

Communities, Biomes, and Ecosystems

section 1 Community Ecology

● Before You Read

On the lines below, list several plants and animals that live in your community. Then name one organism that would have trouble surviving where you live. Read the section to learn why some species can live in an area while others cannot.

MAIN Idea

All living organisms are limited by factors in the environment.

What You'll Learn

- how ranges of tolerance affect the distribution of organisms
- the stages of primary and secondary succession

● Read to Learn

Communities

Your biological community includes more than just the people around you. It also includes the plants, other animals, bacteria, and fungi in your area. A biological **community** is a group of interacting populations that occupy the same area at the same time. Organisms that live in a desert community are different from organisms that live in a polar community. Organisms that live in a city differ from organisms that live in the country.

You have read that abiotic factors affect individual organisms. Abiotic factors also affect communities. For example, soil is an abiotic factor. If soil becomes too acidic, some species might die. This might affect the food sources of other organisms. As a result, the community would change.

Organisms are adapted to the conditions where they live. A wolf's fur coat enables it to survive in cold winter climates. Depending on which factors are present and in what quantities, organisms can survive in some ecosystems but not in others.

Study Coach

Make an Outline Make an outline of the information you learn in this section. Start with the headings. Include the underlined terms.



Think it Over

1. **Predict** Suppose a fungus killed a species of tree in a forest community. What might happen to the woodpecker species that nests in that kind of tree?

Reading Check

- 2. Identify** The average winter temperature in the Arctic is about -30°C . What type of limiting factor is this? (Circle your answer.)
- a. abiotic
 - b. biotic

Picture This

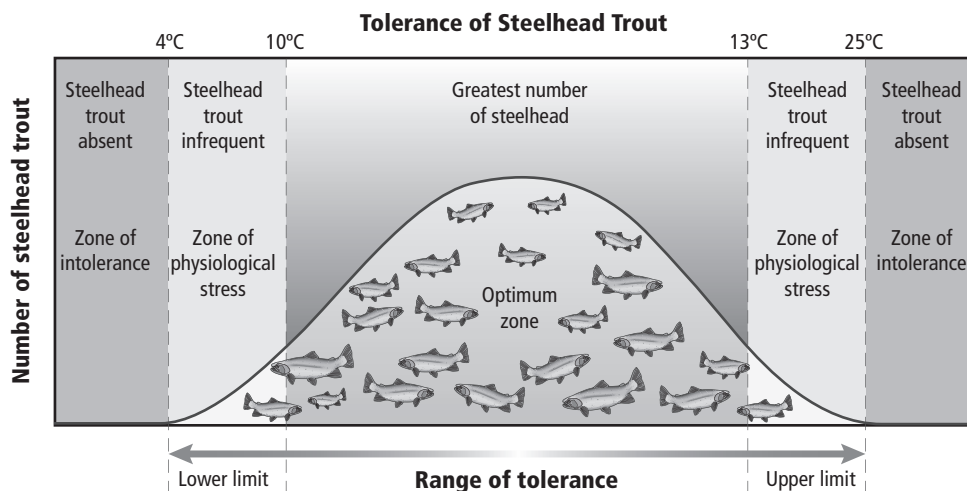
- 3. Explain** what the curved graph line represents.

What factors limit populations in communities?

Any abiotic factor or biotic factor that restricts the numbers, reproduction, or distribution of organisms is called a **limiting factor**. Abiotic limiting factors include sunlight, climate, water, fire, and space. Biotic limiting factors include other plant and animal species. Factors that limit one species might enable another to thrive. For example, water is a limiting factor. Organisms that need less water can survive in a desert community.

How does range of tolerance affect species?

For any environmental factor, there is an upper limit and a lower limit that defines the conditions in which an organism can live. **Tolerance** is the ability of any organism to survive when exposed to abiotic or biotic factors. The figure below shows a range of tolerance for steelhead trout. The limiting factor in this case is water temperature. Trout can tolerate water temperatures between 9°C and 25°C . Most trout live in the optimum zone, which is the temperature range that is best for trout survival. The zone of physiological stress lies between the optimum zone and the tolerance limits. Fewer trout live in this zone. Trout that do live in this zone experience physiological stress, such as the inability to grow.



Ecological Succession

Ecosystems constantly change. A tree falling in a forest affects the forest ecosystem. A fire might alter the forest habitat so much that some species cannot survive while others can thrive. The process of one community replacing another as a result of changing abiotic and biotic factors is called **ecological succession**.

How does soil form in primary succession?

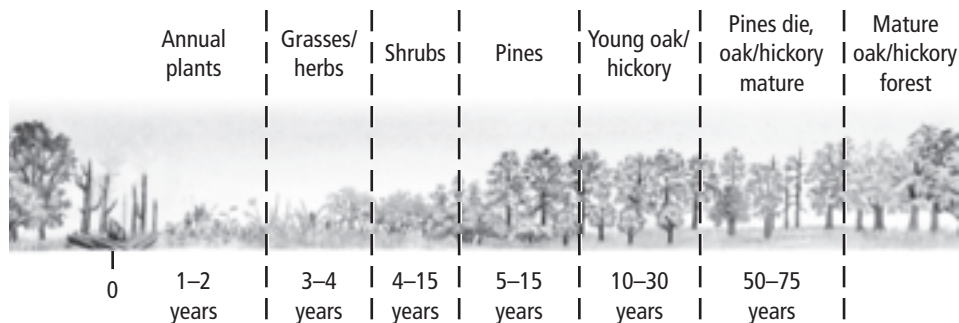
There are two types of ecological succession—primary succession and secondary succession. **Primary succession** is the establishment of a community in an area of bare rock that does not have topsoil. For example, suppose a lava flow alters an ecosystem. The lava hardens to form bare rock. Usually, lichens begin to grow on the rock first. Because lichens and some mosses are among the first organisms to appear, they are called pioneer species.

Pioneer species physically and chemically break down rocks. As pioneer species die, their decaying organic materials mix with small pieces of rock. This is the first stage of soil development. Small weedy plants begin to grow in the soil. These organisms die, adding to the soil. Seeds brought by animals, water, and wind begin to grow. Eventually, enough soil forms to support trees and shrubs.

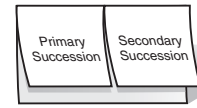
It might take hundreds of years for the ecosystem to become balanced and achieve equilibrium. When an ecosystem is in equilibrium, there is no net change in the number of species. New species come into the community at about the same rate that others leave the community. This is a **climax community**—a stable, mature community in which there is little change in the number of species.

How does secondary succession occur?

Disturbances such as fire or flood can disrupt a community. After a disturbance, new species of plants and animals might occupy the habitat. Over time, the species belonging to the climax community are likely to return. **Secondary succession** is the orderly and predictable change that takes place after a community of organisms has been removed but the soil remains. Pioneer species begin the process of restoring a habitat after a disruption. The figure below shows how the community changes after a forest fire, leading again to a mature climax community.



Record Information Make a two-tab Foldable to record what you learn about the two types of ecological succession.



Reading Check

- 4. Summarize** the importance of pioneer species in primary succession.

Picture This

- 5. Draw Conclusions**

How many years after a forest fire would trees begin to grow?
