

# Primary and Secondary Succession

Many different processes establish plant or animal communities in an ecosystem. Wind can blow seeds to new areas. Birds can carry seeds from one area to another. When appropriate food sources exist, new animal populations may thrive in an ecosystem. The process by which communities are established, develop and change in ecosystems is called **succession**.

There are two types of succession. The first is primary succession. **Primary succession** occurs in an area that has not been previously occupied by a community. Places where primary succession occurs include newly exposed rock areas, sand dunes, and lava flows. Simple species that can tolerate the often-harsh environment become established first. These organisms help enrich the soil, allowing other species to become established. The first organisms to appear in areas of primary succession are often mosses or lichens. These organisms are known as **pioneer species** because they are the first species present; pioneer species must be hardy and strong, just like human pioneers.

Pioneer communities help enrich the soil. As generations of the mosses or lichens die, their remains decompose and are added to the soil. The soil is then able to support a greater variety of plant life. Second-generation plants usually include grasses and small shrubs. With this plant life come animal species that feed on the plants.

Over time, as the soil becomes richer, more species of plants are able to grow. Eventually, the soil is rich enough to support small trees. Finally, a climax occurs with the appearance of the most complex plant species. These climax species include taller trees such as oaks, pines, and spruces. Forest communities containing complex plants can support more diverse animal populations, including various types of prey and predators. The stages of succession are slow; thousands of years may pass before climax communities establish themselves in an ecosystem.



Primary succession occurs in places that have never been occupied by a community, like this lava flow.



Secondary succession occurs in disturbed areas, like clear-cut forests.

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The other type of succession is **secondary succession**. This occurs in areas that have been disturbed. The causes of these disturbances may be natural or human-made. Secondary succession may occur in abandoned crop fields, cutover forests, areas damaged by wind storms or floods, and other previously occupied regions. The conditions that result in secondary succession are usually harsh. For example, if land has been used for agriculture for many years, the soil may be depleted of many important nutrients.

When secondary succession occurs, communities are usually reintroduced to the ecosystem more quickly than happens during primary succession. Plant and animal communities already existed before the disturbance that leads to secondary succession. Therefore, the soil is often richer than in areas where primary succession occurs. Also, some species may remain in the region after the disturbance. Imagine a forest that has been harvested for timber. Once the timber is cut, the climax species no longer exist, and secondary succession begins. Some plant species, such as

weeds, might still live in the disturbed area; these plants are quick to reestablish themselves. Cones or seeds may also remain on the ground or in the soil. After the disturbance, if soil conditions are right, these cones and seeds can germinate and start new plant communities.

The process of primary succession can take hundreds, if not thousands, of years. In contrast, the process of secondary succession can reestablish an ecosystem's climax communities in as few as 50 years. The ecosystem's animal populations are also established more quickly during secondary succession. Animals are largely dependent on plants for food and shelter. As more complex plant populations are reintroduced to an ecosystem, the ecosystem can support more complex animal populations.



Secondary succession is a faster process than primary succession because some cones or seeds likely remain after the disturbance.

### **Comprehension Questions**

1. Is a forest area that has been washed away by a flood a primary or secondary area of succession? Predict how long it would take to reestablish itself and describe how it might look at each stage.
2. Describe an area that could experience primary succession and predict how the area may establish itself.