

# Introduction to Ecology

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## CHAPTER

## 1

# Introduction to Ecology

- Define ecology.
- Compare field studies to laboratory studies.
- Distinguish between abiotic and biotic factors.



## Do organisms live in isolation?

No, organisms are not separated from their environment or from other organisms. They interact in many ways with their surroundings. For example, these deer may be drinking from this stream or eating nearby plants. Ecology is the study of these interactions.

## Introduction to Ecology

Life Science can be studied at many different levels. You can study small things like cells. Or you can study big things like a group of animals. You can also study the **biosphere**, which is any area in which organisms live. The study of the biosphere is part of **ecology**, the study of how living organisms interact with each other and with their environment.

## Research in Ecology

Ecology involves many different fields, including geology, soil science, geography, meteorology, genetics, chemistry, and physics. You can also divide ecology into the study of different organisms, such as animal ecology, plant ecology, insect ecology, and so on.

Ecologists also study biomes. A **biome** is a large community of plants and animals that live in the same place. For example, ecologists can study the biomes as diverse as the Arctic, the tropics, or the desert ( **Figure 1.1**). They may want to know why different species live in different biomes. They may want to know what would make a particular biome or ecosystem stable. Can you think of other aspects of a biome or ecosystem that ecologists could study?

Ecologists do two types of research:




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**FIGURE 1.1**

An example of a biome, the Atacama Desert, in Chile.

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1. Field studies.
2. Laboratory studies.

Field studies involve collecting data outside in the natural world. An ecologist who completes a field study may travel to a tropical rainforest to study, count, and classify all of the insects that live in a certain area. Laboratory studies involve working inside, usually in a controlled environment. Sometimes, ecologists collect data from the field, and then they analyze that data in the lab. Also, they use computer programs to predict what will happen to organisms that live in a specific area. For example, they may make predictions about what happens to insects in the rainforest after a fire.

## Organisms and Environments

All organisms have the ability to grow and reproduce. To grow and reproduce, organisms must get materials and energy from the environment. Plants obtain their energy from the sun through **photosynthesis**, whereas animals obtain their energy from other organisms. Either way, these plants and animals, as well as the bacteria and fungi, are constantly interacting with other species as well as the non-living parts of their ecosystem.

An organism's environment includes two types of factors:

1. **Abiotic factors** are the parts of the environment that are not living, such as sunlight, climate, soil, water, and air.
2. **Biotic factors** are the parts of the environment that are alive, or were alive and then died, such as plants, animals, and their remains. Biotic factors also include bacteria, fungi and protists.

Ecology studies the interactions between biotic factors, such as organisms like plants and animals, and abiotic factors. For example, all animals (biotic factors) breathe in oxygen (abiotic factor). All plants (biotic factor) absorb carbon dioxide (abiotic factor) and need water (abiotic factor) to survive.

Can you think of another way that abiotic and biotic factors interact with each other?

## Vocabulary

- **abiotic factor:** Aspect of the environment that is not a living organism, such as soil, water or air.

- **biome:** Large community of plants and animals distinguished by the dominant forms of animal and plant life and the climate.
- **biotic factor:** Components of the environment that are living, or were alive and then died, such as plants or animals.
- **biosphere:** Part of the planet and atmosphere with living organisms.
- **ecology:** Study of how living organisms interact with each other and with their environment.
- **photosynthesis:** Process by which specific organisms (including all plants) use the sun's energy to make their own food from carbon dioxide and water; process that converts the energy of the sun, or solar energy, into carbohydrates, a type of chemical energy.

## Summary

- Ecology is the study of how living organisms interact with each other and with their environment.
- Abiotic factors are the parts of the environment that have never been alive, while biotic factors are the parts of the environment that are alive, or were alive and then died.

## Explore More

Use the resource below to answer the questions that follow.

- **A Study in Stream Ecology** at USGS <http://gallery.usgs.gov/videos/449#.UKWeJId9KSo> (6:57)



### MEDIA

Click image to the left or use the URL below.

URL: <http://www.ck12.org/flx/render/embeddedobject/117078>

1. What are some of the abiotic factors that scientists monitor when dealing with stream ecosystems?
2. What are some of the biotic factors that scientists monitor when dealing with stream ecosystems?
3. What is a "benchmark" in ecology? Why are they essential?
4. How does water pollution seem to be affecting diversity in some streams?

## Review

1. What do ecologists study?
2. In a forest, what are five biotic factors present? Five abiotic factors?
3. What is a biome? Give an example.

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## References

1. Courtesy of NASA. The Atacama Desert is an example of a biome. Public Domain