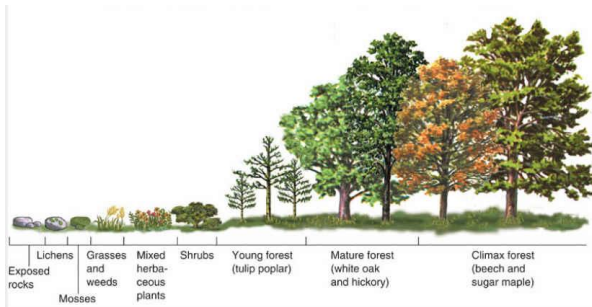


Chapter 4: Ecosystems and Communities

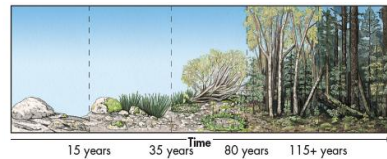
Section 4.3 Succession



Lesson Overview Succession

Primary and Secondary Succession

- **Ecological** succession is a series of more-or-less predictable changes that occur in a community over time.
- Ecosystems change over time, especially after disturbances, as some species die out and new species move in.
- With succession, the number of different species present typically increases.



Lesson Overview Succession

Primary Succession

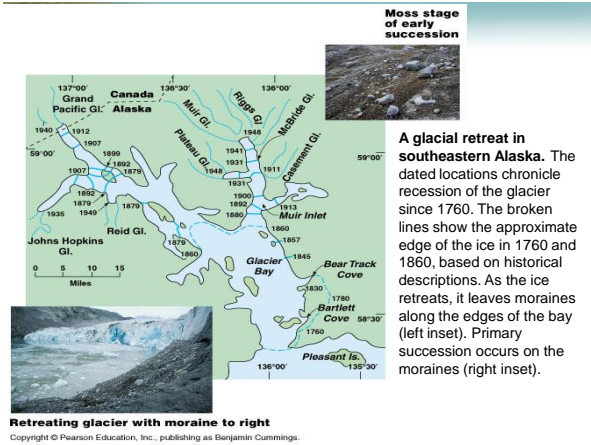
- Succession that begins in an area with no remnants of an older community is called **primary succession**.
 - Volcanic explosions can create new land or sterilize existing areas.
 - Retreating glaciers leave only exposed bare rock behind them.



Lesson Overview Succession

Primary Succession

- In Glacier Bay, Alaska, a retreating glacier exposed barren rock.
- Over the course of more than 100 years, a series of changes has led to the hemlock and spruce forest currently found in the area.
- This will continue for centuries.



Alders and cottonwoods covering hillsides



Spruce moving into alder and cottonwood forest

Glacier Bay, Alaska



Mature Spruce and Hemlock Forest Community

Lesson Overview Succession

Primary Succession

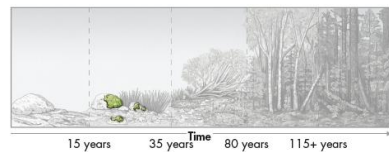
- The first species to colonize barren areas are called **pioneer species**.
- One ecological pioneer that grows on bare rock is **lichen**—a mutualistic symbiosis between a fungus and an algae.



Lesson Overview Succession

Primary Succession

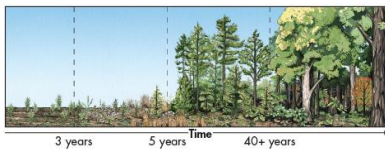
- Over time, lichens convert, or fix, *atmospheric nitrogen* into useful forms for other organisms, break down rock, and add organic material to form soil.
- Certain grasses, like those that colonized Krakatau early on, are also pioneer species.



Lesson Overview Succession

Secondary Succession

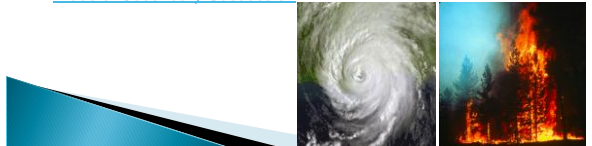
- Sometimes, existing communities are not completely destroyed by disturbances. In these situations, **secondary succession** occurs.
- Secondary succession proceeds faster than primary succession, because there is soil already present.



Lesson Overview Succession

Secondary Succession

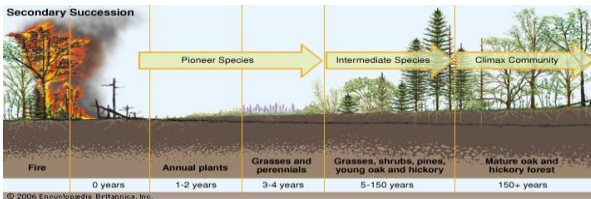
- Often follows a wildfire, hurricane, or other natural disturbance.
- We think of these events as disasters, but many species are adapted to them. May kill some trees, but fire can stimulate other seeds to germinate.
- Can also follow human activities like logging and farming.
- [Video of Secondary Succession](#)



Lesson Overview Succession

Secondary Succession

- This series shows secondary succession taking place in abandoned fields of the Carolinas' Piedmont.
- Over the last century, these fields have passed through several stages and matured into oak forests. Changes will continue for years to come.



Lesson Overview Succession

Why Succession Occurs

- Every organism changes the environment it lives in.
- One model of succession suggests that as one species alters its environment, other species find it easier to compete for resources and survive.
- For example, as lichens add organic matter and form soil, mosses and other plants can colonize and grow.
- As organic matter continues to accumulate, other species move in and change the environment further.
- Over time, more and more species can find suitable niches and survive.

Lesson Overview Succession

Climax Communities

- Ecologists used to think that succession in a given area always proceeds through the same stages to produce a specific and stable climax community.
- Recent studies, however, have shown that succession doesn't always follow the same path, and that climax communities are not always uniform and stable.



Lesson Overview Succession

Succession After Natural Disturbances

- Secondary succession in healthy ecosystems following natural disturbances often reproduces the original climax community.
- Healthy coral reefs and tropical rain forests often recover from storms, and healthy temperate forests and grasslands recover from wildfires.



Lesson Overview Succession

Succession After Natural Disturbances

- However, detailed studies show that some climax communities are not uniform.
- Often, they have areas in varying stages of secondary succession following multiple disturbances that took place at different times.
- Some climax communities are disturbed so often that they can't really be called stable.

Lesson Overview Succession

Succession After Human-Caused Disturbances

- Ecosystems may or may not recover from extensive human-caused disturbances.
- Clearing and farming of tropical rain forests, for example, can change the microclimate and soil enough to prevent re-growth of the original community.





Before and After logging
of old growth forest
Gum trees
(400 + years old)

Before



After