

Overview

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.



Background

The United States has 731 million acres (296 million ha) of forestland that make up about one-third of the total land base. Canada has 1,118.5 million acres or 453 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 483 million acres (195.6 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: private individuals own 57 percent; public agencies (federal, state, county) own 28 percent; and forest industries own 15 percent. Timberlands that are owned and managed by private individuals are often referred to as tree farms.

Tree farms are forests that are managed to grow trees for wood products such as paper and lumber. Like other forests, tree farms 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 tree farmers 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.

Silviculture is the practice of establishing and managing a forest to best meet the objectives of the owner. Tree farmers apply silvicultural techniques to maintain and enhance their forestland. In doing so, they can control forest composition, structure, and growth. Through **harvesting** (tree removal), cutting, **thinning**,

prescribed burning, and various other methods, a tree farmer 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, tree farmers must consider how the next forest will be regenerated and managed. The management techniques a tree farmer 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 student page 250.

Getting Ready

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, PULP, and LUMBER which will go around students' necks. For the Enrichment, make copies of student page 250 for each team; for the Assessment, make copies of student page 251.

Doing the Activity

1. Ask students for the definition of a tree farm. Using the background information, explain that a tree farm is a forest ecosystem that provides many valuable products.
2. Place students in rows. After each is in place, tell students that they are now tree seedlings. You have planted them on a barren piece of land that you own. You want this land to be a productive tree farm, so you call the State Forest Service for advice. They recommend planting pine trees. They also help you develop a long-range management plan for your land.
3. Tell the "trees" that they have now been growing for 15 years, and they

LEVELS

Activity: Grades 4-8
Enrichment: Grades 6-8

SUBJECTS

Science, Math, Social Studies

CONCEPT

- Conservation and management technologies, when appropriately applied to the use or preservation of natural resources, can enhance and extend the usefulness of the resources as well as the quality of the environment. (11.2)

SKILLS

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

OBJECTIVES

Students will ⓐ participate in a simulation designed to teach how forest resources are managed and ⓑ simulate managing a piece of land for various products.

MATERIALS

Activity: Three pieces of cardboard and string to make three signs to go around students' necks
Enrichment: copies of student page 250
Assessment: copies of student page 251

TIME CONSIDERATIONS

Preparation: 30 minutes
Activity: 50 minutes
Enrichment: Two 50-minute periods

need to be thinned so they can continue to grow quickly. If they are not thinned, they will become crowded and compete for food, water, and sunlight. Such competition will stunt their growth and make them more susceptible to insects and disease.

4. For this thinning, you will remove native hardwood “trees” such as oak, hickory, or maple that have occurred naturally in your pine plantation. These “trees” will be used for firewood. Place a FIREWOOD sign around one student’s neck and have him or her stand to one side where the others can see. You will also need to cut some pine “trees” during this thinning. They will be grouped behind another student standing to the side wearing a PAPER sign (because pine trees will be turned into pulp for making paper). 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 and need to be thinned again. This time you will harvest every other pine “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. If 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 all remaining “trees” for lumber. Place the LUMBER sign on one student and begin to remove all remaining “trees.” When all “trees” have been removed, explain that you will replant the land with several trees for every one that you removed in the final harvest. You may also opt to leave some mature seed trees standing for natural regeneration (see student page 250).

7. Line up all the “trees” in the same rows as the beginning 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 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. The forest will return through natural regeneration and planting.



8. Replant the forest so that all "trees" are 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 one row of "trees" and put them aside to be burned. (This is often what happens.) Next, remove some "trees" from the rows next to the road so homes can be built. (Again, put them in a brushpile 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.

Enrichment

1. Divide students into forest management teams of three or four. Give each team a copy of student page 250.

2. Review this information with students to make sure they understand the forestry terms (also use the Glossary on page 371).

3. Tell each team they will lead the group through the same type of simulation they did in the activity, only they will make all management decisions.

4. Give teams about 20 minutes to plan a strategy for managing a forest in which students are the trees (the number of students in the group minus themselves). They can choose one of the silvicultural systems described on the student page, can use a combination of systems, or can make up their own system. Whatever they choose to do, they must explain each action they take.

5. Allow time for each team to lead the entire group through a simulation.

END NOTES...

ASSESSMENT OPPORTUNITY

Pass out copies of the Forest Stand puzzle on student page 251. 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. (See possible Answers below).

RELATED ACTIVITIES

400-Acre Wood, A Forest of Many Uses, Forest Consequences, Tree Lifecycle, Nothing Succeeds Like Succession, Who Works in This Forest?

REFERENCES

Smith, D.M. *THE PRACTICE OF SILVICULTURE*, 8TH ED. New York: John Wiley & Sons, 1986.

SOCIETY OF AMERICAN FORESTERS WITH COOPERATION OF THE WILDLIFE SOCIETY. CHOICES IN SILVICULTURE FOR AMERICAN FORESTS. Washington, DC.: Society of American Foresters, 1981.

POSSIBLE ANSWERS TO ASSESSMENT

1. (c) A young pine forest is planted on barren land.

2. (a) Several trees are removed for firewood.

3. (e) With initial thinning after 15 years, removed trees are used for firewood or paper.

4. (d) With pulpwood thinning after 20 years, removed trees are used for paper.

5. (b) With harvesting of mature trees for lumber after 40 years, a few mature seed trees are left for regeneration.

6. (f) When seed trees are harvested for lumber, young seedlings are growing.

FOREST SILVICULTURAL SYSTEMS

Silviculture is the practice of growing and managing 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*, all 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 may develop by seeds from nearby stands, from seeds stored in the forest floor, or from stump or root sprouts of cut trees. In other cases, a clear-cut area is

regenerated by scattering seeds or by planting seedlings.

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. Later, cuttings will harvest shelterwood trees and allow regeneration to develop as an even-aged stand.

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, 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 single-tree or group selection systems, frequent harvests are needed to maintain a balance of tree ages, classes, and sizes.

FOREST STAND PUZZLE

