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3.1 What Is Ecology?

Lesson Objectives

- Describe the study of ecology.
- Explain how biotic and abiotic factors influence an ecosystem.
- Describe the methods used to study ecology.

Lesson Summary

Studying Our Living Planet **Ecology** is the scientific study of interactions among organisms and between organisms and their environment.

- Earth's organisms live in the **biosphere**. The biosphere consists of the parts of the planet in which all life exists.
- Ecologists may study different levels of ecological organization:
  - Individual organism
  - An assemblage of individuals that belong to the same species and live in the same area is called a **population**.
  - An assemblage of different populations that live together in an area is referred to as a **community**.
  - An **ecosystem** includes all the organisms that live in a particular place, together with their physical environment.
  - A group of ecosystems that have similar climates and organisms is called a **biome**.

Biotic and Abiotic Factors Ecosystems include biotic and abiotic factors.

- A **biotic factor** is any living part of an environment.
- An **abiotic factor** is any nonliving part of an environment.

Ecological Methods Ecologists use three basic methods of research: observation, experimentation, and modeling:

- Observation often leads to questions and hypotheses.
- Experiments can be used to test hypotheses.
- Modeling helps ecologists understand complex processes.

Studying Our Living Planet

1. What is ecology?

_____

_____

_____

2. What does the biosphere contain?

_____

_____

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3. How are human economics and ecology linked?

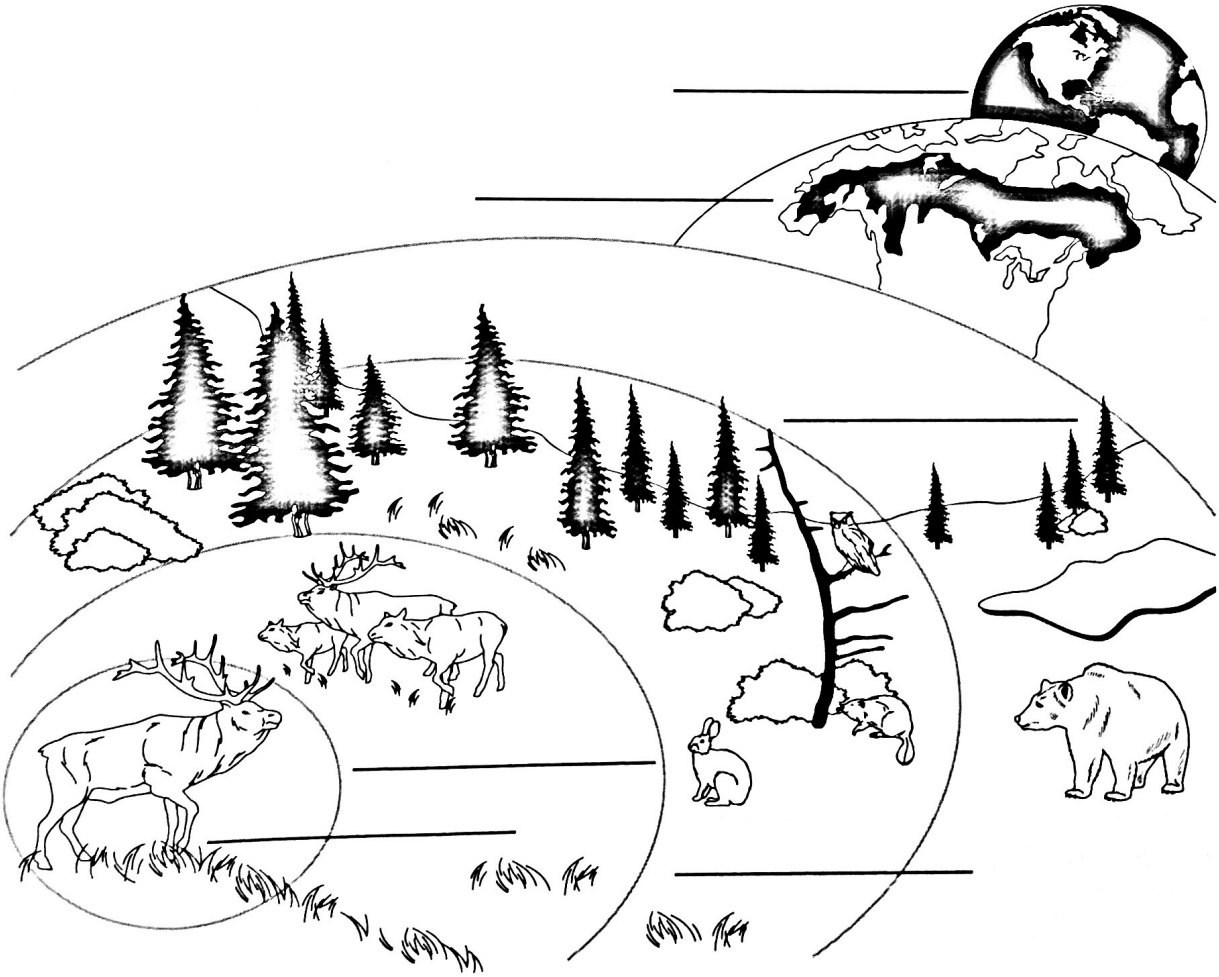
_____

_____

_____

_____

Use the diagram to answer Questions 4–5.



4. Label each level of organization on the diagram.

5. Explain the relationship between ecosystems and biomes.

_____

_____

_____

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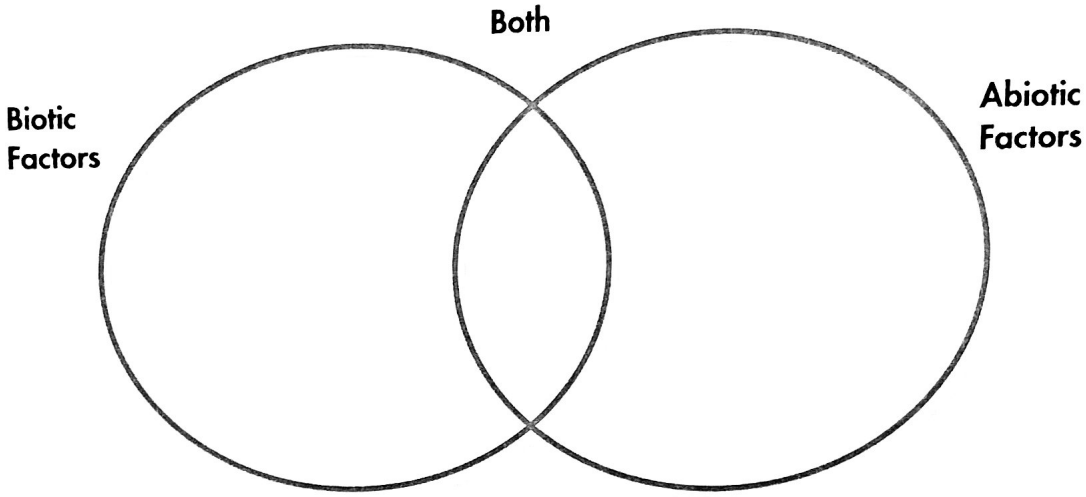
Biotic and Abiotic Factors

6. Use the terms in the box to fill in the Venn diagram. List parts of the environment that consist of biotic factors, abiotic factors, and some components that are a mixture of both.

air	heat	precipitation
animals	mushrooms	soil
bacteria	plants	sunlight



Ecological Methods

7. Why might an ecologist set up an artificial environment in a laboratory?

_____

_____

8. Why are many ecological phenomena difficult to study?

_____

_____

9. Why do ecologists make models?

_____

_____

Apply the Big Idea

10. What makes a planet living? Explain your answer by comparing Earth with Mars.

_____

_____

_____

_____

_____

3.2 Energy, Producers, and Consumers

Lesson Objectives

- Define primary producers.
- Describe how consumers obtain energy and nutrients.

Lesson Summary

Primary Producers Sunlight is the main energy source for life on Earth. Organisms that can capture energy from sunlight or chemicals and use that energy to produce food are called **autotrophs**, or **primary producers**.

- The process in which autotrophs capture light energy and use it to convert carbon dioxide and water into oxygen and sugars is called **photosynthesis**.
- The process in which autotrophs use chemical energy to produce carbohydrates is called **chemosynthesis**.

Consumers Organisms that rely on other organisms for their energy and food are called **heterotrophs**. Heterotrophs are also referred to as consumers. There are many different types of heterotrophs:

- **Herbivores**, such as cows, obtain energy by eating only plants.
- **Carnivores**, such as snakes, eat only animals.
- **Omnivores**, such as humans, eat both plants and animals.
- **Detritivores**, such as earthworms, feed on dead matter.
- **Decomposers**, such as fungi, break down organic matter.
- **Scavengers**, such as vultures, consume the carcasses of other animals.

Primary Producers

1. What do autotrophs do during photosynthesis?

_____

_____

2. Can some organisms survive without energy from the sun? Explain your answer.

_____

_____

_____

_____

3. Can organisms create their own energy? Explain your answer. _____

_____

_____

_____

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Consumers

4. Complete the table about types of heterotrophs.

Types of Heterotrophs		
Type	**Definition**	**Examples**
Herbivore		cows, rabbits
	Heterotroph that eats animals	
Omnivore		humans, bears, pigs
Detritivore		
Decomposer		
	Heterotroph that consumes the carcasses of dead animals but does not typically kill them itself	

5. What is a consumer?

_____

6. How would you categorize a consumer that usually catches and eats prey, but also eats dead animal carcasses? _____

Apply the Big Idea

7. What role do producers play in establishing Earth as a living planet? _____

