

4-H Virtual Forest User's Guide

Old-Field Succession

Concept

This module will illustrate how abandoned agricultural lands revert back to forest through a process called old-field succession. Students will use a timeline to investigate seven successional stages. Each stage includes examples of plant and animal species that use the habitat provided.

This module supports the following Science SOLs:

Scientific and Engineering Practices

3.1 e) use models to demonstrate simple phenomena and natural processes

Living Systems and Processes

4.3 a) interrelationships exist in populations, communities, and ecosystems;

4.3 b) food webs show the flow of energy within an ecosystem;

4.3 c) changes in an organism's niche and habitat may occur at various stages in its life cycle

Earth Resources

4.8 b) plants and animals

4.8 d) forests, soil, and land

Life Science

LS.8 a) organisms respond to daily, seasonal, and long-term changes

LS.11 a) mutation, adaptation, natural selection, and extinction change populations;

LS.11 c) environmental factors and genetic variation, influence survivability and diversity of organisms.

Module Description

Intro to old-field succession. Introduces the concept of old-field succession.

“While riding on the school bus, have you ever passed by a grassy area that was

once a plowed field? Agricultural fields are frequently abandoned when the landowner stops farming. If left alone, these abandoned fields gradually change back to forest over many years. This process is called old-field succession.

Believe it or not, most of Virginia was open farmland at one time or another. American Indians farmed and cleared the land long before Captain John Smith sailed up the James River in 1607. Colonial Americans also cleared land for farming crops like tobacco. For centuries, land all over Virginia has been cleared to grow crops, abandoned, and cleared for crops again.

Bare land gradually changes to forest through an interesting process called old-field succession. Let's look at an abandoned field in the Virginia piedmont to see how succession works!"

Throughout the module, users will have the opportunity to hover on various images with the mouse to learn more. In Frame 2, hovering on "Captain John Smith" will bring up a window that describes John Smith's life and legacy in more detail. Click on the "Close Window" icon to return to the main module.

To advance through the module, the user will click and drag the slider along the timeline located at the bottom of the screen.

Bare Land. Old-field succession begins when agricultural land is abandoned. Throughout history, land has been abandoned for many reasons, including worn-out soil, poor markets for crops, human migration and war. Rolling over the image of the recently abandoned farm produces a pop-up window that elaborates on land abandonment.

"Before the development of scientific agricultural practices, farmers often grew one type of crop in one location for many consecutive years. This practice exhausted the nutrients in the soil, and caused crops to decrease in size and quality. When this happened, the farmer would move on to new land, beginning the process all over again. The abandoned bare land would often erode, leaving deep gullies that we can still see in many locations today.

Many men volunteered to fight during the Civil War, World War I, and World War II, leaving their farms behind. Without as much manpower to maintain the fields and farm, a great deal of agricultural land was abandoned."

An image illustrates men planting trees on badly eroded agricultural land to slow down erosion.

Annual Plants. The first two years after abandonment a field will become covered with many species of annual plants, like crabgrass and horseweed. Biennial and perennial plants will also begin to grow at this time. Annual plants live for one year, biennial plants live for two years, and perennial plants live longer. Insects, voles and songbirds, like

bluebirds and morning doves will begin moving in.

Roll over the aster plant and grasshopper to learn more about these interesting features. White aster flowers from August to October, and grows in fields, meadows, and along the shore. There are many different species of grasshopper in Virginia. Grasshoppers feed on grasses, herbs, and crops. They often leap when alarmed, and several species can even fly.

Perennial Plants. By the time an abandoned field in the Virginia Piedmont is three years old, it will be dominated by broomsedge, a perennial grass. You will notice a lot of broomsedge—some folks call it broomstraw—for several years. Meadow voles will begin to take advantage of this habitat. Roll over the vole to learn more!

Shrub Stage. After about five years, scattered eastern redcedar, pine seedlings, and blackberry will begin growing if there is a seed source nearby. Pine seeds are very light, and each seed has a wing, so the wind carries it long distances. These species grow well in full sunlight that bathes abandoned fields. Bobwhite quail, cottontail rabbit, brown thrasher, and white-tailed deer are some animal and bird species that use this habitat. Roll over the eastern redcedar and cottontail rabbit to learn more!

Young Woodland. The first grasses and shrubs that begin growing on an old field are called pioneer species. These species thrive on bare soil, need full sunlight to grow, and are short-lived. Even though they are trees, eastern redcedar, loblolly pine, shortleaf pine, and Virginia pine are also considered pioneer species. These pines live a short period of time compared to many other trees. They will survive for 50 to 75 years, or longer depending on the species, and then gradually die out over time. As the pines and cedars increase in size, they grow overtop the sun loving grass and briars.

Wild turkey, white-tailed deer, ruffed grouse, and hairy woodpeckers are a few of the species that utilize this young forest. Roll over the deer and grouse to learn more about these interesting species.

Mature Woodland. You won't find many pines growing on the forest floor because most pines don't grow well in the shade. What you will find are hardwoods. As the pines die, they are gradually replaced by hardwood trees like white oak and mockernut hickory. Forest stands that are 100 years old will often have as many hardwoods as pines, or maybe more! After 200 years, the Piedmont forest that started out as a bare, abandoned field will contain primarily hardwood trees. This forest won't change much over time unless it is disturbed. It is home to animal species such as gray squirrel, raccoon, wild turkey, and great horned owl. Roll over the red fox, great-horned owl, and raccoon to learn more!

Conclusion. Old-field succession is also called "secondary succession." Secondary succession occurs where a forest or other plant community is cleared by a disturbance that leaves the soil in place. Hurricanes, wildfire, timber harvesting, or clearing land for crops are examples of disturbances that change the land back to an early stage of

succession.

Once a disturbance has cleared a forest, a lot of people think that the trees will never grow back. This may be true if the forest is being removed to make way for parking lots or shopping centers. The Virginia Department of Forestry estimates that 54,000 acres of forestland are developed each year in Virginia! However, most land that is logged or disturbed in other ways will grow back to a healthy forest very quickly through a process called, you guessed it, succession! Hardwood trees will sprout from stumps or grow from seeds already in the soil. Pine trees will begin growing from seed as well, or foresters may plant seedlings instead. In a few years, these trees will be taller than you and me! Watch and see!