

OVERVIEW

In this activity, students will play the roles of managers of a 400-acre (162 hectare) piece of public forest. Through these roles, students will begin to understand the complex considerations that influence management decisions about forestlands.

**BACKGROUND****Ecosystem Management and Land Stewardship**

Maintenance or restoration of biodiversity is essential to sustain both the commodity and non-commodity values of the eastern deciduous forest.

Traditionally, foresters have regarded sustainability of forests solely as a level of timber harvest or management that could be maintained indefinitely. This early view of sustainability of the forest has been replaced by a more contemporary one that can be defined as the long-term capacity of ecosystems to produce values for society. The concept of ecosystem management as it has emerged today is in response to concerns for conservation of this biodiversity (Yahner, p.134).

Sustainable Forestry: Keeping a Healthy and Productive Forest

Sustainable forestry is defined as the ability to meet the needs of the present without compromising the ability of future generations to meet their own needs. Through sustainable forestry a land stewardship ethic is practiced that encompasses all forest values.

At the core of sustainable forest management guidelines are certain prescriptions: Do not simplify the forest ecologically. Do not take more from the forest than the forest can provide and still remain healthy. Do not allow short-term expediency — the desire to minimize management costs and maximize timber production — to reduce the forest's long-term productive capacity. In essence, while gathering some of the forest's bounty, do no intrinsic harm to the forest (Berger, 1998, p. 112).

Sustainable forestry aims at delivering a continual yield of forest products by protecting the whole forest as an ecosystem. The extraction of forest products is limited to the incremental growth between cycles of harvest so that the forest is constantly able to renew itself without an overall loss in quantity or quality.

Ecosystem Management

A new shift in management philosophy emerged in the mid-1980s. Ecological forest management maintained a forest's capacity to produce a stable and perpetual yield of timber and other goods and services. Some argue that this was not much different than multiple-use forest management, but the management philosophy evolved even further to be called ecosystem management, which emphasized further protecting the forest's natural dynamic processes and functions. Rather than being viewed as containing a set of resources, it was realized that forests are more than just the sum of their parts.

Ecosystem management can be defined simply as an ecological approach to resource management. All aspects of an ecosystem are considered important. The interdependency of biological and non-biological systems and cycles is central to this holistic approach, with a primary goal of keeping the complex interdependencies of ecosystems intact and functioning well over long periods of time.

Two specific goals of ecosystem management are to maintain viable populations of all species and to ensure the preservation of all native ecosystems. As previously discussed, a key element in maintaining ecosystem integrity and viability is the maintenance of biological diversity.

Management of the forest at the ecosystem level is the logical direction to ensure biodiversity conservation. However, in order to realize success, it will require innovative and cooperative interagency plans and the involvement and cooperation of the many private forest landowners.

Land Stewardship through Landowner Education

Forest stewardship is akin to sustainable forestry in that it is the wise management and use of our forests in order

GRADE LEVELS:

Grades 7–10

OBJECTIVES: Students will (1) create a management plan for a hypothetical piece of public forest land, taking into account factors such as ecosystem stability, monetary income or costs, wildlife, water and visitors and (2) experience the analysis and decision making that goes into managing forest land.

PENNSYLVANIA PROPOSED ENVIRONMENT & ECOLOGY STANDARDS ADDRESSED:**4.3.7**

- B. Describe how human actions affect the health of the environment.
- C. Explain biological diversity.

4.6.7

- A. Explain the flows of energy and matter from organism to organism within an ecosystem.
- B. Explain the concepts of cycles.
- C. Explain how ecosystems change over time.

4.7.7

- A. Describe the diversity of plants and animals in ecosystems.
- B. Explain how species of living organisms adapt to their environment.

4.8.7

- C. Explain how human activities may affect local, regional and national environments.
- D. Explain the importance of maintaining the natural resources at the local, state and national levels.

4.3.10

- B. Explain how multiple variables determine the effects of pollution on environmental health, natural processes and human practices.
- C. Explain biological diversity as an indicator of a healthy environment.

4.6.10

- A. Explain the biotic and abiotic components of an ecosystem and their interaction.
- B. Explain how cycles affect the balance in an ecosystem.
- C. Analyze how ecosystems change over time.

4.7.10

- A. Explain the significance of diversity in ecosystems.
- B. Explain how structure, function and behavior of plants and animals affect their ability to survive.

to ensure their health and productivity for years to come. Stewardship challenges landowners to look beyond immediate personal needs in order to leave a living forest legacy for future generations. The forests provide benefits that we cannot live without. We need to take proper care of our forests to ensure that they stay healthy and continue to meet our needs as well as the needs of our children and their children.

Stewardship challenges us first to understand the natural processes that take place in a forest. Then it challenges us to ensure that when we alter these processes we do so in a way that continues to enrich the lives of all who depend on forests — wildlife, humans and generations yet to come (DCNR, p. 2).

As previously discussed, 69 percent of Pennsylvania's forestland is owned by non-industrial private landowners. The majority of these landowners do not currently have a long term management plan.

Landowners often feel that they don't need to manage their land, especially if timber production is not the primary purpose for owning their forest. Average forest parcel size is also decreasing and owners of smaller parcels are even less likely to manage their forest for timber. Regardless of the size of the forest, it is recommended that every private landowner think about their reasons for owning their forestland and develop a management plan that will help them to manage their forest for the benefits desired.

While managing a forest can be complex and time consuming, professional foresters can provide valuable assistance. The landowner decides what kinds of benefits are wanted from the woodland and the forester determines whether and how the resource can be managed to provide these benefits. Depending on the goals of the landowner, the forests could be managed in such a way to be more accessible and attractive for wildlife and/or for recreation, while at the same time increasing the trees' health and vigor, and subsequently growing more timber.

One reason that some landowners may decide to harvest some timber from their land is because of increases in property taxes. A landowner must pay taxes on land whether income is received from it or not. The financial return from a

timber sale may be essential in order to pay taxes or for continued land management. Forest-generated income is an incentive for landowners to maintain woodland on their property. Without this potential source of income, alternatives such as commercial and residential development become more attractive. Providing landowners with income from standing timber helps people retain land ownership, reducing the likelihood of forest fragmentation or permanent land use changes. The results may be that more land ultimately remains forested.

As Pennsylvania's hardwood forests approach maturity, the growing demand for high-quality hardwoods has driven the commercial value of standing timber to an all-time high. These higher timber prices have prompted many landowners, even those who previously had little or no interest in selling timber, to consider a logging operation.

Education is key for helping to instill a land stewardship ethic in landowners that will result in more private forestland being managed and improved timber harvesting practices on private land. Education of and assistance to private forest landowners is difficult due to the complexity of private ownership, but there are a number of programs working towards those goals.

Programs of Stewardship for Landowners

There are a number of traditional landowner and logger education programs in Pennsylvania, supported by the Hardwood Lumber Manufacturers Association, the DCNR Bureau of Forestry, County Conservation Districts, the Penn State Cooperative Extension and others who provide important information for sustaining Pennsylvania's timber resource. For example, forestry and wildlife information and educational programs for woodland owners are provided by the Penn State Cooperative Extension through a variety of publications, exhibits, tours, and short courses. Extension foresters work with specialists from other agencies to conduct forest stewardship workshops for forest landowners and loggers.

Specific programs for landowners have been initiated recently as noted below. The purpose of these programs is to encourage the long-term stewardship of non-industrial private forestlands by assisting owners of such lands to more

4.8.10

- C. Analyze how human activities may cause changes in an ecosystem.
- D. Explain how the concept of supply and demand affects the environment.

ESTIMATED DURATION:

Preparation: 60 minutes; Activity: three to five 50-minute periods

MATERIALS NEEDED: Copies of student pages; yellow markers; butcher paper, newsprint or poster paper; colored markers; calculators (optional); masking tape; transparencies and overhead projector (optional).

CD-ROM: Use section on "Forest Management Video."

actively manage their forests and to use state, federal and private resource management expertise and assistance programs.

Pennsylvania's Forest Stewardship Program

The Forest Stewardship Program was authorized under the Forestry Title of 1990 Farm Bill. The program is administered nationally by the U.S. Forest Service and is directed in Pennsylvania by DCNR's Bureau of Forestry in cooperation with a variety of agencies and organizations involved with forest resources in Pennsylvania. The program was developed by natural resource managers from a variety of disciplines. The aim of the program is to provide information, education and technical support to help private forestland owners better understand our dependence on healthy forests for wood products, clean water, wildlife, recreation and many other benefits. It also is available to assist them in setting and attaining long-term goals and objectives for their forestland. The program is meant to recognize landowners who keep their land and natural resources productive and healthy.

A key component of the program is the development of a Forest Stewardship Plan. To be able to participate in the program, landowners must own at least five acres of forest and must agree to work with a professional resource manager to develop a written resource management plan for their forest. The completed Forest Stewardship Plan describes the forest's present condition and describes the desired forest condition for the future. The plan is meant to guide the landowner towards concrete short- and long-term goals through sound forest management by evaluating a wide range of environmental and financial benefits and the consequences of management options. An activity schedule is developed and the plan is implemented over a 10-year period.

Landowners contact the DCNR Bureau of Forestry service forester to begin the process, then hire resource professionals to help them develop the forest stewardship plan. Through the Volunteer Initiative Project (VIP), stewardship volunteers (or VIPs) who are trained in the basics of natural resource management, then help promote forest stewardship and the Forest Stewardship Program in their communities.

Stewardship Incentive Program (SIP)

Also authorized under the same Forestry Title of 1990 Farm Bill, the Stewardship Incentive Program (SIP) is a cost-share program designed to compliment the Forest Stewardship Program. It does so by providing the landowner with the tools and financial incentives to implement the practices recommended in their Forest Stewardship Plan. SIP is different from other forestry incentive programs in that landowners can receive cost-sharing assistance for practices that are not necessarily timber-oriented.

Sustainable Forestry Initiative (SFI)

The Sustainable Forestry Initiative was created in 1995 by the American Forest and Paper Association, which is the national trade organization representing the U.S. forest products industry. SFI compliance to "a comprehensive system of principles, guidelines and performance measures that integrates perpetual growing and harvesting of trees with the protection of wildlife, plants, soil and water quality is a requirement for all companies belonging to the American Forest and Paper Association. Compliance with BMPs is required for SFI members."

In order to broaden the practice of sustainable forestry in Pennsylvania, SFI of Pennsylvania was formed. SFI of Pennsylvania is a voluntary, industry driven effort sponsored by Pennsylvania's forest products industry. It is a partnership among landowners, contractors and companies that purchase wood.

To successfully expand the practice of sustainable forestry, SFI of Pennsylvania is working to reach the numerous private landowners. Through SFI, landowners receive the information they need to enhance their ability to make good forest management decisions. Also through SFI training programs, loggers learn safer, more productive skills and appropriate environmental practices.

SFI also does public outreach to help others understand that sustainable forestry means "to meet the needs of the present without compromising the ability of future generations to meet their own needs by practicing a land stewardship ethic which integrates the reforestation, managing, growing, nurturing and harvesting of trees for useful products with the conservation of soil, air and water quality, wildlife and fish habitat,

and aesthetics” (SFI of Pennsylvania Packet).

American Tree Farm System

The American Tree Farm Program is administered nationally by the American Forest Foundation (AFF). In Pennsylvania, the program is sponsored by Pennsylvania’s forest industries through the Pennsylvania Forestry Association, DCNR Bureau of Forestry and other organizations. Unlike many of the programs described above, this program is not new. Nationally it began in 1941; the first Pennsylvania Tree Farm was certified in 1947.

The purpose of the program is to encourage private forest owners to do an effective job of managing their wood lots, which includes producing a continuous crop of trees, while simultaneously maintaining the forest to be aesthetically pleasing, available for recreation, and beneficial to wildlife. American Tree Farms are considered living, working examples of applied forestry.

In order to participate in the program a landowner must have at least 10 acres of land. Professional foresters volunteer their time to inspect and certify the Tree Farms, and then reinspect them every five years.

Pennsylvania Forestry Association (PFA) Programs

Members of PFA are forest landowners, forest and wood products industries and others concerned with the wise management of Pennsylvania’s forest resources. PFA conducts public meetings, woodland tours, seminars and workshops for woodland owners. PFA also coordinates and promotes the Tree Farm Program within Pennsylvania.

Pennsylvania Urban and Community Forestry Program

The Pennsylvania Urban and Community Forestry Program provides the means and resources to establish and maintain the urban forest in communities throughout Pennsylvania. Through this assistance communities are enhanced and the pride and level of involvement of Pennsylvania residents is increased.

Green Certification Programs

Green Certification refers to the independent auditing of timberland and forest products to determine whether they conform to established environmental standards. Green Certification could pro-

vide a market advantage for lumber and other wood products, although consumers would need to be willing to pay a higher price for lumber, furniture or paper thus certified. So far, most of the certification has been for land rather than products and has been limited to state-owned land and private landowners with large holdings. One concern about Green Certification is that the expense of having an audit and maintaining a certification from year to year may be prohibitive for smaller landowners, who may then suffer if Green products are preferred.

PROCEDURES

Getting Ready

Make copies of the student pages for each student. Using a light-colored marker, have teams of four to five students draw a 20" x 20" (50.8 cm x 50.8 cm) grid map of 400-acre wood on a piece of butcher paper for each team of four or five students. (Teams can also make their own.) The grid should have 400 1" x 1" (2.5 cm x 2.5 cm) squares, each representing 1 acre (.4047 hectare). On another piece of butcher or poster paper have students make an identical, but larger, grid to use in a group discussion. If you have an overhead projector, you may want students to prepare a transparency of the grid.

Doing the Activity

1. Introduce the activity by explaining that students will look at several complex issues that face forest managers. Help students brainstorm a list of activities that take place on forest land. List their ideas on the chalkboard. Include uses like hiking, fishing, hunting, gathering firewood, camping, rock climbing, skiing, snowmobiling, logging, grazing or mining. Ask the class to look at the list and decide if any activities would conflict with each other if done on the same piece of land.
2. Discuss these questions:
 - ◆ Which activities would cost the most to provide on forestland?
 - ◆ Which would bring the most visitors?
 - ◆ Which would have the greatest impact on the forest ecosystem? On the wildlife there? Would this effect be permanent or temporary?

3. Have students read “If You Were the Boss.” Divide the group into teams of four or five and explain that each team will decide the best use (or uses) of 400-acre wood, which has been donated to the community. Each team will develop a land management plan that will serve the best interest of the entire community. Make sure students understand that their team can use the entire 400 acres (162 ha) for one use or for multiple uses. For example, they may devote 200 acres (81 ha) to wilderness and hiking, 80 acres (32 ha) to a campground and 120 acres (49 ha) for harvesting timber or hunting.
4. Before students begin, ask these questions:
 - ◆ Which forest uses in “If You Were the Boss” are compatible with other uses? (For example, building a campground and hiking trail together)
 - ◆ Which might be incompatible with each other? (hunting at a campground)
 - ◆ What could you learn by figuring out the costs, revenues, wildlife populations, and numbers of visitors for each management plan? (how the plan affects different forest values)
 - ◆ Are owls, wood rats and salamanders the only wildlife in the forest? (no) What could you learn about the forest ecosystem by analyzing the populations of these three species? (by looking at three animals with different habitat requirements, you get an idea of the general health of the forest ecosystem.)
5. Make sure each team has a map (grid) of 400-acre wood. Also give each team a copy of student pages, “What’s The Score?” (You might need to explain how to use these.) Each team should discuss various strategies for managing the forest. When the team arrives at a consensus on how the land should be managed, direct members to use “What’s the Score?” for a cost and benefit analysis of their plan. They should discuss what impact their plan would have in terms of cost, income, timber, wildlife, visitors and ecological balance.
6. When the teams have completed their management plans, they should use colored markers to illustrate their plans on the grids. Remind them to include a key showing what the different colors and symbols mean.
7. Ask teams to present their plans to the entire group, making clear how they decided on their plans. Have them report the findings of their cost analysis worksheets. Post the maps around the room.
8. Use the large grid map to lead a group discussion of different plans. Ask these questions:
 - ◆ Which plan enables the most people to enjoy the forest? What is the monetary cost in attracting the most visitors? Are there any other costs besides money?
 - ◆ Which plan does the most to preserve the forest in its original state? What are the costs of this plan?
 - ◆ Which plan has the most impact on wildlife?
 - ◆ Which animals are sensitive to human disturbance? Why should we care if one animal species leaves the forest?
 - ◆ Which plan seems to provide the best balance of revenue, trees, wildlife and visitors?
 - ◆ How do you think your plan should be paid for? If your plan made a profit, what should happen to the money.
 - ◆ Which do you think is most important: having the most trees, the most wildlife or the most visitors? What makes you think so?
 - ◆ Which do you think is most important—1) an activity’s cost or income; or 2) an activity’s effects on trees, wildlife and visitors? Give an example.
 - ◆ What will be the long-term effects of each plan? How will costs or income change in the next year? Will the number of trees, wildlife or visitors change?

EXTENSION

1. Repeat the activity by having each team (1) extend its management plan into the next year and (2) figure out the effect on money, trees, wildlife and visitors for the second year.
2. Contact the local forest service office or forestry agency and invite a forest manager to talk to your class about

how his or her organization makes land-use decisions. Encourage students to ask questions based on what they learned in the activity. For example, how do forest managers weight the effects of an action on trees, people, and animals in a forested area?

ASSESSMENT

Imagine that 400 acres (162 ha) of forestland has been given to the community to use however people please. Several different groups are competing to have their proposals accepted. A Community Council (made up of students) will hear arguments for each proposal and make a decision. Each team (from step 3 of the activity) should prepare a five-minute argument explaining why their plan should be accepted. Teams can say how

much money they would pay for land and what revenues or other benefits (recreation, wildlife, products) their proposal would bring to the community. When teams have prepared their arguments, select a member from each team to sit on an impartial council (or invite another class to serve as the council). After each team presents its argument, give the council time to make its decision. If the council members cannot reach a consensus, they should choose the proposal with the most support. Use this exercise to assess how well students understand the pros and cons of their proposals.

Adapted from Project Learning Tree, American Forest Foundation, 1996, "400-Acre Wood."