

Here's to the Land of the Longleaf Pine

Alignment to NC Essential Standards

Science 4.L.1, 5.L.2

Social Studies 4.G.1, 4.E.1.3, 5.G.1, 5.G.1.1, 5.G.1.2, 5.G.1.3, 5.G.1.4, 5.E.1

Language Arts RI.5.2, RI.5.4, RI.5.7, RI.5.9, W.5.1, W.5.7, SL.5.4

Learning Objectives

- Students will compare and contrast the positive and negative effects of human activity on the physical environment.
- Students will describe economic factors influencing human activity in the Tar-Pamlico basin.
- Students will evaluate the environmental and economic costs and benefits of land use decisions

Time Required:

Activity 1: 20 minutes

Activity 2: 40 minutes

Activity 3: 60 minutes

Materials

- Internet connection to show the video
- Computer/internet access for class to read *Naval Stores and the Longleaf Pine* at Learn NC.
<http://www.learnnc.org/lp/editions/nchist-colonial/4069>

For each student

- 1 copy of the readings *Early Forests of North Carolina* and *Longleaf or Loblolly?*

For each team

- 1 copy of *The Value of Trees* worksheet

Vocabulary

naval stores, longleaf pine, ecosystem, fire tolerant, fire resistant, diversity, forest succession

Overview

In this lesson, students will explore how the market economy and technological advances have impacted and continue to influence human settlement and ecosystems of the Tar-Pamlico River Basin, by focusing on the longleaf pine ecosystem. In Activity 1, students are introduced to the landscape of the basin during the 1700's, which appeared forbidding and dense to the visitor. Activity 2 allows students to explore some of the economic benefits of longleaf pine forests and the results of human activity on the ecosystem. Activity 3 incorporates current knowledge, technology and views of managing forests for both ecological and economic gain.

Background

The physical environment had a significant impact on early settlement of the Tar-Pamlico region. Access by ship from the ocean was difficult because the inlets were shallow and the sound was wide. Most settlers moving over land came from South Carolina or Virginia. These travelers tended to settle near the Chowan River, if coming from Virginia, and in the Cape Fear region, if coming from South Carolina.

The upland was dense with forest and much of the coastal landscape was swamp and marsh. Only the most adventurous travelers were able to work their way to the Tar-Pamlico region. Bath was incorporated in 1705 as the port for the Pamlico Sound but the geographic constraints imposed by the Outer Banks kept Bath from growing like Wilmington.

Even so, the Naval Stores Act of 1705, passed by the English Parliament, provided enough stimulus to improve the economy of the Tar-Pamlico region. Naval stores are items used in building of wooden ships and included production of tar, pitch and turpentine and were obtained from the resin in longleaf pine. By the 1770s, North Carolina became responsible for 70% of the tar and 50% of the turpentine export from North America.

Longleaf pine forests once covered over 90 million acres in the south, but much of this ecosystem has vanished due to overuse. There are now less than 3 million acres of longleaf pine forest in the south and many of these acres are unhealthy.

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More background information is provided in the attached readings *Early Forest in North Carolina* and *Longleaf or Loblolly?*, found at the end of this lesson, as well as the excellent LEARN NC article *Naval Stores and the Longleaf Pine* <http://www.learnnc.org/lp/editions/nchist-colonial/4069>.

Procedure

ACTIVITY 1

Settling the Wilderness

Time: 20 minutes

1. Have each student read *Early Forests of North Carolina*. This material was edited and adapted for the 5th grade reading level from the book *An Independent People: The Way We Live in North Carolina, 1770-1820* by Harry L. Watson.
2. Ask students to either discuss or write about the following:
 - Based on the descriptions, what did the forest look like in the late 1700's to early 1800's? Students could draw a picture to illustrate their understanding.
 - What types of knowledge, tools and supplies do you think early settlers would have needed to survive in this kind of wilderness?
 - Based on what the early travelers to this area wrote about the area, would you want to move to this land? Why or why not?

ACTIVITY 2

Fall of an Ecosystem

Time: 40 minutes

1. Share with the class that the longleaf pine forest ecosystem was so vast that it is hard to imagine now. For visuals of a healthy longleaf pine forest, play the first minute of the video from The Nature Conservancy <https://www.youtube.com/watch?v=NYo3r-qNdXo>
2. Longleaf pine became a huge economic factor in coastal North Carolina. Students can read about the naval stores industry in the Learn NC article, *Naval Stores and the Longleaf Pine* <http://www.learnnc.org/lp/editions/nchist-colonial/4069>. Students can either read the whole article or, if time is limited, ask them to read at least the *Introduction* and the *Tar, Pitch and Turpentine* and *Growth of an Industry* sections.
3. Ask students to address the following either through discussion or essay:
 - What does "store" mean when talking about naval stores?
 - Why did naval ships need these materials? How were they used?
 - Why did North Carolina produce more naval stores than other states?
 - How did these naval stores get transported from places like Tarboro to the coast?
 - What impact did this industry have on the longleaf pine ecosystem?

ACTIVITY 3

Making Management Decisions

Time: 60 minutes

1. If they haven't done so previously, have students read the *Decline of the Longleaf Pine Forest* section in the Learn NC article, *Naval Stores and the Longleaf Pine*. You can also show them the rest of The Nature Conservancy video <https://www.youtube.com/watch?v=NYo3r-qNdXo>.

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1. Ask the students to brainstorm either as a group or individually, some positive and negative effects of human activity related to the longleaf pine ecosystem (these could economic, environmental, aesthetic, etc.).
2. Tell students: *Longleaf pine ecosystems can still have value to the economy in the Tar-Pamlico region today. However, the longleaf pine ecosystem will not return on its own due to a number of human activities that keep this ecosystem from thriving. We now have the knowledge and technology to create conditions in which the longleaf pine ecosystem can be restored in some places.*
3. Divide the students into teams.
 - Tell them that your county has just received a donation of 400 acres of land. The previous landowner managed this land as a loblolly pine plantation and all of the trees were removed for timber just before the county received it.
 - Each team has been appointed by the county government to determine the best trees to plant on this land in order to bring the "most value" to the community.
4. Take a few minutes to brainstorm with the entire class ideas of what would be of "most value" to the community (examples are timber to sell, wildlife habitat, hunting, hiking, birding, bike trails).
5. Provide each team with a copy of *The Value of Trees Worksheet* and the *Early Forests of North Carolina and Longleaf or Loblolly?* readings. The teams must research their options, determine what trees would be the most value to the community and explain why they made that decision. You can also let them do research on the internet or provide copies of some of the readings in the resources section.
6. Have each group present their results. Ask them if this was their private land, where they were only concerned about the benefit to themselves, would they have made a different decision?

Answer Key –The Value of Trees worksheet

	Loblolly	Longleaf
How quickly does it grow?	Grows fast	Starts out growing slowly
Can it compete with other plants?	Tolerant of competition when young	Not tolerant of competition
Is it fire resistant?	Not fire resistant when young	Fire resistant and requires fire
In what kind of soil does it grow best?	Prefers moist soil	Productive on dry soil
How resistant is it to high winds and insects?	Less resistant to high winds, insects, fire	More resistant to high winds, insects and fire
Do you want hardwoods trees (such as oak and hickory) to grow with it?	Early succession species – which will be replaced by hardwoods as the climax forest	Climax species, fire keeps out hardwoods
Does it have a diverse ecosystem (lots of wildlife)?	Low diversity if managed for timber, higher diversity if growing in forest with other tree species	One of the most diverse ecosystems in the world. Most diversity is on the forest floor in the shrub, grass level
What is the wood used for?	Used for poles, pulp, paper, cardboard, fuel	Grows straighter and has stronger wood than loblolly. Used for poles and saw timber. Pine straw used for landscaping

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Assessment

Assessment will be based on student responses and written results of Activity 3.

Resources

Learn NC's Naval Stores and the Long Leaf Pine <http://www.learnnc.org/lp/editions/nchist-colonial/4069>

North Carolina Longleaf Coalition <http://www.nclongleaf.org/>

The Nature Conservancy Long leaf pine video <https://www.youtube.com/watch?v=NYo3r-qNdXo>

Introduction to Longleaf Pine <http://ncforests-service.gov/publications/LongleafLeaflets/LL01.pdf>

Longleaf Pine Forest: Superior Economic, Environmental and Historical Value
<http://ncforests-service.gov/publications/LongleafLeaflets/LL02.pdf>

Longleaf Pine Ecosystem, Clemson University
<http://www.clemson.edu/cafls/sclife/documents/Longleaf%20Pine%20LP>

Longleaf Leaflet, NC Forest Service <http://ncforests-service.gov/publications/LongleafLeaflets/LL07.pdf>

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THE VALUE OF TREES Worksheet

Your county has just received a donation of 400 acres of land. This land was most recently a loblolly pine plantation and all of the trees were just cut down and harvested before the land was donated. Your team has been selected by the county government to decide what trees would be best to plant on this land now in order to bring the "most value" to the community.

Brainstorm a list of what land uses your team thinks would provide the "most value" to the community.

The county environmental staff provided your team with some reading material so that you can learn more about two species of trees that can be planted on the land. **Use the information in these readings to fill out the table below.**

	Loblolly Pine	Longleaf Pine
How quickly does it grow?		
Can it compete with other plants?		
Is it fire resistant?		
Does it require fire?		
In what kind of soil does it grow best?		
How resistant is it to high winds and insects?		
Do you want hardwoods trees (such as oak and hickory) to grow with it?		
Does it have a diverse ecosystem (lots of wildlife)?		
What is the wood used for?		

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THE VALUE OF TREES Worksheet

Which species (loblolly or longleaf) of tree do you think will provide the most value to the community?

Support your answer with as much information as you can.

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READING: Longleaf or Loblolly?

Understanding the Original Forest

From Longleaf Pine Ecosystem, Clemson University

Longleaf pines form the natural climax forest for much of the Sandhills Region and once covered large areas of the Coastal Plain as well. Periodic wildfires spread across the region burning up any competitor species while the adaptations of the longleaf pine enabled it to survive. Loblolly pines were originally confined to wetter areas of the Coastal Plain and were the first trees to colonize areas opened by fire or early logging operations. Under natural conditions, loblolly pines would eventually be crowded out by hardwood trees that would then populate the climax forest.

In the original forests of the South, loblolly pine was a minor species both on the uplands, which were dominated by longleaf pine or mixed upland hardwoods, and in the wet river bottoms and swamps, which were dominated by mixed bottomland hardwoods. It was, however, an important species on moist sites that were not subject to regular burning. In the Coastal Plain, loblolly pine grew best mixed with hardwoods along stream margins and around swamps on sites that were not subject to long periods of flooding or to serious fires. Under natural conditions, it rarely formed pure stands, and these seldom exceeded more than a few acres in size. When natural disasters created openings, seeds from nearby trees quickly became established. However, because loblolly pine has limited tolerance to fire, it generally could not compete with longleaf pine on well-drained Coastal Plain lands subject to regular fires.

Loblolly Pine (*Pinus taeda* L.)

From Common Forest Trees of North Carolina, NC Forest Service, 2012

Loblolly pine is the most important commercial timber tree in North Carolina. It is a fast-growing member of the yellow pine group, which grows in an area extending from the Coastal Plain throughout the eastern Piedmont. Within this area, loblolly is by far the most common pine.

Loblolly pine needles occur in clusters of three. They are slender and stiff, 6 to 9 inches long and pale green. They drop during the third season. The oblong cones are 2 to 6 inches long, light reddish to brown and are armed with a spine at the tip of each scale. Cones drop their seeds in autumn and winter but remain on the tree for another year. At 60 years, the mature bark is thick, bright reddish to brown and is divided by shallow fissures into broad, flat-topped plates covered with thin scales. The tree often reaches 90 to 110 feet in height on good sites, with a tall, cylindrical trunk 2 to 3 feet in diameter. The lower, short, thick branches on older trees droop, while the higher branches grow upward. The mature crown usually is compact and round-topped. The resinous wood is coarse-grained, with a marked contrast -- as in the other yellow pines -- between the bands of spring and summer wood.

Loblolly has a wide range of uses, such as lumber, pulpwood, plywood, poles and piling. Because it is useful and grows very quickly, loblolly is the target of much of the forest management in North Carolina -- and in the entire Southeast. It is the most widely planted forest tree, and many thousands of acres of productive loblolly pine plantations are now growing in North Carolina.

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Longleaf Pine (*Pinus palustris* Mill.)

From Common Forest Trees of North Carolina, NC Forest Service, 2012

Prior to European settlement of the state, the longleaf pine forest dominated the eastern North Carolina landscape. Two hundred years of clearing for agriculture, logging without reforestation, hog grazing and ironically, wildfire control has reduced this forest to a mere remnant of its original size. Young longleaf pine forms one of the most striking features of the southern forest. As a seedling, it resembles a clump of grass. Longleaf begins height-growth between two to 10 years of age, when it forms a handsome plume of sparkling green. Longleaf pine is appropriately named for its long, drooping, lustrous bright green needles. The needles are 8 to 15 inches long in three-leaf clusters that are crowded into dense tufts toward the ends of the stout branches. The large, silvery white, shiny buds (called "candles" when they begin to grow) make longleaf pine easily recognizable among other forest trees. The longleaf cone is the largest of the southern pine cones, at 6 to 10 inches long. Cone scales are tipped with spines. Longleaf cones mature during their second season and drop shortly after releasing their seed in September to November. The thick bark of mature 70 year old trees is orange-brown or reddish-brown and is separated into large plates with thin scales. The tree commonly is 80 to 100 feet tall, with trunk diameter of 2 to 2 1/2 feet.

Longleaf pines grow on a variety of sites, the most favorable being well-drained, sandy soils. Longleaf pine has a tall, straight trunk and an irregular crown made up of stout and heavy gnarled or twisted branches. Longleaf once was used for commercial production of naval stores (pitch, tar, resin, and turpentine). Today, it primarily is used for poles, piling, lumber and plywood. The heartwood is heavy, hard, strong, tough and durable. The seeds are a favorite source of food for wild turkey, gray and fox squirrels and many other wild animals.

Converting Planted Loblolly Pine to Longleaf Pine: An Opportunity

From Clemson University

Many private forest landowners in the South are interested in restoring native longleaf pine forests because of the higher wildlife, recreational and aesthetic values associated with longleaf compared to other southern pine species. The appeal of the open, park-like longleaf woodlands typical of lands managed for bobwhite quail is strong for many landowners. In addition, longleaf has: greater insect, disease and fire resistance; and longleaf yields higher forest product values compared to other pines.

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READING: Early Forests of North Carolina

Adapted from *An Independent People: The Way We Live in North Carolina* by Harry L. Watson

If you were to visit North Carolina during early settlement times in the 1600s and 1700s, you would encounter forests that seemed to go on forever. Trees were everywhere: tangled oaks and cypresses where the ground was swampy, stately pines where it was dry. To the west, oaks, hickories, walnut, chestnut, and poplars took over but always there were woods – dark, forbidding and dense. By 1770, permanent European settlers had lived in this environment for over a hundred years, but still the wilderness was everywhere. Whatever the people of North Carolina did took shape against a backdrop of seemingly endless forest.

In the winter of 1783, a German traveler made a trip through North Carolina. In his accounts of the trip he said, "The country is a continuous measureless forest, an ocean of trees in which only here and there cultivated spots are to be seen." Another traveler said, "A universal gloomy shade, made dismal by the intermixing branches of lofty trees, which spread over the whole country and which the sun never pervades." Another traveler noted that, "The mariners going up the coast in spring smell the pines when several miles out to sea."

Whether they were making a living from the forest or by farming, a constant factor in the lives of the people of North Carolina during the 18th century was the importance of the land and its rewards. The shape of the terrain, the nature of the soil, and the conditions of the weather all had a direct influence on the pattern of human life that later generations would not experience.