganisms, broken into small particles and are mixed with the soil. The energy of the producers and consumers are used up by the decomposers and is supplied back to the soil thus keeping the environment clean.

Food web is an interconnection of various food chains. When various food chains are interconnected to each other at different levels, a food web is formed. It shows the interconnection between different organisms in an ecosystem. The following diagram will help us to understand the Food web better.

Check 'N' Mate

Critical Thinking

Write 'T' for true and 'F' for false statements.

1. A biotic factors are air, water, soil, warmth, sunshine and minerals. ☐
2. Seed dispersal is the movement of seeds away from the parent plant. ☐
3. Animals are dependent on plants for carbon dioxide. ☐
4. Animals can make their own food. ☐
5. The herbivores are called the primary consumers. ☐

Maintaining Balance in Nature

Balance in nature means the balance between living organisms such as human beings, plants and animals and their environment. Harmonious relationship among all these leads to a perfect ecological balance. For this, there should be sufficient food available for all living beings. Insufficient food leads to starvation and death of an organism. A species can survive only when favourable ecosystem is created where they can live and multiply.

Take a Task

Watch Remedial

What happens to the plants and animals when one type of animal leaves or dies out? Animals that depend on the missing plant or animal for food will be without food. They may die or leave the area in search of other food and shelter sources.

For example, if snakes are killed and eliminated from the rice-fields, there will be an increase in the rat population which will eventually destroy the crops thus disturbing the natural balance.

Did you know ?

Australia has the largest coral reef in the world. It is known as The Great Barrier Reef. Over the past 30 years, there has been a huge loss in coral in this reef. One of the main reasons for this was due to the Crown of Thorns Starfish (COTS). These deadly Starfish can eat 53square metres of live coral annually. This starfish has 21 arms and is covered with venomous spine like spikes.

A Giant Triton feeding on a Crown of Thorns Starfish

Australian marine scientists have found out that this problem can be solved with the help of a marine species of snail called the Giant triton which is the only natural predator of the starfish. It is one of the world's largest sea snails reaching lengths of upto 2 feet. It is said to be very active and is known to aggressively chase its prey, which it detects through smell and kills. The Australian government is giving legal protection to the Giant Triton species and is trying to help it reproduce artificially, so that it can reduce the population of Crown of Thorns Starfish and save the coral reefs from destruction.

Causes of Natural Imbalance

The causes of imbalance in an environment may be a disturbance either caused naturally or created by humans. A disturbance is any change that causes a disruption in the balance of an ecosystem.

A few examples of human-caused disturbances are :

- **Deforestation:** Due to ever-increasing human needs large stretches of forests are cleared which results in habitat destruction of many animal species apart from depriving all living beings from numerous forest resources.
- **Pollution:** Setting up of industries, uncontrolled usage of vehicles, dumping of garbage into water bodies etc. have resulted in various forms of pollution in the environment.
- **Introduction of a New Species:** Sometimes if a new species of plant or animal is brought into a new place, it affects the other native species growing there.
- **Overhunting of a Particular Species:** When there is unlawful hunting of a particular species, it comes to the verge of extinction.

A few examples of natural disturbances are :

- **Volcanic Eruptions:** In the event of a volcanic eruption, large amounts of lava spread across

huge areas with a very large quantity of smoke and chemical release. This adversely affects the natural environment.

- **Floods:** Floods cause huge destruction to life and property. Large numbers of human lives, property, crops, livestock etc. are harmed during floods. This may reduce biodiversity in an environment.
- **Forest Fires:** Forest fires cause great damage to trees and wild animals. Fires destroy the nests, natural habitats and food sources of the animals living there apart from killing a huge number of wildlife.

Steps to Restore Natural Balance

In order to restore the balance of nature certain steps have to be taken. Some of them are:

- **Afforestation:** Large scale planting of trees on barren lands is called afforestation. Afforestation provides a fresh supply of timber, food, fodder for cattle, shelter etc. in addition to bringing rains to the region and cleaning the air. It also prevents soil erosion.
- **Prevent Pollution:** Steps should be taken to prevent factories and vehicles from emitting harmful chemicals. Catalytic converters should be installed in vehicles to convert poisonous gas into non-poisonous gas. Sewage from industries should be treated before releasing into the environment.
- Protected areas should be created by the government for protection of plant and animal species such as Wildlife Sanctuaries and National Parks.

Did you know ?

Important facts about wildlife protection.

1. The Sundarbans area in West Bengal is famous for Royal Bengal Tiger.
2. The Lion is found naturally in Gir Forest in Gujarat. In 1972, the Gir Lion Project was launched for its protection.
3. Project Crocodile was launched in 1975 to protect both ghariyal and alligator species of the crocodile at places like Kukrail Reserve Forest (Lucknow) and Mahanadi river in Odisha.
4. The One Horned Rhino is protected in Kaziranga National Park and Manas Wildlife Sanctuary in Assam and Jaldapara National Park in West Bengal.
5. The Dachigam National Park in Jammu and Kashmir is famous for Hangul (Kashmiri stag).

Check 'N' Mate

Critical Thinking

Fill in the blanks with correct words.

1. Balance in nature means the balance between _____ (living/non-living) organisms and the environment.
2. A _____ (balance/disturbance) is any change that cause a distruption in the balance of an ecosystem.
3. _____ (Overhunting/Feeding) is unlawful hunting of a particular species and it causes to extinction.
4. Large scale planting of _____ (factories/trees) on barren land is called afforestation.

In a Nutshell

- The environment has two components: Abiotic and Biotic.
- Both plants and animals are interdependent.
- Animals provide carbon dioxide, help in pollination, seed dispersal and in the decomposition of dead plant and animal matter.
- Plants provide oxygen, food and shelter.
- A food chain starts with a producer and ends in a decomposer.
- A food web is formed due to the interconnection of different food chains.
- It is important to maintain the balance in nature.
- Natural imbalance may be caused by human related activities such as deforestation, pollution, the introduction of a new species or over hunting of a particular species.
- Natural causes for imbalance are volcanic eruptions, floods, forest fires etc.
- Natural balance may be restored by measures such as afforestation, preventing pollution and setting up protected areas such as National Parks and Wildlife Sanctuaries.

Key Words

Improving Vocabulary

Existence	:	The state of living.
Humus	:	The organic component of soil, formed by the decomposition of leaves and other plant materials by soil microorganisms.
Harmonious	:	Friendly and peaceful.

Ecosystem	:	The living and non-living things that interact in an environment.
Predator	:	An animal that hunts, kills and eats other animals.
Prey	:	An animal that is hunted by another animal for food.
Sewage	:	Wastewater that flows through pipes or sewers.

EXERCISE

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A. Objective Type Questions.

1. The role of decomposers in an ecosystem is that:
   a. They live on dead, organic matter. ☐
   b. They help in recycling of materials. ☐
   c. They are microorganisms like bacteria and fungi. ☐
   d. All of the above ☐

2. If the birth rate of a population increases while the death rate remains the same the result will be:
   a. Increase in population size ☐ b. Decrease in population size ☐
   c. The species becomes extinct ☐ d. Population size remains the same ☐

3. The following is an example of abiotic component in pond ecosystem:
   a. Light ☐ b. Frog ☐
   c. Hydrilla plant ☐ d. Fish ☐

4. Which organism is likely to be at the beginning of a pond ecosystem?
   a. Algae ☐ b. Amoeba ☐
   c. Frog ☐ d. Trout ☐

5. Which of the following best describes a predator-prey relationship ?
   a. Grasshopper-grass ☐ b. Lion-deer ☐
   c. Cat-dog ☐ d. Honeybee-bear ☐

6. A grasshopper eats grass and a frog eats a grasshopper. So, the grasshopper can be called a:
   a. Producer ☐ b. Tertiary consumer ☐
   c. Prey ☐ d. Secondary consumer ☐

B. Fill in the blanks :

1. The living beings that prepare their own food are called _____ .
2. _____ acts upon dead plants and animals and mixes them with the soil.
3. Interconnection of different food chains is called a _____ .
4. A natural phenomenon that results in emission of a large amount of smoke and chemical release is _____ .
5. _____ if installed in vehicles can convert poisonous gases into non-poisonous gases.
6. Living things that constitute the environment are called _____ factors.

C. Very Short Answer Questions.

Name them.

1. The component of soil made by the decomposition of plants and plant material by soil microorganisms _____ .
2. One way to prevent soil erosion. _____ .
3. These are special areas created to preserve plant and animal species. _____ .
4. The component of the food chain that makes the first level in a food chain _____ .
5. Pollination results in formation of this _____ .
6. This marks the end of a food chain _____ .

D. Short Answer Questions.

1. Why is pollination important?
2. What is environment? Name the two factors that constitute the environment.
3. Why are green plants called producers?
4. What do you understand by decomposers? Why are they important?
5. What is afforestation? What are the benefits of afforestation?

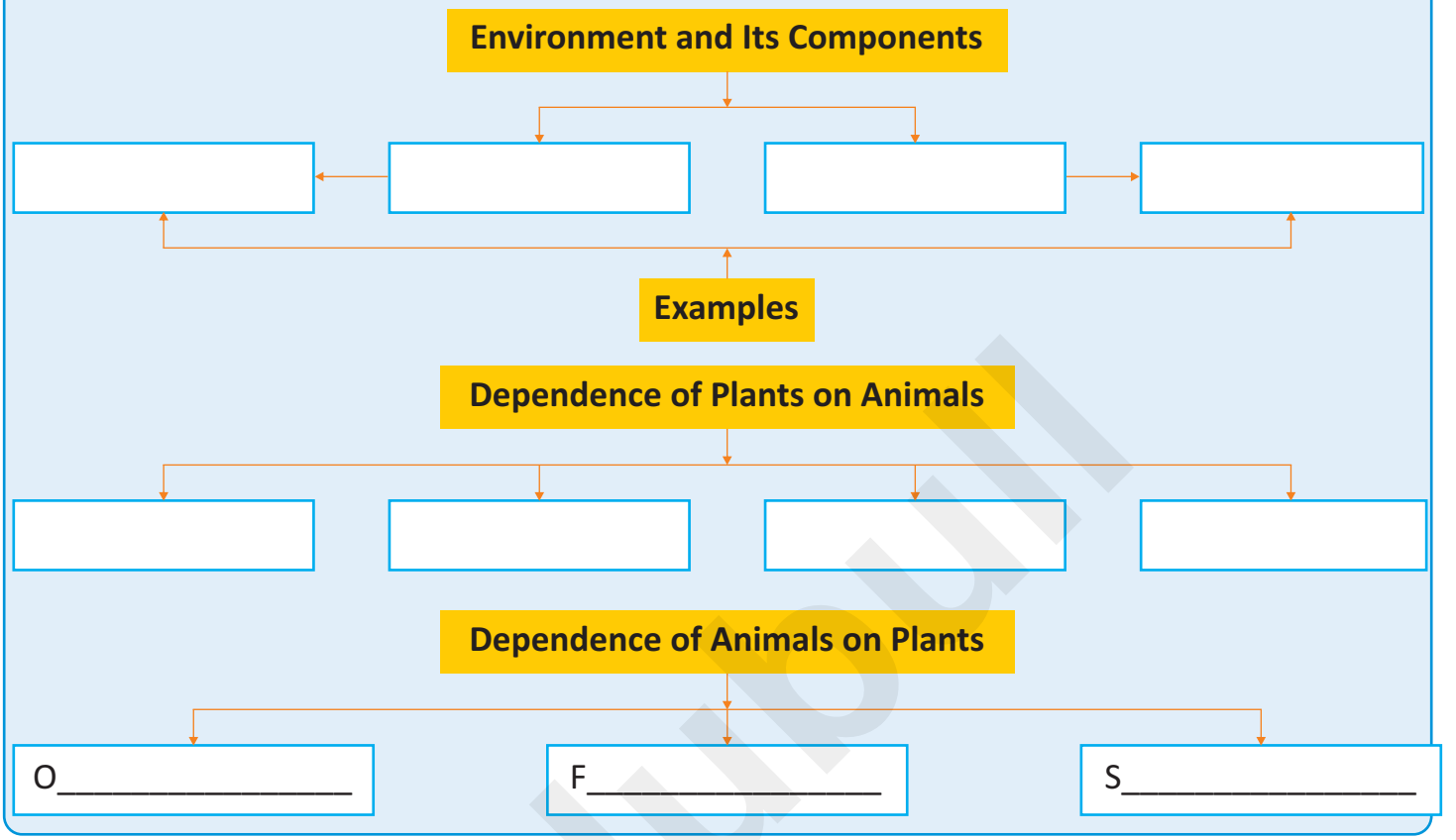
E. Long Answer Questions.

1. For what reasons are animals dependent on plants? Explain.
2. With the help of suitable examples, explain the various components of a food chain.
3. Describe a few steps that can be taken to restore the natural balance.
4. Write a note on the various causes of natural imbalance.

Time to Recall

Remembering and Analysing

Recall and complete the concept map given below.



Time to Apply

Applying and Creating

Build a Food Web

This is a fun activity to try with your class to make them understand the concepts of food chain and food web. Get 2 or 3 large balls of yarn and have the children make 3 large circles. One student at the center holds the free end of the all the three yarns. This student represents the Sun. The "Sun" tosses the ball of yarn to 3 different students, but keeps holding the free ends. That student asks the 3 students of the group what part of the food chain they are ("I am a plant / herb etc. and stick that particular name onto themselves). They should unravel some of the yarn, hold on to it and toss the yarn ball to another student who also announces what part of the food chain they will be. The students should remember to hold on to part of the yarn before they toss the yarn ball. Let them continue tossing the yarn ball until every student is holding part of the yarn. One student tells the group what they are and begins to tug on the yarn. As other students feel the tug, they should tug back. What do you think happens here? What does this tell you about food webs?

List out the food web thus created mentioning the food chains involved.

Time to Discuss

Pondering and Communicating

1. How is the food chain important for life of Earth?
2. What will happen if all the animals become herbivores?

Time to Observe

Observing, Critical Thinking, Analysing

Given below is a table with different organisms. Complete the columns of the table. One has been done for you.

Organism	Name of Organism	Types of Organism	Function
	Vulture	Decomposer	Feeds on dead organic matter thus cleaning the environment.
			
			
			
			
			
			
			

Time to Create

Creating and Collaborating

Visit the zoo in your town and note down the names of the animals you see there. Observe what they eat and make a list of their food habits. At home, draw a possible food chain with those animals and share it with the class.