


Succession

2.6.5,2.6.6,2.6.7

What is Succession?

Primary succession


- **Succession** = the predictable series of changes in a community following a disturbance
- **Pioneer species** = the first species to arrive in a primary succession area (ex, lichens)



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Primary Succession

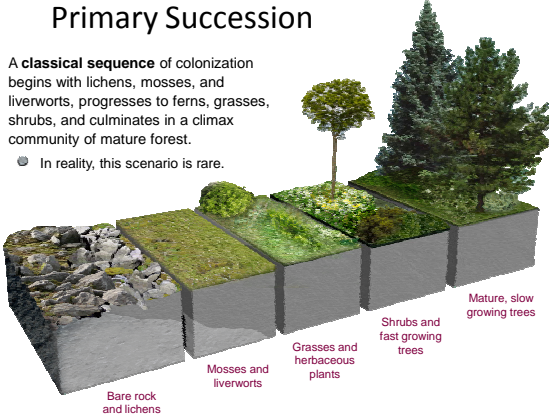
- **Primary succession** refers to colonization of a region where there is no pre-existing community. Examples include:
 - Newly emerged coral atolls, volcanic islands
 - Newly formed glacial moraines
 - Islands where the previous community has been extinguished by a volcanic eruption



Hawaii: Local plants are able to rapidly recolonize barren areas

Primary Succession

- A **classical sequence** of colonization begins with lichens, mosses, and liverworts, progresses to ferns, grasses, shrubs, and culminates in a climax community of mature forest.
 - In reality, this scenario is rare.



Bare rock and lichens
Mosses and liverworts
Grasses and herbaceous plants
Shrubs and fast growing trees
Mature, slow growing trees

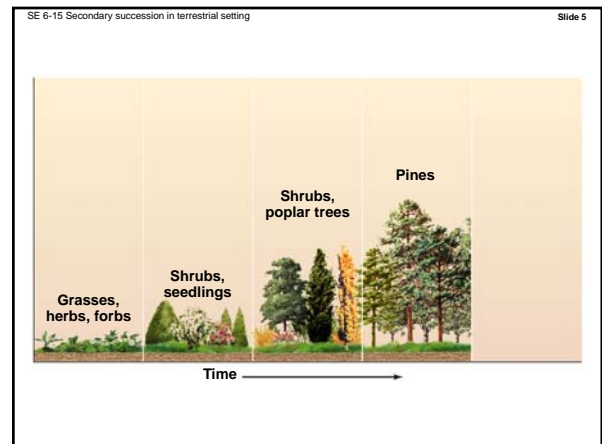
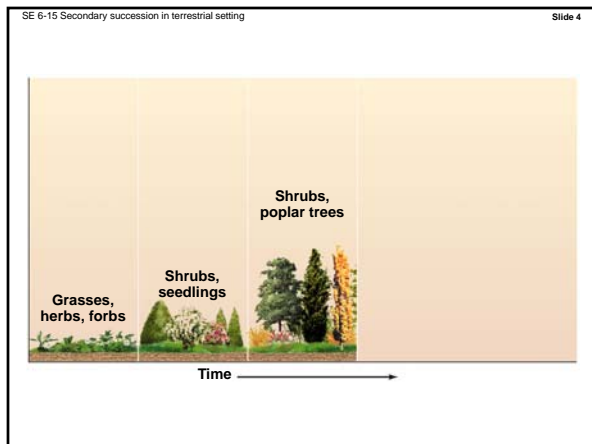
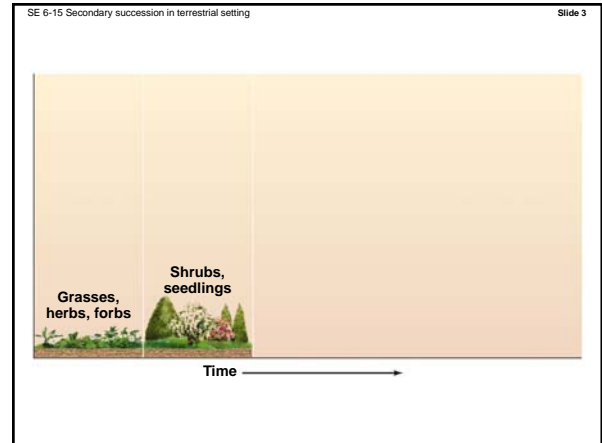
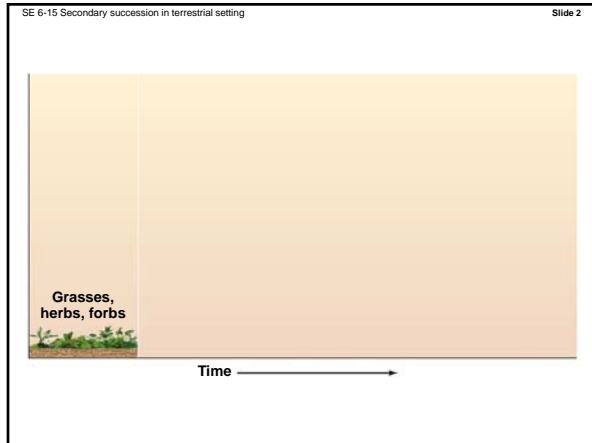
- Pioneer Species – lichens and mosses
- Early successional species
 - Grow close to the ground
 - Grow large populations under harsh conditions
 - Have short lives

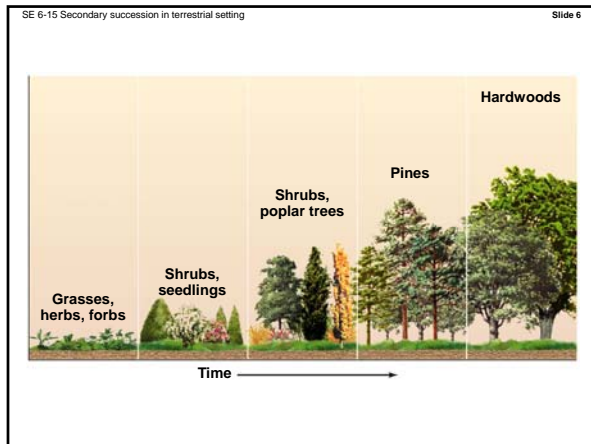
Midsuccessional species

- Trees that need lots of sunlight
- Herbs, grasses and low shrubs

Late successional species

- Mostly trees that tolerate shade





Early Successional Communities

- A succession proceeds in **stages**, until the formation of a **climax community**, which is stable until further disturbance.
- Early successional (or **pioneer**) communities are characterized by:
 - Simple **structure**, with a small number of species interactions
 - Broad **niches**
 - Low **species diversity**

The slide includes two photographs of pioneer communities in Hawaii. The top photograph shows a rocky, sparsely vegetated landscape labeled "Pioneer community, Hawaii". The bottom photograph shows a similar landscape with a large, gnarled tree trunk in the foreground, labeled "Broad niches".

Some Characteristics of early stages

"In early stages, gross productivity is low due to the initial conditions and low density of producers.
The proportion of energy lost through community respiration is relatively low too, so net productivity is high, that is, the system is growing and biomass is accumulating."

Climax Communities

- the community resulting from successful succession
 - Remains stable until another disturbance restarts succession
- Complex **structure**, with a large number of species interactions
- Narrow **niches**
- High **species diversity**

The slide includes two photographs of climax communities in Hawaii. The top photograph shows a dense, lush forest labeled "Climax community, Hawaii". The bottom photograph shows a close-up of a tree trunk with many epiphytes and mosses, labeled "Large number of species interactions".

Characteristic of climax communities

"In later stages, with an increased consumer community, gross productivity may be high in a climax community.
However, this is balanced by respiration, so net productivity approaches zero and the production:respiration (P:R) ratio approaches one."

Secondary Succession

- Secondary succession** occurs where an existing community has been cleared by a disturbance that does not involve complete soil loss.
- Such disturbance events include **cyclone damage**, **forest fires** and **hillside slips**.

The slide includes two photographs illustrating secondary succession. The top photograph shows palm trees being blown over by a cyclone, labeled "Cyclone". The bottom photograph shows a forest with smoke rising from the ground, labeled "Forest fire".

Secondary Succession

- Because there is still soil present, the ecosystem recovery tends to be more rapid than primary succession, although the time scale depends on the species involved and on **climatic** and **edaphic** (soil) factors.

