Ecosystem

LERNING OBJECTIVES

This lesson 'will help you to:-

- Learn about the basics of ecosystem.
- Study about different types of ecosystem.
- Understand and study about different food chains and food webs.
- Learn and understand the relationship between different food chains.

Real-Life Example

Our country India has diverse climatic and accordingly we find different plant and animal species. Example: In hot and dry Rajasthan we will find small shrubs and cacti plants and the prominent animal seen id camel. On the other hand, in Lehn in Kashmir, extreme cold temperature prevails and there is hardly any vegetation and the animal mostly seen is yak.

QUICK CONCEPT REVIEW

Ecosystem:

- An ecosystem is a community of living things interacting with each other and their surroundings.
- An ecosystem can be anything from a piece of rotting wood to a huge swamp. In every

ecosystem, each organism is dependent on the other organism as well as on the surrounding.

- It is a complex set of relationship among the living resources, habitats and residents of an area. It includes plants, trees, animals, fish, birds, micro- organisms, water, soil and paper.
- Ecosystems vary greatly in sizes and the elements that make them up, but each is a functioning unit of nature.
- If one part of an ecosystem is damaged or disappears, it has an impact on everything else.
- A healthy ecosystem means that all the elements live in balance and are capable of reproducing them.
- BIOME: A biome is a very specialized ecosystem that only exists in a certain area or climate. They are identified by factors like temperature, rainfall, soil type and altitude.
- Various types of biomes present in the world are given in the table below.

_	Moisture	Temperature	Vegetation	Animals
Arctic Tundra	Dry season, wet season	Cold all year	Shrubs, grasses, mosses and lichens	Birds, mammals and insects
Deciduous Forest	Low, distributed throughout the year	Warm summers and cold winters	Trees, shrubs, herbs, lichens and mosses	Mammals, birds, insects and reptiles
Desert	Sporadic, highly localized	Great daily range	Trees, shrubs and succulents	Small mammals, birds and insects
Taiga	Moderate, varies throughout the year	Cold winters and cool summers	Evergreens	Birds and mammals
Tropical Rainforest	Wet season, short dry season	Hot	Trees, vines and fungi	Small mammals, birds and insects
Tropical Savanna	Wet season, dry season	Hot	Tall grasses, shrubs and trees	Large mammals, birds and reptiles

FLORA: The plants of a particular region or habitat are termed as flora.

FAUNA: The animals of a particular region or habitat are termed as fauna.

DIFFERENT TYPES OF ECOSYSTEM

There are essentially two kinds of ecosystems-Aquatic and Terrestrial.

Terrestrial Ecosystem

Forest Ecosystem

- They are the ecosystems in which an abundance of plants is seen.
- In forest ecosystem the density of living organisms is quite high.
- A small change in this ecosystem could affect the whole balance, effectively bringing down the whole ecosystem.

Desert Ecosystem

- Desert ecosystems are located in regions that receive very less rainfall.
- They occupy about 17 percent of all the land on our planet.
- Due to the extremely high temperature, low water availability and intense sunlight, fauna and flora are scarce and poorly developed.
- The vegetation is mainly shrubs, bushes, few grasses and rare trees.

Amazing Facts

- There are more than 100,000 different types of decomposer organisms.
- A niche is the smallest unit of a habitat that is occupied by a plant or an animal.
- The best known desert plants are the succulents such as the spiny leaved cacti.
- The animal include insects/ birds, camels and reptiles, all of which are adapted to the desert conditions.

Grassland Ecosystem

- The area mainly comprises of grasses with few trees and shrubs.
- A lot of grazing animals, insectivores and herbivores inhabit the grasslands.
- The two main kinds of grassland ecosystems are Savanna and Prairies.

Mountain Ecosystem

- Mountain provides a scattered and diverse array of habitats, where a large number of animals and plants can be found.
- At the higher heights, there are harsh environmental conditions and only the treeless alpine vegetation can survive.
- The animals that live there have thick fur coats for prevention from cold and hibernation in the winter months.

Aquatic Ecosystem

- The aquatic ecosystem is the ecosystem found in a water body.
- It encompasses aquatic flora, fauna and water properties, as well.

There are two main types of aquatic ecosystem -Marine and Freshwater.

Marine Ecosystem

- ✤ Marine ecosystems are the biggest ecosystems, which cover around 71% of earth's surface and contain 97% of our planet's water.
- Many kinds-of organisms live in marine ecosystems: the brown algae, corals, sharks, etc.

Freshwater Ecosystem

- The freshwater ecosystem covers only 0.8% of earth's surface and contains 0.009% of the total water.
- These are habitats to reptiles, amphibians and around 41% of the world's fish species.

PRODUCERS

Plants are called producers. This is because they produce their own food! They do this by using light energy from

Sunlight + Carbon dioxide + Chlorophyll + Water + Glucose/Sugar + Oxygen

GONSUMERS

Animals are called consumers. This is because they cannot in make their own food, so they need to consume (eat) plants and/or animals. The consumer may be primary, secondary, tertiary and so on.

There are 4 groups of consumers:

1. Herbivorous - Animals that eat only plants.

2. Carnivorous - Animals that eat only animals.

3. Omnivorous - Animals that eat both animals and plants. Humans are also omnivores.

4. Scavengers - Animals that eat dead animals. **Examples:** Eagles, hawks, etc.



DECOMPOSERS

Bacteria and fungi are decomposers. They eat decaying matter - dead plants and animals and in the process they break them down and decompose them. When it happens, they release nutrients and mineral salts back into the soil - which then will be used by plants!

FOOD CHAINS

Every living thing needs energy in order to live. All living things get energy from food. Plants use sunlight, water and nutrients to get energy (in a process called photosynthesis). Energy is necessary for living beings to grow.

Historical Preview

- Arthur Tinsley a British ecologist, was the first person to use the term "ecosystem" n 1935.
- Food chains were first introduced by the African Arab scientist and philosopher Al-Jahir in the 9th century and later popularized in a book published in 1927 by Charles Elton, which also introduced the food web concept.

Misconcept/concept

Misconcept: Plants cannot defend themselves against herbivores.

Concept: Plants have a range of defence mechanism including external structure mechanism (sap, hair, thorn, wax) and chemicals that either reduce digestibility or are toxic.

Misconcept: Carnivores are big or ferocious, or both. Herbivores are small and passive.

Concept: Although some carnivores may be big and ferocious and some herbivores small and passive, there is a great diversity among each group of organisms.

Misconcept: Species co-exist in ecosystem, because of their compatible needs and behaviour; they need to get along,.

Concept: Within an ecosystem, species compete for resources and feed on one another. Species live in the same ecosystem because of similar adaptations and environmental needs.

Misconcept: Ecosystems are not a functioning whole but simply a collection of organisms.

Concept: Ecosystems include not just the organisms but also the interactions between organisms and their physical environment.

A food chain shows how each living thing gets food, and how nutrients and energy are passed from producers to all the consumers. Food chains begin with plant-life, and end with animal-life. Some animals eat plants, some animals eat other animals.

Example: A simple food chain could start with grass, which is eaten by rabbits. Then the rabbits are eaten by foxes.



Bigger food chains can contain many more animals. Like the food chain shown below, has a grasshopper that eats grass. This grasshopper is eaten by a mouse which is further eaten by a snake. This snake is then eaten by a hawk.



There is actually even more to this chain. After a hawk dies, fungi (like mushrooms) and other decomposers break down the dead hawk, and turn the remains of the hawk into nutrients, which are released into the soil. The nutrients

(Plus sun and water) then cause the grass to grow. It's a full circle of life and energy!!



These (shown in the above figure) bigger complex networks of food chains are called as food webs. A food web—every food web—begins with sunlight. Plants turn that sunlight into usable food energy, and that energy is transferred to the herbivorous animals that eat those plants. When those plant eating animals are themselves eaten by predators, the energy is transferred higher up the food chain and becomes concentrated in the bodies of the top predators. The top predators return energy to the food web after they die and their bodies are consumed by scavengers, fungi and microbes.