

# Success(ion) Stories

**Main SOLs Addressed (Science 2010):** 4.1, 4.4, 4.5, 4.9, 5.1, 5.5, 6.1, LS.1, LS.4, LS.8, LS.9, LS.10, LS.11, LS.13

## Materials:

Laminated cards with large print and photos (See chart on pp. 2-3. Numbers shown are for a class of 30; adjust proportionately for smaller numbers of students.)

Lanyards

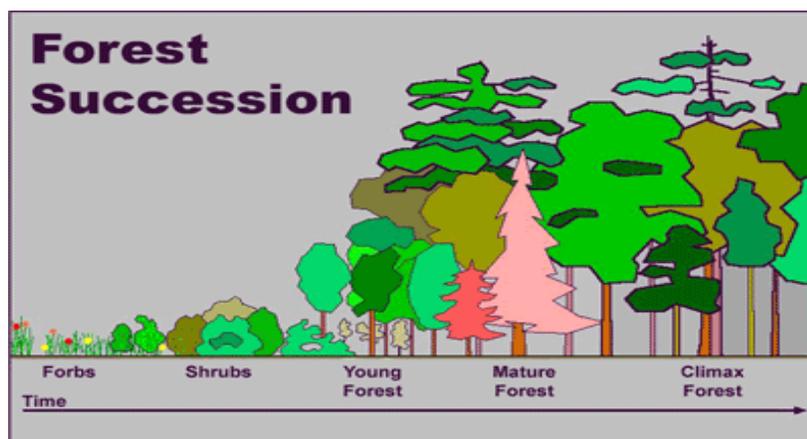
Clipboard, paper, and pencil for each student

## Background:

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 do the animals that live there change predictably as the plant community changes.

This picture shows changes in a typical Virginia 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 looks like this (with times approximate):

Year 1: Light-seeded annuals like horseweed and crabgrass dominate.

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

Years 3-18: Perennials like broomsedge establish, later developing into a grass/scrub community with shrubs like 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 hardwood seedlings do.

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*

### **Classroom or Field (Open Area) Activity:**

Give each student a card on a lanyard to wear. Adjust numbers proportionately by species if working with a smaller group. Double up students with a few cards if you have a larger class. Go over the “growth habits” listed in the chart below so each student knows what to do. Set an area as the “stage” and begin to tell the story below, with students acting out what is happening as time passes. Pause between paragraphs to give students time to take or change places.

<b>Plant</b>	<b>Which years present?</b>	<b># of cards</b>	<b>Action (Growth Habit)</b>
Crabgrass	1 <sup>st</sup>	3	Lie down and spread out arms
Horseweed	1 <sup>st</sup>	3	Hands and knees
White aster	2 <sup>nd</sup>	4	Hands and knees

Broomsedge	3 <sup>rd</sup> -10 <sup>th</sup>	4	Hands and knees
Blackberry	4 <sup>th</sup> -15 <sup>th</sup>	3	High kneel, arms at sides bent up from elbow, palms open, fingers spread
Sumac	4 <sup>th</sup> -15 <sup>th</sup>	3	High kneel, arms at sides bent up from elbow, palms open, fingers spread
Virginia pine	8 <sup>th</sup> -70 <sup>th</sup>	4	Start in low squat; rise a little every few “years” until standing; spread bent arms slightly for branches
White oak	25 <sup>th</sup> -100 <sup>th</sup> +	3	Start in low squat; rise a little every few “years” until standing; spread arms wide for branches
Hickory	25 <sup>th</sup> -100 <sup>th</sup> +	3	Start in low squat; rise a little every few “years” until standing; spread arms wide for branches

### A Succession Story:

Many years ago, a young couple, Gary and Doris Martin, bought an old farm in the Virginia Piedmont. They worked in town and were not farmers themselves. So, the family set aside a few acres for their house, yard and garden, but they decided to “let nature take its course” on the rest of the land.

The first year, tiny wind-blown seeds of horseweed and crabgrass arrived in the old fields, and the plants sprouted immediately.

The next year, the fields were overtaken by lovely white asters.

The third year, broomsedge grass took root. In a couple of years, it came to dominate the field. Shrubs like blackberry and sumac soon spread here and there among the broomsedge. The Martins’ children, James and Dennis, loved to pick blackberries in the old fields.

In a few years, young Virginia pines began to raise their heads above the grasses and shrubs. These plants all grew together for several years.

But gradually, the pines became tall enough to shade out the grasses and shrubs, and the broomsedge, sumac and blackberry slowly disappeared.

For many years, pines dominated the land. They produced seeds, but the little pine seedlings could not grow in the shade of the larger trees. The Martins retired and moved to Florida, and James moved away to New York. But Dennis kept the old farm and raised his own family there.

As Dennis got older, so did the pine forest. It now had an understory of young hardwoods, like white oak and pignut hickory, which grew slowly in the shady

understory. As the pines began to die out, the oaks and hickories got more light and grew taller. Dennis' daughter Marie moved into the old homeplace when her father went to live in a retirement community. Her husband loved to hunt in the woods, and her daughter Emily loved to play there.

One hundred years after the Martins first bought the old farm, the oak-hickory forest had an understory of more young oaks and hickories. This was the climax stage of succession, which would continue indefinitely, or until the family decided to change it. Meanwhile, the land passed along to Emily – the Martins' great-granddaughter.

In the 115<sup>th</sup> year, Emily's son Daniel was almost ready to start college. Money was tight, so Emily and her husband decided to sell some timber to pay for Daniel's college. A large group of the old trees were cut down and sold. Realizing that trees could be a good investment, the family decided to replant the land immediately with pines. And so began a new chapter on the old farm...

### **Field activity:**

Choose a spot where the forest adjoins an open area and students can easily enter both areas. 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.

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

### **Discussion (together in the field, or back in the classroom):**

When everyone has visited both open and forested areas, bring the group together. Compare and contrast the plant types, sizes, and numbers in the two areas. (If doing this in the classroom, making a chart on the board will be helpful. In the field ask students to describe the plants.) Use the questions below to guide the discussion, or add your own.

**Questions for discussion:**

What were some 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 species from other countries, such as tree-of-heaven, bring to the successional pattern?

How would you expect the types of wildlife in an area to change over time as the plants change? Give some examples of animals that might prefer early succession and those that prefer later succession.

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?