

Forest for the Trees

In this activity, students will role-play managing a Tree Farm. By using a piece of land as a Tree Farm, they will begin to understand the economic factors that influence management decisions for private forest lands.

Copyright 2012, American Forest Foundation. This activity was reprinted with permission from Project Learning Tree's "PreK-8 Environmental Education Activity Guide." © 2012 Universal Studios. "Dr. Seuss' The Lorax" and Dr. Seuss Characters © and ™ Dr. Seuss Enterprises, L.P.



Objectives

- Students will understand how forest resources are managed to provide products and other benefits.



Assessment Opportunity

- Pass out copies of the Forest Stand puzzle on the second student page. Tell students to number Boxes A to F in a logical sequence. On the back of the page, have them describe the sequence of events and say what actions were taken in each box.

Possible answers:

- (C) A young forest seeded naturally, or planted.
 - (A) Several trees are removed for firewood.
 - (B) With harvesting of mature trees for lumber after 40 years, a few mature seed trees are left for regeneration.
 - (F) When seed trees are harvested for lumber, young seedlings are growing.
 - (E) With initial thinning after 15 years, removed trees are used for firewood or paper.
 - (D) With pulpwood thinning after 20 years, removed trees are used for paper.
- Have students use graphic organizer software to create a concept map of the situations and processes they simulated in the activity.

Background

The United States has 749 million acres (303 million ha) of forestland that make up about one-third of the total land base. Canada has 1,032 million acres or 418 million ha of forestland. To be classified as forestland, an area must be at least 1 acre (.4 ha) and contain about 10 percent tree cover. About 504 million acres (204 million ha), or two-thirds, of U.S. forestlands are also classified as commercial **timberland** (forests capable of growing merchantable crops of trees). Canada has 244 million acres (99 million ha) classified as commercial. U.S. commercial timberlands are owned by three sectors of society: family owned forests make up 58 percent, while public agencies (federal, state, county) own 29 percent, and forest industries own 13 percent.

Privately owned forests are managed for many objectives. Many private forests, most of them family owned, choose to grow trees for wood products such as paper and lumber. Like other forests, family owned forests not only produce timber and other forest commodities, but also provide homes for wildlife, produce oxygen, reduce soil erosion, help

protect water quality, and offer recreation areas. Although family forest owners often have different goals for managing their lands, most have one thing in common: they want to manage their forests in an aesthetically pleasing and ecologically sound way, while growing trees for forest products. One organization, the American Tree Farm System® (ATFS), works with family forest owners through its network of foresters and other natural resource professionals to help them better understand how to sustainably manage their forest land. Since 1941, ATFS has offered family forest owners education and information to help them enhance their forest lands. They also certify family forests as being sustainably managed. These certified forests are known as Tree Farms. To be certified, landowners must demonstrate that they are managing their forests for all its values: wood, water, wildlife, and recreation.

Silviculture is the art and practice of managing and regenerating a forest to best meet the objectives of the owner. Family forest owners apply silvicultural techniques to maintain and enhance their forestland. In doing so, they can influence forest composition, structure, and growth. Through various techniques

Levels

Activity: Grades 4-8

Variation: Grades 6-8

Subjects

Science, Math, Social Studies

Concepts

Conservation and management technologies, when appropriately applied to the use of preservation of natural resources, can enhance and extend the usefulness of the resources as well as the quality of the environment.

Skills

Identifying Main Ideas, Analyzing, Solving Problems, Synthesizing and Creating

Technology Connections

Graphic Organizer Software

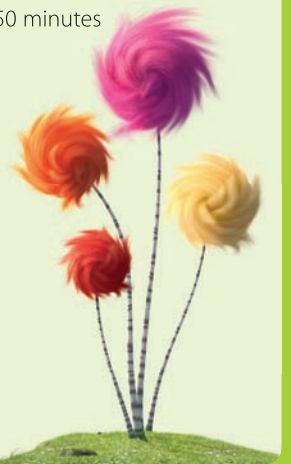
Materials

Three pieces of cardboard and string to make three signs to go around the students' necks

Time Considerations

Preparation: 30 minutes

Activity: 50 minutes



DiscovertheForest.org/lorax

that include harvesting (cutting and thinning), planting, and vegetation control (herbicide use and prescribed burning), a forest owner can manipulate the variety and age of tree species within a forest, the density of trees, the arrangement of different layers or stories of vegetation, and lighting and shading. Even before a forest matures, owners must consider how the next forest will be regenerated and managed. The management techniques a forest owner applies to his or her land not only affect the present forest but also influence its future characteristics.

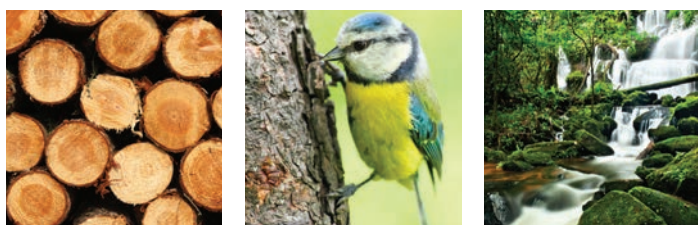
For more specific information on silvicultural systems of management, refer to the first student page.

Background

Find a comfortable seating area indoors or outdoors where you can arrange students in rows. You'll divide your group into about five rows of roughly equal numbers. Prepare three signs that read FIREWOOD, PAPER, and LUMBER, which will go around students' necks.

Doing The Activity

1. Ask students for the definition of a Tree Farm. Using the background information, explain that a Tree Farm, as certified by the American Tree Farm System®, is a forest ecosystem, often family owned, that can provide many valuable benefits, including wood, recreation, clean water, and habitat for wildlife.



2. Explain to students that in this scenario they are going to be a family owned forest. Explain that you want to manage this forest to be a productive Tree Farm, so you call ATFS or the State Forest Service for advice. For this scenario they recommend planting pine trees (for southern states) or hybrid poplars (for northern states). (Recommendations of trees to plant in these regions may vary for different scenarios or management objectives.) They also help you to develop a long-range management plan for your land.

3. Based on the ATFS and Forest Service recommendations, randomly place students within a defined area to start the simulation. After each is in place, tell students to crouch down low because they are now tree seedlings. Many of them have seeded naturally, but some have been planted. Tell the "trees" that they have now been growing for 15 years. They should now kneel and have their arms outstretched. Tell them that they need to be thinned so they can continue to grow quickly. If they are not thinned, they may

become crowded and compete for food, water, and sunlight. Such competition may stunt their growth and make them more susceptible to insects and disease.

4. Next, ask students which trees should be harvested. Explain that for this thinning, you will remove those "trees" that are overcrowding others and causing too much competition for water, sunlight, and soil. Some of these "trees" will be used for firewood and some for making paper. Place a FIREWOOD sign around one student's neck and have him or her stand to one side where the others can see. Have another tree (student) that has been harvested wear a PAPER sign. You should remove approximately every other "tree" during this initial thinning operation. You can designate these "trees" as firewood or paper and then have them stand behind the respective students.

5. Tell the remaining students that they have now grown for another 10 years. Have them stand with their arms outstretched and ask them what they think you should do now. Explain that the trees need thinning again and this time you will harvest roughly half or every other pine or poplar "tree" for paper. This thinning will enable the remaining "trees" to continue growing at the maximum rate. All "trees" that are cut down will join the others already behind the PAPER sign. Explain that pulp from the trees will be used to make books, boxes, tissues, and other paper products.

6. After growing another 15 years, the remaining "trees" will be as big as they will probably get. Have them stand with their arms outstretched overhead. Ask students what they think you should do at this point. Explain that if all the trees are left as they are, they may be attacked by insects, infected by disease, or destroyed by wildfire. If any of these things happen, the "trees" will lose most, if not all, of their value as timber. Therefore, you have decided to harvest most of the remaining "trees" for lumber. Place the LUMBER sign on one student and begin to remove most of the remaining "trees." When the "trees" have been removed, explain that you will replant the land with several trees for every one that you removed in the final harvest. Leaving some mature seed trees standing will allow for natural regeneration.

7. For a second simulation, place all of the "trees" in a defined area, as in the beginning of the activity, and ask them what natural events could drastically change the forest. (Wildfire, insect infestation, or plant disease could kill many trees and plants and could greatly affect the ecosystem.) Discuss students' answers. Pretend you are a wildfire roaring through the forest and destroying many of the "trees" (all students sit down). Discuss the results: Wildlife is homeless; soil is charred; streams are choked with sediment and ash; valuable timber is lost. Explain that although you, the landowner, are very upset, fire is a natural and sometimes vital part of the forest lifecycle (some tree species actually need fire to regenerate naturally from seed). The forest will return through natural regeneration and planting.

8. For the final simulation, replant the forest or allow for natural regeneration so that all “trees” are standing back in their places. Tell the students that you have decided to retire and move away. Before you leave, you must sell the land. You sell to someone who isn’t interested in forest management. This person has decided to develop the property for housing without consulting forest managers.

9. First, the new landowner puts in a road so prospective homebuyers can see the lots. Remove a portion of the “trees” where the road will go, and put them aside to be burned. (This is often what happens.) Next, remove some “trees” next to the road so homes can be built. (Again, put them in a brush pile to be burned.) Continue cutting down “trees” to make room for the construction of businesses, schools, and roads until all “trees” are gone. Ask the students, “Would you like to live in this community?” Point out the many benefits that trees provide for a development like this. (Beauty, shade, recreation, clean air, and homes for animals.) Discuss how the landowner could have developed this housing community with the assistance of foresters so that many of these benefits could have remained.



Variation—Silvicultural Simulation

1. Divide students into forest management teams of three or four. Give each team a copy of the student page “Forest Silvicultural Systems.”
2. Review this information with students to make sure they understand the forestry terms.
3. Give teams about 20 minutes to plan a strategy for managing a forest in which the other students are the trees. They can choose one of the silvicultural systems described on the student page, use a combination of systems, or make up their own system. They must be prepared to explain each action they take.
4. Allow time for each team to lead the entire group through a simulation of its strategy.



Reading Connections

Drake, Jane. *Forestry*. Kids Can Press. 2002.

Where do the wood products that we use everyday come from? Take an informational tour of the harvesting and replanting of trees and the equipment and manpower it takes to provide these products for us. Grades 3-5. ISBN: 1553374231.

Heinrich, Bernd. *The Trees in My Forest*.

HarperCollins Publishers. 1997. The author takes the readers on an eye-opening journey through the hidden life of a three hundred acre forest. Each of the 24 essays explores a different aspect of the relationships among plants, animals, and people of the forest. Grades 7+. ISBN: 0060174463.

Johnson, Sylvia. *Apple Trees*. Lerner. 1983.

Discusses the growth and cultivation of apple trees and the development, harvesting, and storage of apples. Grades 3-6. ISBN: 0822514796.

Jordan, Sandra. *Christmas Tree Farm*. Orchard Books. 1993

Describes the activities that take place on a Christmas tree farm in Rhode Island throughout each season of the year. Grades K-3. ISBN: 0785798978.

Pringle, Laurence. *Fire in the Forest: A Cycle of Growth and Renewal*. Simon and Schuster. 1995.

Depicts, in text and illustrations, the stages of fire and regrowth in a Western lodgepole pine forest over a period of three hundred years. Also discusses the fire cycle and the role of fire in forest ecology. Grades 2-6. ISBN: 068980394X.

Shetterly, Susan Hand. *Shelterwood*.

Tilbury House Publishers. 1999. This story takes the reader on a journey through the woods as an environmentally conscious forester passes on his knowledge to his granddaughter, showing her how he protects forest biodiversity by selectively cutting trees. Grades 3-7. ISBN: 0884482111.

Waldron, Kathleen Cook and Ann Walsh. *Forestry A-Z*. Orca Book Publishers. 2008.

An A to Z format answers numerous questions about the history of modern forestry, from how plywood is made and what the workers do at camp to how the industry has changed over the years. Grades 3-6. ISBN: 1551435047.



Forest Silvicultural Systems

Silviculture is the art and science of managing and regenerating forests to control their composition, structure, and growth. Forests are frequently managed in smaller units called **stands**. A stand is a group of trees similar enough in species composition, condition, and age distribution to be considered a unit. Stands may be even-aged (trees are of relatively the same age) or uneven-aged.

A forest manager can choose among several systems of silviculture to harvest and grow new trees within a forest stand. These include the clearcutting, seed-tree, shelterwood, and single tree and group selection systems.

In the **clear-cutting system**, most trees in a stand are harvested at once, with the expectation that a new, even-aged stand becomes established. The clear-cut system works well for establishing trees that grow best in full sunlight. The new stand is most commonly developed by planting seedlings. In other cases, a clear-cut area is regenerated by seeds from nearby stands, from seeds stored in the forest floor, or from stump or root sprouts of cut trees.

The **seed-tree system** requires leaving a few good seed-producing trees on each stand when the mature stand is harvested. These trees provide the seeds needed to regenerate a new, even-aged stand. The seed trees are sometimes harvested after a crop of new, young trees has become established.

The **shelterwood system** involves a series of partial cuttings over a period of years in the mature stand. Early cuttings improve the vigor and seed production of remaining trees and prepare the site for new seedlings. The remaining trees produce seeds and shelter young seedlings.

The **single-tree selection system** differs from the other systems by creating and maintaining an uneven-aged stand. Foresters examine a stand and judge each tree on its individual merit. Trees are harvested as they mature. Seedlings or sprouts grow in the spaces created. Periodic thinning and harvesting results in a stand that contains trees of many ages and sizes. Because relatively few trees are harvested at any one time, and because the forest floor is generally shaded, this system favors species that thrive in low light.

The **group selection system** requires harvest of small groups rather than individual trees. The openings created resemble miniature clear-cuts, or gaps, with the major difference being that the resulting regeneration occupies too small an area to be considered an even-aged stand. As in the single-tree system, both thinning and harvest cuttings are done at the same time. The new trees that grow in these small openings are regarded as parts of a larger stand containing trees of many ages. In either singletree or group selection systems, frequent harvests are needed to maintain a balance of tree ages, classes, and sizes.

