Ecosystem Change

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CHAPTER 1 Ecosystem Change

Lesson Objectives

- Define ecological succession.
- Explain how primary succession occurs.
- Explain why secondary succession occurs more rapidly than primary succession.
- Discuss the concept of climax community.

Lesson Vocabulary

- climax community
- ecological succession
- pioneer species
- primary succession
- secondary succession

Introduction

Imagine walking in the forest in **Figure** 1.1. The towering trees have been growing here for hundreds of years. It may seem as though the forest has been there forever. But no ecosystem is truly static. The numbers and types of species in most ecosystems change to some degree through time. This is called ecological succession. Important cases of ecological succession are primary succession and secondary succession.

FIGURE 1.1
An old redwood forest seems unchanging, but even here change happens.

Primary Succession

Primary succession occurs in an area that has never before been colonized by living things. Generally, the area is nothing but bare rock.

Where It Happens

This type of environment could come about when:

- a landslide uncovers bare rock
- a glacier retreats and leaves behind bare rock
- lava flows from a volcano and hardens into bare rock (see **Figure** 1.2)

How It Happens

The first few species to colonize a disturbed area are called pioneer species. In primary succession, pioneer species must be organisms that can live on bare rock. They usually include bacteria and lichens (see **Figure** 1.2). Along with wind and water, the pioneer species help weather the rock and form soil. Once soil begins to form, plants can move in. The first plants are usually grasses and other small plants that can grow in thin, poor soil. As more plants grow and die, organic matter is added to the soil. This improves the soil and helps it hold water. The improved soil allows shrubs and trees to move into the area.

FIGURE 1.2

Lichen growing on bare lava rocks

Secondary Succession

Secondary succession occurs in a formerly inhabited area that was disturbed.

Where It Happens

Secondary succession could result from a fire, flood, or human action such as farming. For example, a forest fire might kill all the trees and other plants in a forest, leaving behind only charred wood and soil.

How It Happens

Secondary succession is faster than primary succession. The soil is already in place. After a forest fire, for example, the pioneer species are plants such as grasses and fireweed. You can see a forest in this stage of recovery in **Figure** 1.3. As organic matter from the pioneer species improves the soil, trees and other forest plants will move into the

area. You can see the amazing real-world story of secondary succession on Mount St. Helens by watching this short video: http://www.youtube.com/watch?v=4RsMyVavT2Q .

MEDIA

Click image to the left or use the URL below.

URL: https://www.ck12.org/flx/render/embeddedobject/140779

FIGURE 1.3

Just a few months after a forest fire, fireweed and other pioneer plants are already growing among the charred tree trunks.

Climax Community

Does a changing ecosystem ever stop changing? Does its community of organisms ever reach some final, stable state? Scientists used to think that ecological succession always ended at a stable state, called a climax community. Now their thinking has changed. Theoretically, a climax community is possible. But continued change is probably more likely for real-world ecosystems. Most ecosystems are disturbed too often to ever develop a climax community.

Lesson Summary

- Ecological succession is the process in which the numbers and types of species in an ecosystem change over time.
- Primary succession occurs in an area that has never before been colonized. Pioneer species include bacteria and lichens that can grow on bare rock and help make soil.
- Secondary succession occurs in a formerly inhabited area that was disturbed. Soil is already in place, so pioneer species include small plants such as grasses.
- Most ecosystems are disturbed too often to attain a final, stable climax community.

Lesson Review Questions

Recall

1. What is ecological succession?
2. Define climax community, and state why climax communities are unlikely.

Apply Concepts

3. Assume that a flood washed out all of the plants in a large area along the bank of a river. It left behind nothing but soil. How will ecological succession occur in this area?

Think Critically

1. Compare and contrast primary and secondary succession.

Points to Consider

Many ecosystems have changed because of human actions. The human species is responsible for a range of environmental problems.

1. What environmental problems have human actions caused?
2. How have these environmental problems affected living things?

References

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