Ecological Succession

Not in Text!

- Decades ago, most ecologists thought that biological ecosystems and communities always exist in a state of equilibrium or stability, unless disturbed by humans. In other words, the communities maintained a relatively constant composition of species.
- Most biological communities are constantly changing because of disturbances,both natural or human, prevent them from reaching a stable state.

- Disturbance is an event that changes a community by removing organisms or altering the availability of resources.

Various disturbances

Exs: -abiotic: fire, flood ,drought, volcanic eruption, glacial activity,etc.

-biotic: e.g human activity (clearcutting, farming, etc...)

Q: Do all disturbances have the same effect on an ecosystem? Why/why not?

Depends on frequency and severity

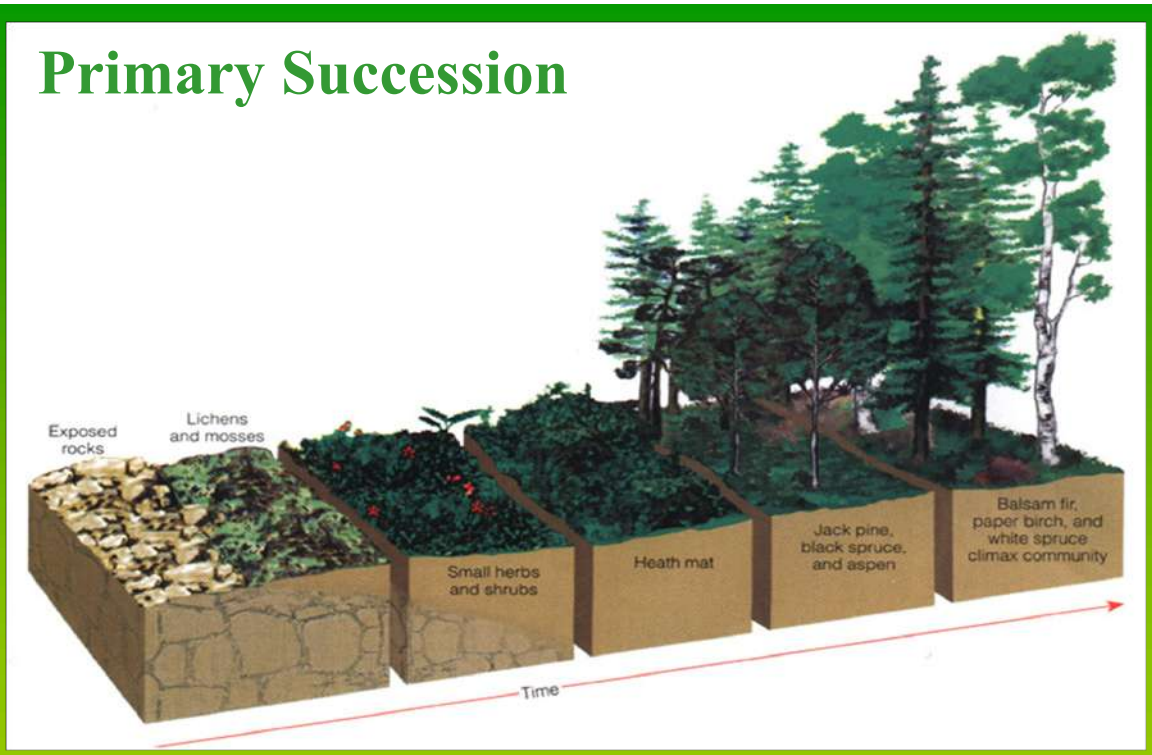
- If a disturbance is severe enough to strip away all existing vegetation, the area will be recolonized by a variety of species which are gradually replaced by other species, which in turn are also replaced in a process known as **succession**.

Two Types:

- **Primary succession** sequence of events from barren area to stable ecosystem. It occurs in a lifeless area where soil has not yet formed (ex.new volcanic islands). This process can take hundreds to thousands of years.

E.g. Barren rock ->Lichens/Mosses ->soil with bacteria ->Grasses/shrubby plants -> Large Trees/Plants

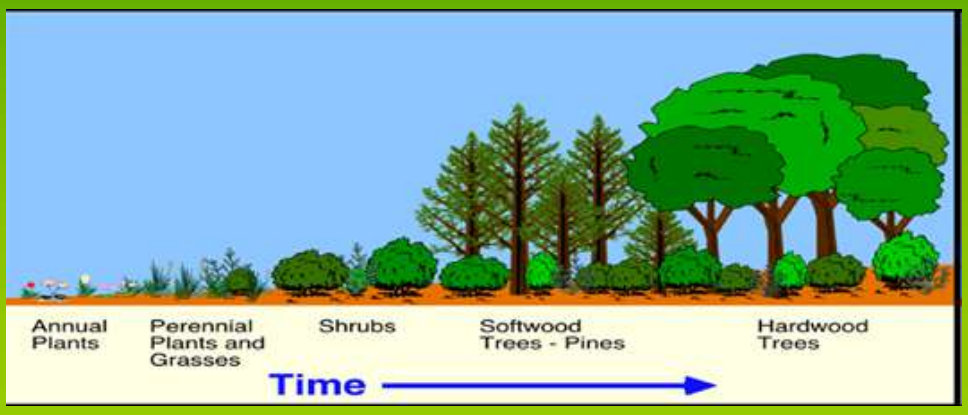
Primary Succession



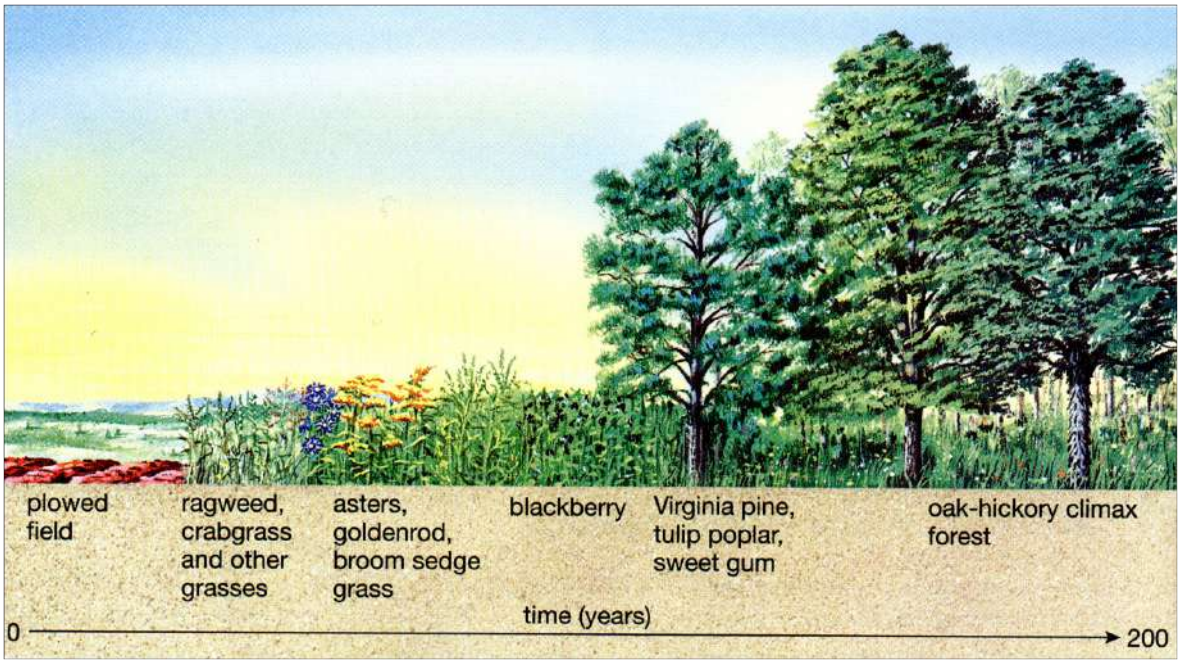
Fire (secondary) succession at Yellowstone

Primary Succession in Hawaii

- **Secondary succession** sequence of events from soil to stable ecosystem. It occurs when an existing community has been cleared by some disturbance that leaves the soil intact Ex. Major storm (ie. Fire) or human disturbance (ie. clearcutting). In this case, the area slowly begins to return to its original state.
- In each case, succession starts with a few hardy invaders called **pioneers.**



Secondary Succession



- Seeds are brought in by wind or animals,producing grasses and shrubs that are eventually replaced by trees and other dominant vegetation.

- Once a community has recovered from a disturbance, through ecological succession, it is called a **climax community**.

How does primary succession work?

- Pioneer species are first ones to grow

E.g. Lichens can grow on barren rock, together with bacteria ca generate organic material which later becomes soil.

- Early species often change conditions (e.g. making soil) that makes them more suitable for later successional stages.
- Entire process is a set of competitive replacements of one species by another.
  - **Let's look at an example...**

Lake Michigan is receding… How does this image illustrate succession?

- No life on water's edge - waves, sand
- Foredune - pioneer community, beach grass binds sand, supports insects
- Shrubs - inhibit grass by stealing light, improve soil quality by providing lots of plant material.
- Pine Woods - short stage because trees shade own seedlings and inhibit growth. Needles add to soil that supports…
- Hardwoods - own seedlings can grow in shade - reach equilibrium i.e. climax community