

Sustainable Forestry: Urban or Wild?

Unit Overview

This unit focuses on forest resources as they relate to sustainable development. It is appropriate for grades 6-8. It is the goal of the unit to have students increase their understanding of the basic benefits of forest resources, costs and benefits of setting aside wilderness preservation areas, public policy decisions involved in the trade-offs, and challenges of providing wood products using forest management practices.

Unit Background

Using the background paper “Forests: A Renewable and Sustainable Resource” students will read and discuss forest management, a topic critical to natural resources conservation and sustainable forests for the future. Some of the major benefits of forests to be discussed include outdoor recreation, wildlife habitat, watershed protection, and forest products.

Case Studies

In this unit, six groups of students will study three different aspects of sustainable forest practices and management techniques. The three case studies are:

1. The challenge of a wood products company is in meeting the demand for products from the forest while seeing that America’s forests are managed sustainably. Students will evaluate the problem of maintaining forest health, protecting wildlife and water quality, while harvesting the area properly.
2. Managing a forest for multiple use requires expertise and many productive resources, including human and capital. In this case, students will manage a 200-acre hardwood tree farm. The goal is to sell the timber for a profit while protecting wildlife habitats, the watershed, and the recreational activities such as camping, hunting, and hiking.
3. In this case study, students will decide if the government should designate more land as wilderness area. This is a controversial issue where students will need to determine the trade-offs. Students will use a decision worksheet and decision grid to make their recommendations.

Application to Sustainable Development

After the groups have developed their forest management plans, they will present them to the class and defend their decisions. The student groups focusing on the same case study will compare the different approaches and how their decision affects the future of forests in America. The students also will be asked to correlate their decisions to a sustainable development matrix that assesses the economic, environmental and social consequences of their decisions.

Unit Context

In terms of our Soft vs Hard Green Framework (see Chapter 1), Soft Green enthusiasts advocate multiple-use management of forests, critical habitat preservation for biodiversity, and distrust of “free market” prices as adequate reflectors of the true (current and future) value of nature’s many services. Hard Green enthusiasts advocate the use of state-of-the-art technology to harvest trees and drill for oil, while protecting wilderness for humans’ aesthetic enjoyment. Both groups appreciate the ecological and human services provided by trees via evapotranspiration: helping keep the climate cool by removing carbon dioxide (a greenhouse gas), emitting oxygen for living creatures to breathe, and circulation water in the hydrologic cycle. Hard Green advocates also emphasize that, for most species of trees, younger/growing trees have a higher rate of evapotranspiration than older/decaying trees, thereby justifying harvesting trees with replanting.

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- Virginia Council on Economic Education
- Virginia Environmental Endowment

Lesson 1: Wood Products Case Study

Target Level:

Grades 6-8

SOLs:

Science 6.11

Life Science 11, 12

Earth Science 7

Civics & Economics 7.6

Subjects Covered:

Science, Math, Social Studies

Skills:

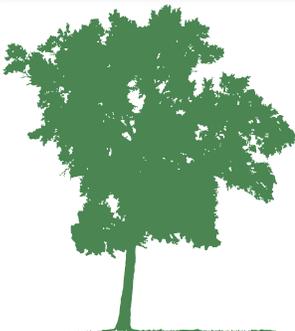
Defining, categorizing, comparing, planning, concluding

Vocabulary Words:

- clear cutting
- forest products
- multiple use
- forest preservation
- reforestation

Materials Needed:

Make copies of the background materials, the five options, and the sustainable development chart for each group working on the wood products case.

**Overview**

This unit focuses on forest resources as they relate to sustainable development. It is appropriate for grades 6-8. It is the goal of the unit to have students increase their understanding of the basic benefits of forest resources, costs and benefits of setting aside wilderness preservation areas, public policy decisions involved in the trade-offs, and challenges of providing wood products using forest management practices.

Objectives

Students will:

1. evaluate the problem of maintaining sustainable forests,
2. compare and contrast five management options, and
3. correlate their decisions on a sustainable development.

Background

The increasing world population and growing demand for wood products and fuel are creating a critical need to create a sustainable system of forestry that supplies a wide array of goods and services, while protecting the health and diversity of forest ecosystems. Forests need be managed to meet the social, economic, and ecological needs of current and future generations. Sustaining forests into the future requires changes in the way forestry is practiced so that forest quality is enhanced and that biodiversity and ecological processes are maintained. The changes may require policy and pricing changes, reduction in waste and consumption, and recognition of the real wealth of a healthy forest ecosystem (Abramovitz). To ensure that our needs and those of future generations are met, we must practice conservation and sustainable management, rehabilitate degraded forests and value the benefits of forest products and forests (Abramovitz).

There are about 737 million acres of forests covering about 30 percent of the total land in the United States. About 490 million acres are commercial timberland used to produce wood products (American Forest & Paper Association) with more than ten million Americans owning 59 percent of the commercial forest land in America (Sustainable Forests). Federal, state and local government agencies own 27 percent of the commercial forests while forest products companies own 14 percent-- about 70 million acres. Private owners, such as farmers and owners of estates, own more than 59 percent of our working forests.

In Virginia, there are 16 million acres of forestland. Almost three-quarters of the forestland is owned by 300,000 private land owners. State and federal governments own 12 percent of the forestland. Forest industries own 13 percent of the forestland. The forest industry is the number one manufacturing industry in Virginia. One out of every seven manufacturing job is forest-related. Each year over 60 million pine seedlings are planted in Virginia to reforest the land. Forest resources contribute \$7.4 billion annually to Virginia's economy (Virginia Resource-Use Education Council).

In the United States, forestland is converted to shopping centers, new subdivisions, roads and commercial centers because these uses have higher value or because forestry has become unprofitable as the result of regulations, urban sprawl, or environmental movements. In the world, more than 90

percent of deforestation occurs because of the demand for more agricultural land or firewood for cooking and heating (American Forest & Paper Association). Wood remains the major source of energy for human use with about 3 billion people worldwide using wood as their primary source of energy. In the United States, wood supplies about 10 percent of home heating fuel. In developing countries, wood is the main source of fuel for heating and cooking. The Food and Agriculture Organization of the United Nations estimates over one billion people are meeting their need for wood by depleting existing supplies and are cutting trees faster than they can be replenished. In Africa, women and children walk 30 miles for a few sticks of wood to cook their meals (Owen). Trees around villages have been depleted and desperate peasants use dried cattle dung as fuel.

Harvesting

Forest harvesting uses three basic methods: *clear-cutting*, *selective cutting* and *shelterwood cutting*.

The fastest and cheapest method to harvest trees is a *clear-cutting* operation, where loggers remove all the commercial timber (usually trees larger than one inch in diameter) from a plot. The remaining slash of loose bark, branches, sawdust and broken logs can be left on the land or burned. In some operations, the leftovers are chipped, bundled and used for other wood products. Burning

also is an option which adds nutrients to the soil, facilitates regrowth, and reduces the threat of forest fires from the forest litter. In hilly terrains where clear-cutting would result in extensive runoff and soil erosion, the strip cutting method of harvesting timber has been used. Similar to the strip cropping on farmland, strip cutting allows loggers to remove narrow strips of forest and leave the remaining forested strips to serve as erosion controls and seed sources.

Another system of clear-cutting is the seed-tree cutting system that leaves enough large trees behind in a clear cut to provide seeds for reforestation. Removal of the seed trees usually takes place after the cut area is repopulated with desirable seedlings. Clear-cutting destroys the scenic beauty of an area, alters habitats and diminishes the carrying capacity for some species in that area. It can accelerate soil erosion that reduces the quality of water resources and it depletes the soil of nutrients. Despite these environmental impacts, clear-cutting has its advantages. It is the quickest and simplest method of harvesting and is the only way to harvest such desirable species as Douglas Fir. It is the only effective method to control some disease and insect infestations. Clear-cut areas regenerate quickly as sun-loving shrubs and saplings become established providing habitat and food for a great variety of wildlife such as deer, grouse, turkey and songbirds.

Selective cutting removes a limited number of mature trees from a forest. Deformed and trash species called cull trees are removed to upgrade the forest. New trees begin growing in the newly-created openings and in a few years become established under the existing canopy of older, larger trees. This uneven-aged management approach allows for continuous growth and harvest (Tomorrow's Forests Begin Today). Over time this process is repeated and the cutting can occur as often as every five years or as long as every 20 years. The forest undergoes continuous harvesting and regeneration. Selective cutting

reduces soil erosion and wildlife habitat destruction and is viewed as a good alternative to clear-cutting (Chiras). However, an uneven-aged management system is more costly, requires more time to harvest all of the desirable trees, and is not suitable for trees that must grow in sunny locations. Because of these disadvantages, some forest experts do not view it as a replacement to clear-cutting.

Shelterwood cutting is an intermediate form of tree harvesting between clear-cutting and selective cutting that leaves a cover of large trees on a site to protect regeneration. In this technique forty to



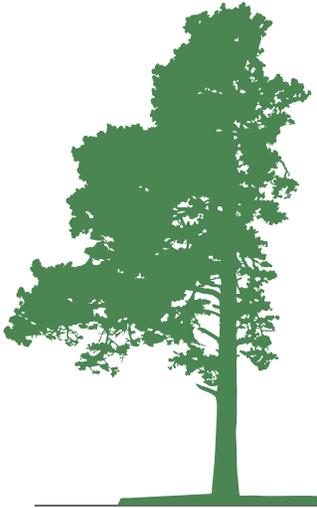
Clear-Cutting



Selective Cutting



Shelterwood Cutting



sixty percent of the trees are removed, allowing new trees to become established in the partial sunlight under the shelter of remaining older trees. Once seedlings become established, loggers remove a portion of the commercially valuable mature trees. When the seedlings become saplings, the remaining older trees are harvested. Although this harvesting technique has the advantages of the selective cutting in that erosion is minimized, there is no unvegetated land, and it increases the regeneration of the forest, it is more costly than either clear-cutting and selective cutting. In areas where the local economy depends on tourism, selective cutting and shelter-wood cutting can provide additional economic and aesthetic advantages (Chiras).

In a sustainable forest, whenever timber is harvested or the forested land is destroyed by fire, insects or natural disasters, the area must be reforested to ensure sustainable yields in the future. After the forest is logged off, natural reseeding will occur as mature trees will provide the seed which is scattered by the wind and dispersed by birds, rodents and runoff water. Natural seeding does not usually allow for complete regeneration of the site because some varieties do not produce seeds every year, some seeds do not fall on fertile ground, and adequate moisture and nutrients may be missing. Natural reseeding is often supplemented by aerial, hand or machine seeding. More successful than seeding, is reforestation by planting young seedlings.

Management

Five options for managing and maintaining a sustainable forest while meeting the demands for wood products might include the following:

Option 1

- **Ban clear-cutting** as a means of harvesting trees, thereby forcing landowners to choose other options to ease the aesthetic concerns of many people concerned about cutting all of the trees. For some businesses this approach would make it easier to deal with the public and to do business. The ban would also prevent unscrupulous companies from poor management approaches that result in erosion, impaired water quality, or destruction of wildlife habitat. However, banning clear-cutting would raise the cost of timber by reducing the supply, increase harvesting costs, limit productivity of working forests, and leave forests unmanaged in case of disease or insect infestation.

Option 2

- Have **states develop their own forest standards** for harvesting and management because forests are different across the country and standards do not work the same in all states. State officials are closer to the issues, the level of demand, and the type of trees in their area. They also know more about the forests' health and public concerns. However, leaving issues like forestry to individual states has many potential problems. If neighboring states have drastically different standards, the forest health on adjacent lands could suffer. Paper mills could be in one state and use wood from surrounding states, putting disproportionate pressure on the others. In addition, some state many not share the same level of concern for the sustainability of the forests.

Option 3

- Institute **educational programs** to make the public aware of forest issues and the value of forests. Media coverage of environmental issues rarely covers forestry issues. Many Americans are unaware of timber supply concerns. The industry states that if more people understood what goes on in the forests and how much they use out of the forest each year, the public would demand the practice of sustainable forestry. However, some feel that a public education program is not enough to ensure that the job gets done. The public can be fickle—one day they are excited and interested in an issue and the next they are on to something else. It may require a combination of approaches, but the choice is either a public education program or nothing.

Option 4

- Allow **industry to manage the natural resource** in a sustainable manner because they depend on a supply of wood to stay in business and survive. The American Forest and Paper Association,

a trade organization, has created the Sustainable Forestry Initiative that requires a company to adhere to a set of principles designed to manage today's forests for future generations or they lose their membership. Some companies require that their loggers complete education seminars and training workshops. More than one-third of the United States is forested. Timber companies point out that in the U.S. today there are more acres of forests than 100 years ago, proving that they can manage this renewable resource in a responsible and sustainable way. However, many people are skeptical about the industry's claims of improving the environment, pointing out the environmental destruction that some companies have done to the nation's forests. They wonder if the industry can achieve a genuine change in America's commercial forestry practices that will have a positive effect on the future of America's forests.

Option 5

- **Abandon the use of wood for making paper**, requiring the nation's paper generally supply to come from recycled paper or non-wood fiber. The quality of paper made from recycled paper is very good and sometimes indistinguishable from paper made from wood. Although more than 40 percent of the paper produced in this country is already recycled, recycled fibers eventually break down and cannot keep being recycled. Fibers made from annual plants can be used to make paper instead of wood. However, using annual fibers requires huge amounts of land to grow them and would have economic repercussions that might be harmful to America's forests. If forests that are being managed and grown for the timber and wood products have to compete with the paper making industries that use annual fiber farms, the value of the timber may go down. Large tracts of forests might be cut because of the economic incentive to switch from trees to annual fibers for paper making. The competing economic forces may force some forests owners to convert the land to non-forest uses, or to sell to developers who harvest the trees and build subdivisions, shopping centers or commercial complexes. Each option has its benefits, costs and social consequences.

Procedure

1. Assign students to the two groups that will work on the wood products case study.
2. Explain to students that they will be applying the information they have been reading on sustainable forestry to a case about a corporation that produces wood products. The objective is to select a sustainable forestry management option for their land and be able to defend their decision. They can use one of the five options, a combination of the options, to devise an option of their own.
3. Have students complete the work by discussing the consequences of their decision on the forests. In addition, to discussing the environmental effects of their decision, ask students what were the economic implications. Have students relate the exercise to how timber companies make forest management decisions and the impact on the community. What are the social consequences of their decision. Have students complete the sustainable development matrix.
4. Have each of the two groups present their decision, explain why they decided as they did and defend it to the rest of the class. Compare the matrix for each group.

Evaluation

Assess student learning by how well they have compared the different methods and how well they defended their decision. Completing the sustainable development matrix requires independent thinking beyond the case content and is an opportunity for application of new information.

Extension

1. Have students develop the five options into a forest survey they can do outside of the classroom. Compare the survey results with those selected by the groups.
2. Have a representative from a local wood products company visit the class and discuss the forest benefits and conflicting goals of sustainable forestry management.
3. Have students select one of the options and debate the benefits and costs.

Lesson 2: Sustainable Hardwood Tree Farm Case Study

Target Level:

Grades 6-8

SOLs:

- Science 6.11
- Life Science 11, 12
- Earth Science 7
- Civics & Economics 7.6

Subjects Covered:

Science, Math, Social Studies

Skills:

Defining, categorizing, comparing, planning, concluding

Vocabulary Words:

- clear cutting
- forest products
- multiple use
- forest preservation
- reforestation

Materials Needed:

- Class copies of the background information
- Overhead transparencies of the methods of tree harvesting
- Group copies of the Tree Farm Worksheet

Overview

Sixty percent of all forestland is managed by private non-industrial landowners. There are 70,000 certified Tree Farms in the 48 continental states, accounting for 85 million acres of forest land and a majority of the watershed that surrounds our nation’s lakes, rivers, and wetlands. These small private landowners may include a person who owns only a few acres around their hunting cabin to larger landowners who might have 10,000-acre forest plantations. Many of these landowners depend on the timber values of their forestland to pay basic expenses, including taxes. Students will examine management options and the profit incentives for tree farmers and determine how they can make a profit while still protecting wildlife habitats, the watershed, and recreational activities such as camping, hunting and hiking.

Objectives

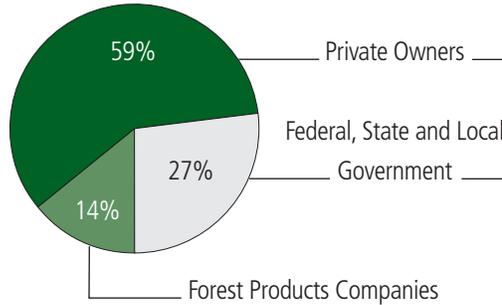
Students will:

1. list the types of production resources needed to manage a tree farm,
2. define market price, supply and demand as it relates to a tree farm, and
3. devise a profitable management plan for the tree farm.

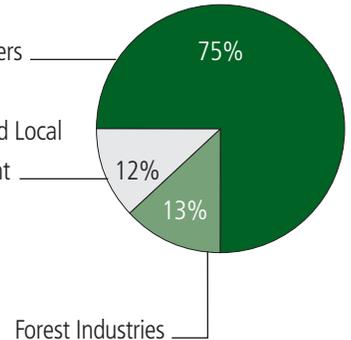
Background

In Virginia, there are 16 million acres of forestland. Almost three-quarters of the forestland is owned by 300,000 private land owners. State and federal governments own 12 percent of the forestland. Forest industries own 13 percent of the forestland. The number one manufacturing industry in Virginia is the forest industry. One out of every seven manufacturing jobs is forest-related. Each year over 60 million pine seedlings are planted in Virginia to reforest the land. Forest resources contribute \$7.4 billion annually to Virginia’s economy (Virginia Resource-Use Education Council).

Commercial Forestland Ownership



Virginia Forestland Ownership



An acre of working forests must be cared for by its owner for 25 to 50 years before it can be used for timber. During that time the forest provides many others things we value, such as clean air, water, wildlife habitat, recreation and aesthetics. However, if after 25 to 50 years of growing tree farming, the trees become diseased, damaged or die and the trees are no longer valuable as timber, the landowners might have to find more profitable uses of their property. Many farms are being converted to non-forest use, such as developments, recreational

areas, and shopping centers. It is important that landowners know the benefits of managing their own land and practice sustainable forestry.

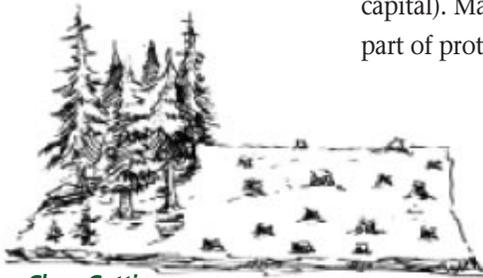
Private forest owners have an economic incentive to manage their forestlands well. Trees are a highly profitable commercial crop. Poorly managed land tends to lose value. Properly managed, even small forests can help supply today's world with wood-based products and recreational opportunities and meet the same needs of future generations. Managing a forest for multiple use requires expertise and many productive resources.

Marketing

The market price of wood is determined by its supply and demand. If the market price is low, then wood producers know there is more supply (wood available for sale) than demand (people wanting to buy the wood). In this type of market, the tree farmer would need to put fewer productive resources into wood production. A high market price for wood tells producers that wood is scarce in relationship to demand. In other words, there is not enough wood for sale to meet the demand for all those needing to buy it at the time. In this type of market, consumers want more productive resources devoted to wood production. The market price for wood changes depending on supply and demand. Timber producers cannot set the price; they must accept the price that is determined by the market. Tree farmers try to lower their unit costs in order to increase profits. If the market price goes up, their profits usually will too. They also can increase profits with most cost-effective production methods. However, if production costs increase and market price decreases, their profits will be reduced.

Management

Managing a tree farm requires expertise and many productive resources (natural, human and capital). Managing a tree farm for the timber value and maintaining opportunities for recreation are part of protecting the ecosystem's structure and function. For example, when a tree farmer chooses to cut some trees and clear an area to provide an opening to benefit wildlife, it means that some birds and plants that live in existing forest environments will be impacted. Each management choice favors some species and enhances some processes at the expense of the others. Responsible forest management means managing an ecosystem in which the future of every element in the system depends on carefully considering the future of every other element.



Clear-Cutting



Selective Cutting



Shelterwood Cutting

Forest harvesting uses three basic methods: *clear-cutting*, *selective cutting* and *shelterwood cutting*.

The fastest and cheapest method to harvest trees is a *clear-cutting* operation, where loggers remove all the commercial timber (usually trees larger than one inch in diameter) from a plot. The remaining slash of loose bark, branches, sawdust and broken logs can be left on the land or burned. In some operations, the leftovers are chipped, bundled and used for other wood products. Burning also is an option which adds nutrients to the soil, facilitates regrowth, and reduces the threat of forest fires from the forest litter. In hilly terrains where clear-cutting would result in extensive runoff and soil erosion, the strip cutting method of harvesting timber has been used. Similar to the strip cropping on farmland, strip cutting allows loggers to remove narrow strips of forest and leave residual forested strips to serve as erosion controls and seed sources.

Another system of clear-cutting is the seed-tree cutting system that leaves enough large trees behind in a clear cut to provide seeds for reforestation. Removal of the seed trees usually takes place after the cut area is repopulated with desirable seedlings. Clear-cutting temporarily destroys the scenic beauty of an area, alters habitats and diminishes the carrying capacity for some species in that area. It can accelerate soil

erosion that reduces the quality of water resources and it depletes the soil of nutrients. Despite these environmental impacts, clear cutting has its advantages. It is the quickest and simplest method of harvesting and the only way to harvest such desirable species as Douglas Fir. It is the only effective method to control some disease and insect infestations. Clear-cut areas regenerate quickly as sun-loving shrubs and saplings become established, providing habitat and food for a great variety of wildlife such as deer, grouse, turkey and songbirds.

Selective cutting removes a limited number of mature trees from a forest. Deformed and trash species called cull trees are removed to upgrade the forest. New trees begin growing in the newly-created openings and in a few years become established under the existing canopy of older, larger trees. This uneven-aged management approach allows for continuous growth and harvest (Tomorrow's Forest Begin Today). Over time this process is repeated and the cutting can occur as often as every five years or as long as every 20 years. The forest undergoes continuous harvesting and regeneration. Selective cutting reduces soil erosion and wildlife habitat destruction and is viewed as a good alternative to clear-cutting (Chiras). However, an uneven-aged management system is more costly, requires more time to harvest all of the desirable trees, and is not suitable for trees that must grow in sunny locations. Because of these disadvantages, forest experts do not view it as a replacement to clear-cutting.

Shelterwood cutting is an intermediate form of tree harvesting between clear-cutting and selective cutting that leaves a cover of large trees on a site to protect regeneration. In this technique 40 to 60 percent of the trees are removed, allowing new trees to become established in the partial sunlight under the shelter of remaining older trees. Once seedlings become established, loggers remove a portion of the commercially valuable mature trees. When the seedlings become saplings, the remaining older trees are harvested. Although this harvesting technique has the advantages of the selective cutting in that erosion is minimized, there is no unvegetated land, and it increases the regeneration of the forest, is more costly than either clear-cutting and selective cutting. In areas where the local economy depends on tourism, selective cutting and shelterwood cutting can provide additional economic and aesthetic advantages (Chiras).

In a sustainable forest, whenever timber is harvested or the forested land is destroyed by fire, insects or natural disasters, the area must be reforested to ensure sustainable yields in the future. After the forest is logged off, natural reseeding will occur as mature trees will provide the seed which is scattered by the wind and dispersed by birds, rodents and runoff water. Natural seeding does not allow for complete regeneration of the site because some varieties do not produce seeds every year, some seeds do not fall on fertile ground, and adequate moisture and nutrients may be missing. Natural reseeding is often supplemented by aerial, hand or machine seeding. A major disadvantage of seeding an area is the portability of seeding during the first year because of insects and harsh weather conditions. More successful than seeding is reforestation by planting young seedlings.

In the sustainable approach to forest management, resources are used without adversely affecting or creating long-term damage to the physical and biological environments. It includes multiple use. Tree Farms and forests are not only a source of timber, but also have many other values such as wildlife habitat, beauty, flood and erosion control, and climate control. This approach requires that resources be used so as to not adversely affect the physical and biological environments. Managers must consider the whole system to ensure the long-term health and vitality of all of the natural resources, not just one. The multiple use approach has as its goal to make the greatest number of forest resources available to the greatest number of Americans. Sound multiple-use management requires that the needs of many people be considered, a complex ecological and economic challenge.



Procedure

1. Begin the lesson by having all students read the background information on Sustainable Hardwood Tree Farms. Explain that they will be using this information to help them with their case study.
2. Using the overhead transparencies of each of the tree harvesting methods, discuss clear cutting, selective cutting, and shelter wood cutting. Point out the advantages and the disadvantages of each method.
3. Ask students to rank the merits of each method as a sustainability forest management approach.
4. Have students complete the Tree Farm Worksheet. Discuss each question paying special attention to productive resources and market price topics.
5. Using the tree farm description, have the two groups design a management plan for the hardwood tree farm. The goal is not only to sell the timber for a profit, but also to protect the wildlife habitats and watershed and to preserve recreational activities. Some possible ideas would be hiking and biking trails, primitive camping sites, catch and release fishing pond, harvest festivals, photography and bird watching events, and other money-making activities. Tell students that they can develop a land management plan that includes only one use or multiple uses, but the plans must be compatible with each other. All plans must consider present and future tree farm operations. At least 25 percent of the land must remain in tree farming.
6. Have students complete the sustainable development matrix that assesses the economic, environmental, and social consequences of their decision.
7. Have each group present to the class their forest management plans and the sustainable development matrix. Compare the different approaches and discuss how their decisions will affect the future of the tree farm.

Evaluation

Assess student learning by how well they have developed their forest management plans and how well they defended their decision. Determine application of new information by how well they completed the sustainable development matrix.

Enrichment

1. Visit a tree farm or have a tree farmer come to class to discuss the management practices used by improve productivity and to make the farm sustainable.
2. Debate the question "Can clear-cutting be beneficial to forests?"
3. Prepare a report on the differences between a tree farm and a hardwood tree farm in terms of types of trees grown, years from seedlings until harvest, types of sustainable management techniques.
4. Research how the timber industry has changed in the past 50 years and illustrate the changes with graphs.



Handout 1 – Tree Farm Worksheet

1. Managing a tree farm for timber and other multiple uses such as wildlife habitat, recreation, scenic landscapes, watershed protection requires many productive resources. It takes a combination of natural, human and capital resources. For example, a productive, healthy tree farm requires adequate money (capital) and knowledgeable managers. Complete the chart below by listing five productive resources in each category.

Natural Resources (<i>Environmental</i>)	Human Resources (<i>Social</i>)	Capital Resources (<i>Economic</i>)
<ul style="list-style-type: none"> • Trees • Clean water • Wildlife • Scenic landscapes • Air • Minerals • Sunlight 	<ul style="list-style-type: none"> • Logger • Truck driver • Forester • Tree planter • Biologist • Financial Manager 	<ul style="list-style-type: none"> • Adequate funding • Proper equipment such as chain saws, tree planting equipment, hard hats, climbing equipment • Trucks • Skids

2. The price of hardwood timber is not fixed. It changes every day based on factors such as how much wood is for sale and how many people are willing to buy it. These changes in the price derive from supply and demand and affect whether the market price will go up or down. In the chart below, circle your decision about whether the market price will go up or down for each situation.

<i>Situation</i>	<i>Market Price</i>
1. The demand for wood stays the same, but the supply of wood decreases	Increase Decrease
2. The supply of wood stays the same, but demand increases	Increase Decrease
3. The demand for wood stays the same, but the supply increases	Increase Decrease
4. The supply of wood stays the same, but demand decreases	Increase Decrease
5. The supply increases, and the demand increases	Increase Not Enough Info
6. The supply decreases, and the demand increases	Increase Decrease

3. In each of the six situations what will happen to the tree farmer's profits if he must sell at that time?

<i>Situation</i>	<i>Profit</i>	<i>Reason</i>
#1	Increase Decrease	Higher price but same production costs
#2	Increase Decrease	Higher price but lower production costs
#3	Increase Decrease	Same production costs but lower price because of more sellers
#4	Increase Decrease	Same production costs but lower price because of fewer buyers
#5	Increase Decrease	Higher production costs and same price
#6	Increase Decrease	Higher price with lower production costs and more buyers

4. During the past few months you have reached a point in the management of your tree farm where you have to make some difficult decisions. You have no more trees that are ready to be harvested. The market price for your timber is frozen and you cannot get a higher price. Profit is the amount of money left from sales revenues after all of the costs of production have been paid. In this situation, what is the only way to increase your profits and what are some of the ways you can achieve this? How might you use the land that has only small seedlings? How do you plan to preserve recreational activities such as hiking, camping, hunting, or mountain biking? Develop a plan for how you will manage the 600 acres of your tree farm so that you can meet all of these goals. (*Answers will vary.*)

Handout 1 – Tree Farm Worksheet

- Managing a tree farm for timber and other multiple uses such as wildlife habitat, recreation, scenic landscapes, watershed protection requires many productive resources. It takes a combination of natural, human and capital resources. For example, a productive, healthy tree farm requires adequate money (capital) and knowledgeable managers. Complete the chart below by listing five productive resources in each category.

Natural Resources (Environmental)	Human Resources (Social)	Capital Resources (Economic)
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

- The price of hardwood timber is not fixed. It changes every day based on factors such as how much wood is for sale and how many people are willing to buy it. These changes in the price derive from supply and demand and affect whether the market price will go up or down. In the chart below, circle your decision about whether the market price will go up or down for each situation.

Situation	Market Price	
1. The demand for wood stays the same, but the supply of wood decreases	Increase	Decrease
2. The supply of wood stays the same, but demand increases	Increase	Decrease
3. The demand for wood stays the same, but the supply increases	Increase	Decrease
4. The supply of wood stays the same, but demand decreases	Increase	Decrease
5. The supply increases, and the demand increases	Increase	Not Enough Info
6. The supply decreases, and the demand increases	Increase	Decrease

- In each of the six situations what will happen to the tree farmer's profits if he must sell at that time?

Situation	Profit		Reason
#1	Increase	Decrease	_____
#2	Increase	Decrease	_____
#3	Increase	Decrease	_____
#4	Increase	Decrease	_____
#5	Increase	Decrease	_____
#6	Increase	Decrease	_____

- During the past few months you have reached a point in the management of your tree farm where you have to make some difficult decisions. You have no more trees that are ready to be harvested. The market price for your timber is frozen and you cannot get a higher price. Profit is the amount of money left from sales revenues after all of the costs of production have been paid. In this situation, what is the only way to increase your profits and what are some of the ways you can achieve this? How might you use the land that has only small seedlings? How do you plan to preserve recreational activities such as hiking, camping, hunting, or mountain biking? Develop a plan for how you will manage the 600 acres of your tree farm so that you can meet all of these goals.

Lesson 3: Sustaining Wilderness Areas Case Study

Target Level:

Grades 6-8

SOLs:

Science 6.11

Life Science 11, 12

Earth Science 7

Civics & Economics 7.6

Skills:

defining, categorizing,
comparing, planning,
concluding

Vocabulary Words:

- clear cutting
- forest products
- multiple use
- forest preservation
- reforestation

Materials Needed:

- Copies of scenario for each of the three groups
- Copies of political profile of the “representative” who will present their viewpoint
- Class ballots
- Sustainable Development Chart – copies for class or an overhead transparency

Overview

One-third of the United States (about 731 million acres) is forestland. Approximately 95 million acres is part of the National Wilderness System, the largest set-aside program in the country. Created under the Wilderness Act of 1964, these wilderness lands may be forested or not, but they have no roads, power lines, or any settlements. About 35 million acres of these protected lands have commercially valuable timber, but it cannot be harvested under the law. Until 1970, only about 11 million acres were part of the National Wilderness System. Today, most of the wilderness areas are in Alaska and many citizens feel that more land should be set aside as wilderness areas. However, the decision is left to Congress who must consider the economic costs and benefits in such a decision. Every public policy has its trade-offs. Setting aside more wilderness areas means less wood is harvested, making the price of wood and wood products higher. Not setting aside preservation areas means timber harvesting, oil exploration and mining might occur in beautiful, untouched areas. In this case, students will represent the various views of members of Congress. They will present their case to the class who will vote on the proposal.

Objectives

Students will:

1. identify the costs and benefits of setting aside land as a wilderness area,
2. analyze the trade-off of such a policy, and
3. defend their recommendation on this controversial issue.

Procedure

1. Read students the following scenario about an up-coming debate in the House of Representatives.

Scenario

The House of Representatives is considering a controversial bill that would set aside under the 1964 Wilderness Act 340,000 acres of undeveloped land in Alaska as a new wilderness area. All of the land would remain in its natural state and could not be used for any commercial use. Many environmental organizations would like to see the bill pass. However, many of the representatives are concerned about the economic value of the land and the loss of timber and mining resources. The bill has come up for debate. Three representatives are ready to state their view points. Once they have completed their presentation, the House of Representatives will vote.

2. Select or have students volunteers to be the three representatives who will debate the topic. Pass out the role cards to the volunteer representatives.
3. Divide the remaining students into three work groups to assist the student “representative.” Their job is to help prepare the facts to be used in the presentation. Explain to the groups they have to follow the political philosophy

of their representative. They should consider the economic benefits and costs and the trade-offs that a wilderness designation will include for the state and the country.

4. Conduct the debate and have the remaining class members vote on the legislation.
5. Complete the case study by completing the sustainable development chart.

Prepare the following cards in a format suitable for the teacher to copy and hand out to the students

Evaluation

Assess student learning by the quality of the presentation, the preparation done by the groups and how well they defended their decision. Determine if students can address the trade-offs with each viewpoint and examine how well they can complete the sustainable development matrix.

Enrichment

1. Research the Wilderness Act of 1964 and describe the areas that have been designated wilderness areas in the United States.
2. Debate the statement: "Wilderness areas and the environment are a moral, not an economic issue."
3. Find newspaper or magazine articles on forest environmental issues. Categorize the articles as to the author, i.e., industry or environmental group. Analyze each statement to determine the techniques used to convince the reader. Examine the artwork or picture and determine its effect on the message. Summarize your analysis in a paragraph and relate your conclusions to how the article's message fits the goal of sustainable forestry.

Resources

"Seeing the Forests for their Green," ECONorthwest, 2000 available at www.sierraclub.org/forests/report00/



Lesson 3: Political Profiles



Wilma Saveit, Representative from New Mexico

Wilma Saveit, an environmentalist, is the bill's sponsor and feels it is critical to set aside more public lands for protection from economic development. She says that landscape beauty, wildlife habitat, and protected watersheds are important to the country and future generations. If all of the wild lands in the country are mined or logged there will not be undisturbed lands for future generations. Such unspoiled wilderness areas are the only way to manage these lands sustainably. She does not support the compromise proposal that would restrict timber operations, but allow for natural resource exploration such as mining and oil drilling. Such an approach would allow development. The land, she says, needs complete protection and to be preserved for future generations.



Mark Sellers, Representative from New Hampshire

Mark Sellers is sensitive to the need for protected set-aside lands, but he feels that there is much economic value in 340,000 acres including minerals and future oil reserves. The country recently experienced a very high rise in gasoline and home heating oil. Many of the voters in his district want him to work to get their fuel bills down. Exploring for oil in this remote area could be a possible solution to the need for more domestic reserves of oil. Representative Sellers thinks the environmental impact would not be any greater than the Alaska Pipeline built many decades ago. There will be economic loss for the people of the area if the oil companies cannot drill for oil, he says.



Sylvia Culture, Representative from Oregon

Sylvia Culture is from Oregon and knows how important timber jobs in her district are to the economy of the area she represents. This land in Alaska is producing valuable timber and providing jobs for many families in small rural towns. Representative Culture has seen what happens to small towns, the sawmills and the communities when timber operations are halted. If the bill passes, she says that some people will lose their jobs and the price of timber will rise, affecting all Americans. Such a rise in timber prices will affect the citizens with lower incomes the most. She says that the land must be kept open as a multiple use area for the future of the country.

Lesson 3: Evaluation – Congressional Decision

Discuss the effects of your congressional decisions pertaining to the undeveloped land in Alaska. What are the consequences of the legislation passed?

	Positive	Negative
Environmental Effects		
Social Effects		
Economic Effects		

