

# Ecological Succession

The area surrounding the Kilauea volcano on the island of Hawaii is a prime example of what happens when an ecosystem undergoes a devastating disturbance. What was once a lush tropical ecosystem is now covered in bare volcanic rock. Over time, this new volcanic rock will undergo a series of changes. **Ecological succession** is the sequence of biotic changes that restore a damaged community or create a community in a previously uninhabited area. Two types of ecological succession occur: primary and secondary.

## Primary Succession

**Analyze** Where do pioneer species come from?

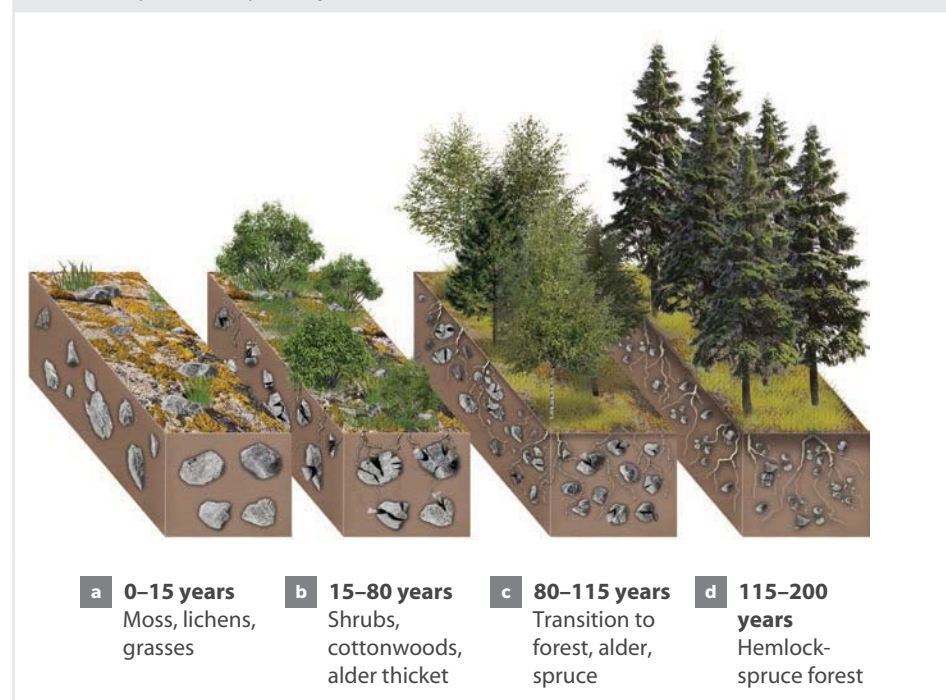
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### Hands-On Lab

**Using GPS in Ecological Surveys** Perform a survey by collecting and recording samples of plant life from a given area of land. Find and map their exact location using GPS, and analyze the data.

Primary succession, shown in Figure 17, is the establishment and development of an ecosystem in an area that was previously uninhabited, usually a bare rock surface. Melting glaciers, volcanic eruptions, and landslides all begin the process of primary succession. The first organisms that move into this area are called *pioneer species*. These organisms, such as mosses and lichens, break down solid rock into smaller pieces. Once pioneer species have made soil, plants such as grasses can begin to grow. Over time, shrubs and trees replace the grasses to form a forest. This process continues until a climax community is established.

**FIGURE 17:** It can take hundreds of years to establish a climax community. This diagram shows the process of primary succession in a boreal forest.



**Explain** Do you think tall trees are the final stage of primary succession in every biome? Explain your answer.

## Secondary Succession

Secondary succession is the reestablishment of an ecosystem in an area where the soil was left intact, such as after a fire or flood. Because soil is already present in the ecosystem, secondary succession reaches the climax community stage more rapidly than primary succession. The process of regrowth is begun by the plants, seeds, and other organisms that remain after the disturbance occurs.

As with primary succession, biodiversity of the ecosystem typically increases as secondary succession progresses. One reason for increased biodiversity is the return of animals as the plant population grows. In addition, animals bring in seeds from plants in other ecosystems on their fur and in their waste, which will establish new plant populations if conditions are favorable for growth.

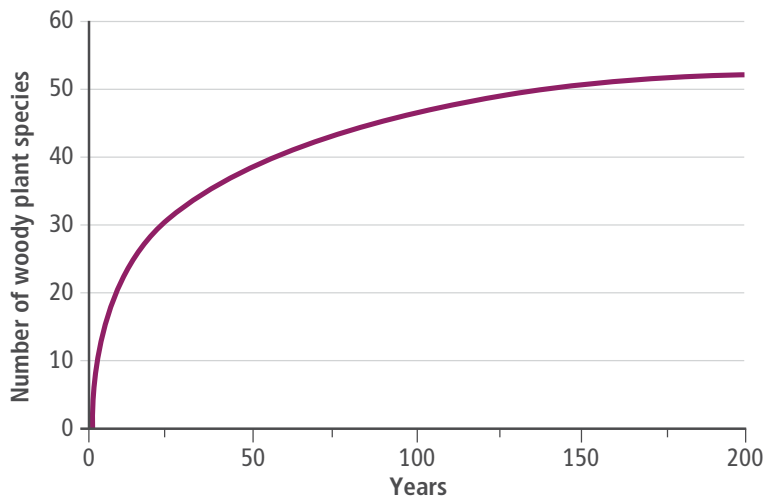


**Model** Make a model that shows the difference between primary and secondary succession. Make sure your model explains how long each step takes and why.



### Data Analysis

**FIGURE 18:** The amount of species richness in an ecosystem is related to its stage of succession.



**Analyze** Think about how an ecosystem changes during secondary succession. Refer to the graph in Figure 18 to answer the following questions.

1. When does species richness increase at the fastest rate? Why is this possible?
2. Why does the species richness not continue to rise over time? Explain.

Succession is an ongoing process. Even after the climax community is reestablished, changes continue to occur. Small disturbances, such as a tree falling, restart the process. For this reason, an ecosystem is generally never really permanently established—the processes of succession are always causing changes in an ecosystem.



**Gather Evidence** How does ecological succession affect biodiversity? Use evidence gathered from this lesson to support your claims.