

Forest Succession

Objective: Students will learn about the process of forest succession, and examine and compare plants from different successional stages.

Standards of Learning: Science 6.1, LS.1, LS.9, LS.10, LS.11, BIO.1, BIO.6, BIO.8
(Also 4.5 and 4.9, but lesson is designed for grades 6+)

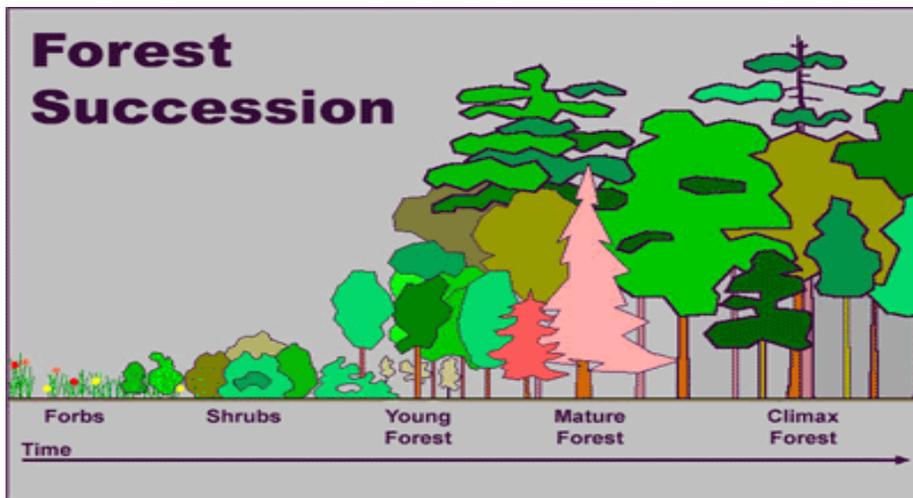
Materials:

Clipboards
Pencils
Paper

Background (Review in classroom before going into the field):

Succession is a natural pattern of change in plant (and animal) communities over time. Succession is most obvious after some disturbance in the plant community, either natural or human-caused. Examples include fires, hurricanes, insect and disease attacks, farming, and timber harvesting. When land is left alone after one of these events, succession happens! In many parts of Virginia, we can observe succession on abandoned farmland or unmowed fields. The plants tend to come in a particular order and stay for a fairly predictable length of time before being replaced by other species. So too, the animals that live there change as the plant community changes.

This picture shows changes in a typical eastern landscape left undisturbed over time:



Succession can be controlled to some extent by human activities. Forest management allows us to make planned changes in the successional stages. For example, if we want to grow pines for lumber, we can harvest trees and set back succession to an earlier stage.

Succession in the Virginia Piedmont often proceeds like this (with times approximate):

Year 1: Light-seeded annuals, such as horseweed and crabgrass, dominate.

Year 2: Heavier seeded annuals, such as asters and ragweed, dominate.

Years 3-18: Perennials, such as broomsedge, establish, later developing into a grass/scrub community with shrubs, such as blackberry and sumac. Young pines begin to grow.

Years 19-30: Young pines become tall enough to shade out the grasses and shrubs.

Years 30-70: Pines are mature. Pine seedlings are not able to grow in their shade, but many hardwood seedlings can.

Years 70-100: The mature pine forest has an understory of young hardwoods (oaks, hickories, maples, and others). As pines die out, the transition to hardwoods begins.

Years 100+: The “climax” oak-hickory forest has an understory of young oak and hickory, and other shade-tolerant trees.

Source: Duke Forest web site: <http://www.dukeforest.duke.edu/>

Field activity:

Choose a spot where a forested area adjoins an open area (such as a field) and students can easily enter both areas. (The open area should appear “weedy”; that is, it should not be a lawn or other frequently mown area.)

Divide the class in half. Ask one half of the students to draw and/or describe the plants seen in the open area. They should note the general sizes of the plants, any distinguishing features such as leaf shapes, flowers or seeds, and estimate the average height and number of each kind of plant they drew. Ask the other half of the class to draw and/or describe the plants seen in the forest, following the same instructions.

Next, have each student switch papers and areas with someone from the other group. (If this is a problem for your group, just take up the two groups of papers and redistribute them anonymously.) Students should try to locate the plants drawn or described on the paper they received. If they can't get enough information from the paper, they can do their own drawings in the new area.

When everyone has visited both open and forested areas, bring the group together. Ask students to describe and/or show others the main plants they saw. Compare and contrast the plant types, sizes, and numbers in the two areas. Use the questions below to guide the discussion.

Questions for discussion:

Which area had more grasses and herbaceous (soft-stemmed) plants? Which had more woody plants?

What were some other general characteristics of the plants seen in the open area? In the forested area?

What stage of succession would you estimate the open area is in? The forested area?
What do you predict would happen if each area were left alone (barring major disturbance) for 10 years? 50 years? 100 years?
What kinds of changes or disturbances (natural and human) could set back succession in these areas?
What changes could invasive plants from other countries, such as tree-of-heaven, bring to the successional pattern?
How would you expect the types of wildlife in the area to change over time as the plants change? Give some examples of animals that might prefer the open (early successional) area and some that prefer the forested (later successional) area.
Why might people want to manipulate succession? When might it be a good idea to go back to early succession? When might you want to encourage later successional stages? What are some reasons to have a mix of successional stages across the landscape?

Optional Classroom Activity:

Make a pie chart or bar graph showing the prevalence of general plant categories (or individual species, if names are known). Categories could include grasses, forbs (soft-stemmed plants), shrubs, vines, tree seedlings, saplings, mature trees. Compare the charts/graphs for open and forested areas.

Lesson Plan Developed by Ellen Powell, Virginia Dept. of Forestry