

Lesson Title: Changing Habitats

Grade levels: Grades 2-5

Applicable SOL:

2nd Grade: Science 2.1 (investigations) 2.4 (plant lifecycle)

2.5 (habitat change over time)

Math 2.11 (measurement)

English 2.2 (vocabulary) 2.10 (reference materials)

2.12 (descriptive writing)

3rd Grade: Science 3.1 (investigations) 3.6 (population/community)

Math 3.9 (measurement)

English 3.2 (vocabulary in content)

3.7(reference materials) 3.9 (writing for a
purpose)

4th Grade: Science 4.1 (investigations) 4.4 (plant structure)

4.5 (plants in an ecosystem)

Math 4.7 (measurement)

English 4.6 (nonfiction texts) 4.8 (writing for a purpose)

5th Grade Science 5.1 (investigations) 5.5 (traits of organisms)

Math 5.8 (measurement)

English 5.6 (nonfiction texts) 5.7 (writing for a purpose)

Materials:

- John Smith map
- Native and Non-native Plants PowerPoint
- Changing Habitats PowerPoint
- Student journals
- Measuring tape
- String and wooden stakes or pegs
- Grid paper

Procedure:

Building Supporting Knowledge: (30 minutes, dependent on age level)

There are two PowerPoint presentations to develop student background knowledge and to encourage discourse in the classroom. Use them at separate times, or pieces of them to discuss how Virginia's landscape has changed. Older students could be given the presentations to view in pairs or groups of 3. They can discuss and take notes, and then share out in a whole group. For younger students, showing pieces of the presentations for discussion would be more age appropriate.

Main Lesson: (60 minutes)

1. Print copies of John Smith's map, or project it so that the class can view it. Notice the plant drawings on the map. Discuss the plant life shown on Smith's map. What information can we get from this map? How do you think John Smith found out about the different plants? Could we do a similar map of our school yard?
2. Explain that they will be marking an area of the schoolyard to make long term observations. Split the students into groups of 2 to 4. Give each group 9 feet of string, measuring tape, and 4 pegs.
3. In the schoolyard, have student mark out areas that are two feet by two feet. Areas should be away from main areas so that they can be kept over time. (Alternatively, areas can be mapped according to landmarks in the schoolyard, so they can be taken down after each observation.)
4. Have the students create a detailed mapping, using grid paper, of their 2 x 2 square. In their journals, they should create a dated entry about any observations they make. The grid paper can be glued into their journals to accompany their entry.
5. Revisit the sites, making journal entries, including mappings, at least once a month, noting any changes to their mini-habitats.

Follow-up:

1. After the second observation, discuss changes in their sites, and what may have caused the changes.
2. Go on a scavenger hunt in the schoolyard, looking for any examples of the invasive species. Have students bring in photos or written observations of invasive plants they see at home or in the community.
3. Create persuasive posters about planting native species. Research can be taken from Native Species file and the Invasive file which contain brochures from the Virginia Department of Conservation and Recreation.
4. (For more advanced students) Project the discussion poster, or provide copies for the students. Have a discussion, with a follow-up writing activity about the poster.

Assessment Opportunities:

1. Continuing assessment can be taken from the journal entries.
2. Persuasive posters, as well as research for the posters, provide assessment opportunities.
3. Discourse during PowerPoint presentations, and poster discussions give opportunities for informal assessment.



Native and Non-Native Plants

Does it Matter?



Native Plants

- Native plants are plants that were in Virginia before the Europeans settled.
- Native plants are adapted to live in their particular ecosystem. They have a niche in that particular ecosystem, and are able to live in sync with the other living things.



Non-Native Plants

- Non-native plants were introduced either intentionally or unintentionally since the Europeans settled in Virginia.
- Another name for non-native species is **alien species**.
- Some alien species can adapt well in a new habitat, and live without disrupting the other species living there.
- Other alien species become **invasive**. This means that they overwhelm the ecosystem, and multiply so much that they push natural, native species out of the ecosystem by competing for limited resources in the area.



How Alien Species Are Introduced

- “Many alien species are well known and economically important in agriculture and horticulture, such as wheat, soybeans, and tulips. Alien species, whether plant or animal, often do not become established outside of cultivation and, if they do, they usually have few impacts on natural communities.”

www.dcr.virginia.gov/natural_heritage/invspinfo.shtml

- According to the Virginia’s Department of Conservation and Recreation, 4,000 alien species have been introduced into the United States and became established outside of cultivation. 400 of these are invasive. Half of these were intentionally grown, while the other half came accidentally through seed mixes, in packages materials and on ship ballasts.

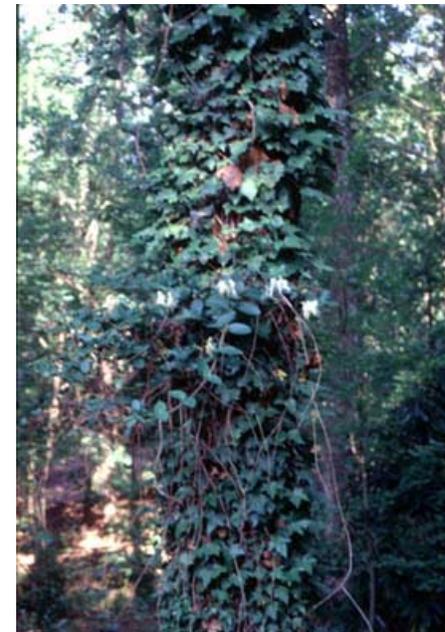
Examples of Invasive Species

- **Kudzu** was introduced as an ornamental plant, for livestock feeding, and for erosion control.
- Kudzu grows up to a foot a day, and totally covers other plants, keeping them from getting sunlight.
- Kudzu is difficult to control as most herbicides cannot kill it.
- Kudzu even damages power lines as it totally covers them!
- Virginia's Division of Natural Heritage classifies Kudzu as "highly invasive".



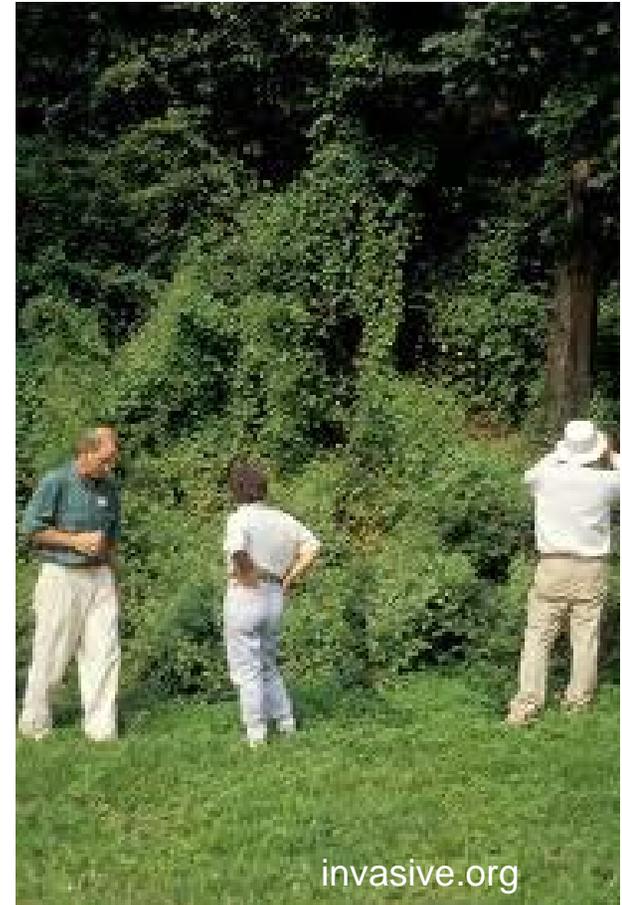
Examples of Invasive Species

- *Japanese Honeysuckle* was brought to the United States from Asia. Virginia's Division of Natural Heritage classifies it as "highly invasive".
- Many people like it because the nectar from its flowers tastes good, and it is highly fragrant in spring.
- Japanese Honeysuckle smothers other plants, competing for the sunlight and water.



Examples of Invasive Species

- The *Mile-a-Minute* is an invasive vine from Asia which was found in the United States as early as 1890 (Douglas, 1996).
- It overgrows other species, competing for water and sunlight.
- Virginia's Division of Natural Heritage has classified it as "highly invasive".





What Makes A Species Invasive?

According to Virginia's Department of Conservation and Recreation's Division of Natural Heritage, species are invasive if they have the following characteristics:

- Rapid growth and maturity
- Prolific seed production
- Highly successful seed dispersal, germination and colonization
- Rampant vegetative spread
- Ability to out-compete native species
- High cost to remove or control



What Can We Do?

- While Virginia has 5 regions, there are 3 major plant growth regions:

Coastal Plain: from the Atlantic Ocean in the east to the Fall Line in the west the Coastal Plain, from the Atlantic Ocean in the east to the Fall Line in the west

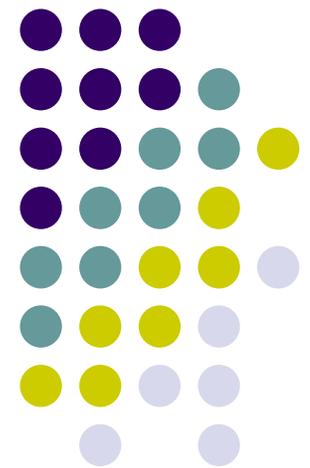
Piedmont: from the Fall Line in the east to the Blue Ridge Mountains in the west

Mountains: including the Blue Ridge Mountain, the Ridge and Valley, and the Appalachian Plateau Provinces

- Find out which plants are native to your area, and which meet the conditions for your area. Grow native plants that are suited for your area.
- Once native plants are established, they are hardy and do not require pesticides or fertilizers, which can further harm the balance of the natural ecosystem!

Virginia's Changing Habitats

A Constant Shift Caused By Man





Virginia in the Past

- According to Flora of Virginia (Crowder, 2012), **96% of Virginia's land, or 25 million acres was covered by forest in 1630.**



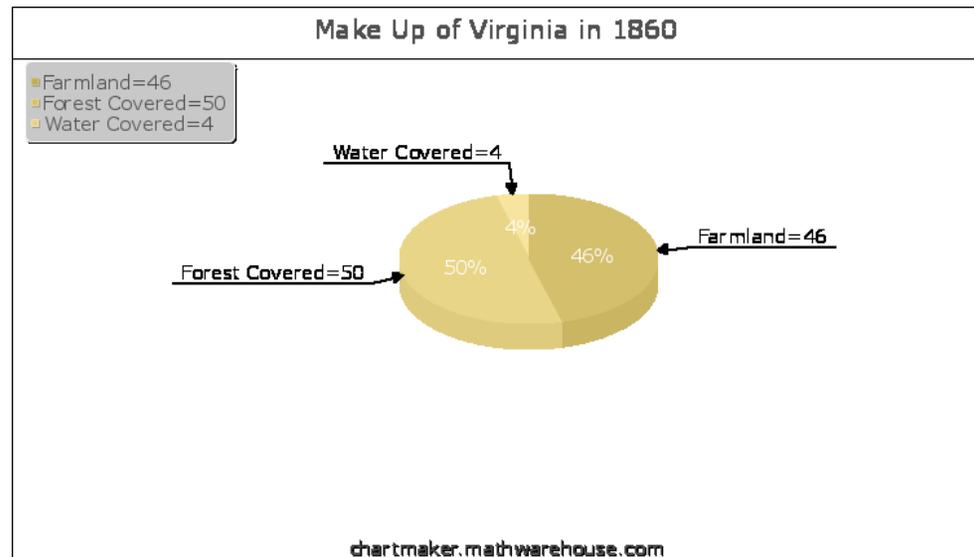
Virginia's Changing Landscape



- During the next 230 years, most fertile land was cleared for agricultural purposes. This left the land about 40-60% forest covered (Crowder, 2012).



In the Virginia State Chamber of Commerce photograph collection located in the Picture Collection at the Library of Virginia , 1999





More Man-made Changes

- Soil depletion and erosion was severe at this time. Trees were cut for home building. Many oak forests were cut for tanbark and made into charcoal for furnaces for the iron industry in the 19th century.
- During the Civil War, most of the older forests still standing were cut for building needs and firewood. Many forests were also destroyed by forest fires since once they were started, there was no way to stop them. (Crowder, 2012)



Library of Virginia Archives Research Services Map
Collection: Birds eye view of Alexandria, Va. , 1863 by
Charles Magnus

Continuous Changing Landscape



- After the Civil War, railroads expanded, giving access to the remaining old-age forests in Virginia's mountains. The timber industry took advantage of this access.
- Entire mountainsides were clear cut.
- Forest fires accidentally set also contributed to loss of forests.
- Many of Virginia's wetlands were also lost during this time due to development. (Crowder, 2012)



Waynesboro Public Library Photograph Collection at the Library of Va.



Conservation Initiatives



- Most of the forests were depleted by 1930.
- Conservation began:
 - George Washington and Jefferson National Forest
 - Virginia State Forest System
 - Shenandoah National Park
- Abandoned farmland during the Depression began a re-growth of young forests
- US Forest Service introduced the Smokey Bear Campaign to stop forest fires.



Staehele, Albert, 1899-World War, 1939-1945, Library of Virginia



Forest tree nursery in New Kent County for the capacity of one million pine trees per year, 1939 World's Fair Collection, Library of Virginia



Library of Virginia image

Result of Conservation Efforts



- By 1980, there was a 2 million acre increase in forest cover.
- Types of forests have changed, as there was a loss of natural pines.
- Some plants require natural forest fires to grow (such as the longleaf pine). Efforts at stopping forest fires have also stopped these natural species.
- Wetland loss slowed, but did not stop.



(Crowder, 2012)





Fragmented Habitats

- Development has led to fragmented habitats. This means that larger habitats are broken into smaller parcels as areas throughout are developed.
- This causes a decrease in the types of species in each area, and often a total loss of a species in that area.



Roads, clearcutting and agriculture fragment a tract of forested land in the ACE Basin.



Introduction of Alien Species

- Invasive nonnative species have drastically changed Virginia's habitats.
- Plants such as the Kudzu vine and the Japanese Honeysuckle have smothered other native plants.
- Insects and fungi brought here with other plants have devastated our native plants since they have no natural barriers to these.

(Crowder, 2012)

[Forest health review \(November 2007\)](#), Virginia Dept. Of Forestry

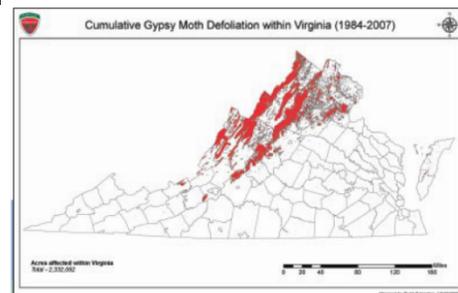


Kudzu is a highly invasive vine which totally smothers other, native species. It can grow up to a foot a day!



The European Gypsy Moth can very quickly defoliate forests.

<http://eol.org/pages/860845/overview>



Virginia Today



Land Type	1630	Today
Forest Covered	96% (old age forests)	63% (most less than 100 years old)
Wetlands	2.4 million acres	1.4 million acres
Agricultural	0	42%
Developed	0	8%

Only about 20% of the natural land is unfragmented.

