

Instructional Guide

Special Note to Users of this Guide

We hope you find your *Alabama Forests Forever Instructional Guide* useful as you set out with your students to explore the wonders of Alabama's most valuable and ... properly managed ... and ... infinitely renewable resources. Hopefully, you and your students will enjoy the learning and implementation challenges of the CD-ROM and Guide to be as rewarding as we found their development to be.

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INTRODUCTION

Purpose

The *Alabama Forests Forever CD-ROM* is designed and produced with one goal in mind – to educate. Using the CD-ROM to actively engage student learning will increase understanding of the importance of employing scientific principles to sustainable forest management. The interactive format provides a captivating presentation of forest facts and the forest products we use.

Use in the Classroom

The *Alabama Forests Forever Instructional Guide* is designed to assist the educator in using the CD-ROM. Presented in an easy-to-use format, the guide provides information to facilitate learning about Alabama’s forests. To assist in the learning experience, each of the four content areas include grade level, subjects, concepts, skills and correlations to the Alabama Course Content Standards. A brief introduction to each topic is provided along with an activity to reinforce content and a listing of associated activities from the *Project Learning Tree (PLT) PreK – 8 Guide*.

Using the *Alabama Forests Forever CD-ROM*, this Instructional Guide, PLT activities, the contact list provided and imagination, the educator can lead students into subjects beyond forest resources. Educators may: explore the role of forest products in Alabama’s economy, examine the importance of forestry as related to societal values and even challenge students’ skill in creative writing. There is no limit!

The *Alabama Forests Forever CD-ROM* is developed for use in the middle grades classroom but can be utilized with a wide variety of audiences. It is designed primarily for single-user or small group settings.

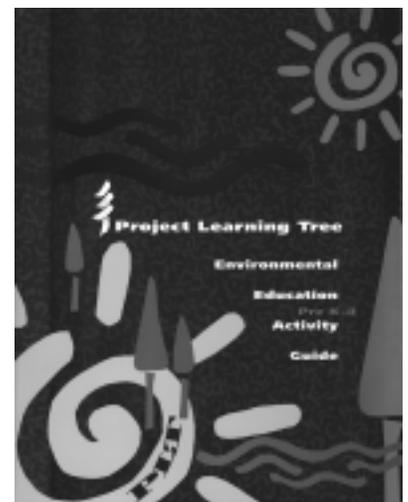
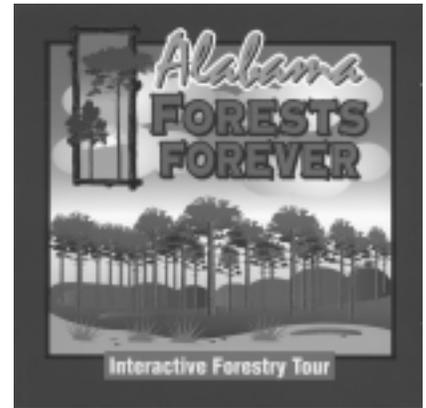
What is Project Learning Tree?

Project Learning Tree (PLT) is an internationally recognized environmental education curricula. PLT provides hands-on activities using the forest as a window to awareness and knowledge of the world. Ultimately, PLT prepares students to make wise decisions about conservation practices and resource use by developing critical thinking skills.

So you can see how PLT and the *Alabama Forests Forever CD-ROM* work together, we have included a sample PLT activity as well as a listing of some PLT activities that relate to each of the content areas. For more information see the “Reference Section” listing for a sample PLT Activity or call the Alabama Forestry Association office at the number listed in the reference section.

Required Computer Equipment

The minimum and recommended system requirements are listed on the back of the CD-ROM case for both IBM-compatible and Macintosh computers. Your computer must meet these requirements in order to operate the CD program. The installation instructions are printed on the tri-fold pamphlet inside the case.



ENVIRONMENT



Levels
Grades K - 8

Subjects
Science, Math

Concepts
The forest provides habitat for thousands of different creatures. Each inhabitant does its part in continuing the forest life cycle.

Skills
Observing, Organizing Information, Identifying Relationships, Patterns, Analyzing

Content Standard Correlation

Science Standards
K.1, K.5, 1.3, 1.5, 1.20, 1.25, 2.3, 2.5, 2.20, 2.21, 2.23, 3.1, 4.1, 5.1, 5.15, 6.9, 6.37, 6.45, 7.11, 8.11, 8.25
Math Standards
3.53, 3.54, 4.60, 4.61, 5.43, 5.44, 5.46, 5.47, 5.48, 6.45, 6.46, 6.48, 7.50, 7.51, 8.41, 8.42, 8.44, 8.45



It's an air conditioner, a water purifier, an air filter, a zoo — it's an Alabama Forest. The shade that trees give can cool the surrounding area by almost 10 degrees (**Pre-Post Test Question 8, Answer B**). One acre of trees can provide enough oxygen for you and seventeen of your friends (**Pre-Post Test Question 1, Answer B**). The trees themselves pull in the carbon dioxide we exhale, and produce the oxygen we inhale—air, clean air, we all need to breathe. The forest provides habitat for thousands of different creatures, including a number of endangered species. Each creature does its part to continue the forest life cycle. Professional foresters understand the complexity of ecosystems and are committed to maintaining balanced forests.

Components

In the environment section, students will see and hear about the things trees do for our environment. They will participate in a virtual forest activity. The virtual forest activity allows students to discover wildlife in the forest and learn facts about each. There are nine hidden animals: white-tail deer, wild turkey, black bear, barred owl, wood duck, gopher tortoise, alligator, raccoon and green tree frog.

Sample Activity

Imagine, if you can, living in a place with no trees. What if all the trees in Alabama disappeared? What would happen to us? To help us think about trees and their place in the environment, plan a scientific field study of an area close to the school.

Plants and animals benefit from the forest as a whole as well as from individual trees that woodpeckers or squirrels might call home, or a brook that nurtures aquatic life. A forest habitat thus may range in size from a lone limb on a tree trunk in a five-acre stand to a forest of many thousand acres. To better understand the dependency of plants and animals, let's examine the interactions of the various life forms inhabiting the forest.

Have students, individually or in groups, examine a tree. You might recommend they begin by standing back and surveying the whole tree, using binoculars, then examine it in detail. Ask them to note all kinds of living creatures — including other plants, that depend on the tree. Make a distinction between those animals that actually live on the tree and those that just visit the tree. Have them look for signs of life such as chewed leaves, holes in the bark, broken branches, carved initials and so on.

Be sure to study the area around the tree for signs of animal life among the fallen twigs, leaves, nuts, seeds, etc. Are there any signs that humans have used this tree?

Have the students organize the information they collect into a booklet, table or some other format. It might be organized by where the organisms were found or the type of organisms found. Have them note how the organisms benefit from the tree and how they affect the tree. Encourage them to create charts, tables and graphs to illustrate their data.

Some questions you might ask the students include:

- What did you find on the tree's trunk?
- What did you see in the tree's branches?
- How might the tree be affected by the plants and animals that live on it?
- Which of these organisms seemed to harm the tree?
- Do any of the plants or animals seem to benefit the tree?

Project Learning Tree Activities

#94: Where Are the Cedars of Lebanon?

In this activity, students study the Babylonian culture before and after its decline. Students examine evidence using a student information sheet and pose reasons for the decline of the Babylonians. An important concept of the lesson will be the role of land use.

#30: Three Cheers for Trees

Students examine the benefits of trees to people, wildlife, and the environment in several different locations.

STUDENTS ASSESSMENT- ENVIRONMENT

Match the animal with its habitat.

- | | |
|-----------------------|--|
| ___1. White-tail Deer | a. feed on leaves, twigs, fruits and acorns |
| ___2. Wild Turkey | b. amphibians which feed on insects |
| ___3. Black Bear | c. has three sets of eyelids for hunting underwater |
| ___4. Green Tree Frog | d. sleep in big trees, perched on a strong branch |
| ___5. Alligator | e. make their dens in hollow trees or thick evergreens |

Select the answer which best completes the statement.

- ___6. The shade that trees give can cool the surrounding area by:
- a. 10 degrees b. 30 degrees c. very little
- ___7. The root systems of trees hold together the forest floor and:
- a. make room for insects b. purify drinking water c. destroy ecosystems
- ___8. Forest management includes:
- a. harvesting trees b. planting trees c. growing trees d. a, b, and c
- ___9. Trees act as an air filter by:
- a. taking in oxygen and giving off carbon dioxide
b. taking in carbon dioxide and giving off oxygen
- ___10. These animals depend on forests swamps and nest near water.
- a. black bears b. bobcats c. wood ducks

Describe why a forest might be considered a “zoo.”

PRODUCTS



Levels

Grades 5 – 7

Subjects

Science, Social Studies

Concepts

Trees provide a large number of products people use every day. Trees are a renewable resource.

Skills

Classifying and Categorizing
Evaluating

Content Standard Correlation

Science Standards
5.1, 6.9, 6.43, 7.11,
7.57, 8.11, 8.56
Social Study Standards
7.27, 7.32

There are so many different parts to trees that we can make over five thousand different products. (**Pre-Post Test Question 7, Answer C**). We can actually use every part of the tree—the solid wood, the wood pulp, the bark, sugars and cellulose. The usefulness of the tree doesn't stop there...many wood products are recovered, recycled and reused every day. In fact, many egg cartons and cereal boxes are made entirely of recycled fiber.

Components

Students will discover a number of products that come from trees. There is an interactive game entitled "I Wood If I Could" in which sixteen wood products are shown on a grid. The students are to identify the products that do not come from wood. Every

one of the sixteen products listed in the game is made from wood: (See the list below). As a student chooses a product, a voice explains how the item is a wood product as well as from which tree it comes and what part of the tree is needed for its production. The student plays against a game clock to make the game more challenging.

After students view the product section, make a chart with each of the sixteen items and the part of the tree that is needed. Have students brainstorm, in groups of two or three as many of the products and as much of the information as they remember. When they have generated as much information as possible, show only the game portion of "Products" again, describe each item to verify accuracy and fill in missing information. The completed chart is included below.

"I Wood If I Could"

Product	Part of Tree
1. Ice Cream	cellulose
2. Cereal	bark
3. Gum	storax
4. Muffins	gum, torula yeast, artificial flavorings
5. Orange Drink	estergum
6. Shaving Cream	terpenes
7. Toilet Paper	wood pulp
8. Shoe Polish	
9. Glue	resins
10. Crayons	resins
11. Toothpaste	cellulose
12. Football Helmets	cellulose
13. Cellophane tape	wood sugars
14. Clothing	wood cellulose

Project Learning Tree Activities

82: Resource Go-Round

Students will study the materials that make up a pencil, where they come from, and the life cycle of a pencil. A world map will be used to show where all the materials originate and how they are used to make a pencil.

In addition to the pencil, students will be asked to explore other products in the same way, perhaps doing their research in the media center or in the classroom on the Internet.

The recycling of used products into new products will also be explored and may be used as an introduction to the next section on "Balance."

#12: Tree Treasures

Students discover how many different products come from trees as well as the part of the tree used. Activity #13, We All Need Trees, is an excellent companion to #12 with a student handout on wood and its products.



STUDENT ASSESSMENT- PRODUCTS SECTION

Match the tree product with the part of the tree from which it is made.

- | | |
|----------------------------|----------------------------|
| ___1. Toilet Paper | a. resin |
| ___2. Ice Cream | b. bark of the willow tree |
| ___3. Waxy Part of Crayons | c. cellulose |
| ___4. Wooden Furniture | d. wood pulp |
| ___5. Aspirin | e. lumber |

Select the answer which best completes the statement.

- ___6. Trees provide us with more than:
a. 100 different products b. 5000 different products c. 500 different products
- ___7. Everyday many wood products are:
a. recovered b. recycled c. reused d. a, b, and c
- ___8. Many orange-flavored drinks contain this ingredient which comes from trees:
a. cellulose b. bark c. estergum d. resin
- ___9. Chewing gum is made from this part of the tree:
a. cellulose b. resin or storax c. bark d. lumber
- ___10. Football helmets contain this part of a tree:
a. cellulose b. bark c. lumber d. sugars

Describe how a wood product can be recycled.

BALANCE



Levels
Grades 4 – 8

Subjects
Science, Math, Social
Studies

Concepts
Conservation and
management practices
can enhance and
extend the usefulness
of the resources as
well as the quality of
the environment.

Skills
Identifying Main Idea,
Analyzing, Solving
Problems, Synthesiz-
ing & Creating

**Content Standards
Correlation**
Science Standards
4.1, 4.48, 5.1, 5.13,
5.15, 5.40, 6.9, 6.37,
6.43, 7.11, 7.12, 8.11,
8.53
Social Studies
4.21, 4.29, 4.49, 6.35,
6.39, 7.22, 7.27, 7.32

Alabama has 22 million acres of forest-land. That means over two-thirds of the state is covered with trees (**Pre-Post Test Question 3, Answer C**). However, over the years, things like urban encroachment – building restaurants, shopping centers and highways – have replaced thousands of acres of valuable woodlands and wildlife habitat. As these forests disappear, it becomes more important than ever to manage and protect the trees that remain.

Trees are a renewable resource. That means there is virtually an unlimited supply if we take care of our forests. By practicing proper forest management we can maintain healthy ecosystems and provide a steady supply of products. In fact, forests managed by professional foresters are actually healthier and more productive than forests left unmanaged. Harvests are staggered over many years; while new trees are growing in one part of the woods, another is cut and quickly reforested, either by planting, natural reseeding or sprouting (**Pre-Post Test Question 9, Answer A**).

Forest managers sometimes use fire to help keep the forests healthy. Small controlled fires reduce undergrowth that competes with the trees for water, sunlight and nutrients, along with getting rid of dead branches which could fuel wild fires. They also open up new habitat for wildlife, new plant growth and return nutrients to the soil.

With responsible forest practices people enjoy the environmental benefits that forests bring and the products that trees provide (**Pre-Post Test Question 11, Answer B**).

Components

The role of trees as a renewable resource is explored in the “Balance” section. The students will view the state as it is divided into three geographic areas: the Mountains, the Piedmont and the Coastal Plains. Students will listen to and view information on the life cycle of hardwoods and softwoods. They will learn the approximate number of years in each cycle, how the trees are managed during that time, what the characteristics of the forest will be, the products that come from trees in each stage, and the animals and insects which inhabit the forest during each stage.

Sample Activity

PLT #69, *Forest for the Trees*, is an effective activity for this section. In it students participate in managing an imaginary forest. First, they role play trees at different stages of growth. Then they role play the managers of the forest making decisions about proper management.

Project Learning Tree Activities

#45: Web of Life

In this activity, students will take a close look at one particular ecosystem (a forest) and discover how plants and animals are connected to each other.

#88: Life on the Edge

Patterns of change can be observed in the diversity of species on Earth. In this activity, students will become animals and create public relations campaigns on behalf of these species.



STUDENT ASSESSMENT – BALANCE

Select the answer which best completes the statement.

___1. Professional foresters manage the forests by:

- a. planting trees b. harvesting c. controlling undergrowth d. a,b, and c

___2. In Alabama, we have _____ acres of forestland:

- a. 12 thousand b. 22 million c. 24 thousand d. 10 million

___3. Pine forests account for _____ of all forests in Alabama:

- a. 35% b. 10% c. 75% d. 100%

___4. Forest managers grow trees that are best suited to different regions of the state by looking at features such as:

- a. soil composition b. climate c. watersheds d. a,b, and c

___5. Hardwood and mixed hardwood-pine forests account for over _____ of all forests in Alabama:

- a. 25% b. 90% c. 65% d. 10%

Determine if the statement is **True** or **False**. Write the correct answer in the blank.

___6. Forest managers sometimes use fire to help keep the forest healthy.

___7. Each stage of the managed pine forest cycle provides different habitat needs to a variety of plants and animals.

___8. A new pine forest can only begin by allowing seed trees left on site after harvest to re-seed the area.

___9. A pine forest in Alabama is first thinned after about 50 years of growth.

___10. In a hardwood forest, the stage between seedling and 20 years of growth provides the most diverse plant life and attracts the greatest variety of animals.

Describe the different stages of a pine or hardwood forest and how it can provide different products and wildlife habitats.

RECREATION



Levels

Grades 5 – 8

Subjects

Social Studies, Language Arts, Science, Art

Concepts

Forests provide a place for recreation as well as growing commercial products. Proper management allows Alabama's citizens to enjoy the forests.

Skills

Analyzing, Data Gathering, Discussing, Interpreting, Researching

Content Standards Correlation

Science Standards
5.1, 5.4, 6.9, 7.11, 8.11
Social Studies -
Citizenship, 7.8, 7.17, 7.19;
World Geography, 7.1
Language Arts
5.15, 5.25, 6.20, 6.25, 6.29,
6.30, 7.14, 7.20, 7.21, 7.22,
7.27, 7.28, 8.10, 8.11, 8.12,
8.14, 8.18, 8.19, 8.24, 8.25,
8.26, 8.27



Just about any outdoor activity can be done in an Alabama forest. Hiking, horseback riding, canoeing, camping, fishing, and swimming are all activities that are popular in Alabama's forests. All of these are benefits of a well-managed forest. No matter where a person lives in Alabama, one of the state's coolest recreational areas, the forest, is always close at hand.

Components

The recreation section shows the richness of recreational resources in Alabama. Students can study the state from a number of different perspectives, checking the availability of different activities. The students will see a map of Alabama with the recreational areas marked. They will be able to choose activities to explore, and the CD-ROM will respond with the location of the activities. This section of the CD-ROM also explores the interrelatedness of industry, nature and recreation.

Sample Activity

To introduce this section, have the class make a list of recreational facilities within their travel region. As they list the facilities, have them describe all the activities that go on there. Students will probably be able to relate some of their own experiences. Post this list for everyone to see. Ask students what age groups would most enjoy each site. Discuss facilities/accommodations for children, for wheelchair visitors, etc. Challenge students to research their region for answers to questions.

Activities to Extend/Enrich

1. Create a collage of recreational activities available in a forest.
2. Make a map of local areas used for recreational purposes.
3. Take pictures of recreational areas and use the pictures to make promotional materials,

e.g., brochures, media presentations, recreational guides, etc.

4. Write newspaper articles for the local newspaper regarding recreational areas.
5. Present programs for in-school media services (television, radio) regarding recreational areas.
6. Have students play

the role of travel agents to identify recreational sites in Alabama that would be of interest to certain populations like the handicapped, families with small children, hikers, etc. Using maps, have the students calculate a route to follow and the mileage. Students can write letters to request information on a certain site.

Activity - "Taking a Stance"

Once students have explored what there is for them to enjoy in the forest, then they begin to consider changes brought about by man and nature, why these changes occur and how we balance the use of forests for recreation and industry:

1. Examine state and federal laws regarding the use of recreational areas. Explore any recent changes and why they have happened.
2. Debate land use topics by using local issues and/or related topics. PLT's 400 Acre Woods would be an excellent activity to extend the discussion. In this activity, students play the roles of city council and various citizen interest groups. The city council must decide whether the land in question will be used for recreation, business, other city needs or be left unchanged. Students have to balance environmental concerns with personal and financial issues.
3. Examine local controversial land use areas such as freeways, swamps, archeological/native American sites, highways, construction sites and the impact of these areas on the region.

Note: This section provides an opportunity to conduct a geographic/recreational study of Alabama as small groups explore different parts of the state.

Project Learning Tree Activities #54: I'd Like to Visit a Place Where...

Students will explore the concept of recreation areas as essential elements of a community. By working on a project to improve a local park, they will also learn about the community's system for managing open spaces.

#35: Loving It Too Much

National parks are the treasure of any nation, yet national parks today struggle with serious dilemmas. By looking at problems in America's national parks, students can begin to use critical thinking skills to examine environmental issues that affect parks locally and globally.

STUDENT ASSESSMENT- RECREATION

- I. List 5 recreational activities that can be done in a forest.

1. _____
2. _____
3. _____
4. _____
5. _____

- II. List 5 state parks in Alabama and their locations.

1. _____
2. _____
3. _____
4. _____
5. _____

- III. List the four National Forests in Alabama.

- IV. Give the website for (1) the Alabama Forestry Commission, (2) the Alabama Department of Conservation & Natural Resources, and (3) the Alabama TREASURE Forest Association.

1. _____
2. _____
3. _____

- V. Describe how a well-managed forest can provide recreation.

PRE-POST TEST

1. **One acre of trees can provide enough oxygen daily for:**
 - a. You and 2 friends
 - b. You and 17 friends
 - c. You and 100 friends
 - d. Just you
2. **What do trees do for us?**
 - a. Give off carbon dioxide, and take in oxygen
 - b. Provide a home for wildlife
 - c. Clean our water and prevent soil erosion
 - d. b & c
3. **How much of Alabama is covered with trees?**
 - a. Almost one quarter
 - b. About half
 - c. two-thirds
 - d. three-fourths
4. **What kind of recreation does Alabama's forest provide?**
 - a. Hiking
 - b. Camping
 - c. Fishing
 - d. All of the above
5. **What do forest managers sometimes use to keep the forest healthy?**
 - a. Fire
 - b. Egyptian scrub beetle
 - c. Thinning
 - d. a & c
6. **Which of the following is not a wood product?**
 - a. Latex paint
 - b. Football helmet
 - c. Tin foil
 - d. Aspirin
7. **How many different products are made from trees?**
 - a. 153
 - b. About 2,500
 - c. Over 5,000
 - d. 5 million
8. **Shade from trees can cool the surrounding area by as much as?**
 - a. 2.5 degrees
 - b. 10 degrees
 - c. 16 degrees
 - d. 30 degrees
9. **What is one important way professional foresters plan to keep *Alabama Forests Forever*?**
 - a. Stagger harvests and replant seedlings
 - b. Prevent all forest fires
 - c. Prevent people from using the forest for recreation
 - d. Never cutting trees
10. **What kind of forest does not grow in Alabama?**
 - a. Pine forest
 - b. Hardwood forest
 - c. Rain forest
 - d. Mixed pine-hardwood forest
11. **What is the most important function of Alabama's professional foresters?**
 - a. Controlling beavers
 - b. Balance the environmental benefits with the need for wood products
 - c. Acting as a lookout for forest fires
 - d. Making paper out of trees

CONTACTS

Alabama Cooperative Extension Service

112 M. White Smith Hall
Auburn University, AL 36849
(334) 844-1002
www.aces.edu

Alabama Department of Conservation & Natural Resources

64 Union Street
Montgomery, AL 36310
(334) 242-3465
www.dcnr.state.al.us/agfd

Alabama Environmental Council

2717 7th Avenue S., Suite 207
Birmingham, AL 35233
(205) 322-3126
www.alenvironmentalcouncil.org

Alabama Forest Owners' Association

P.O. Box 361434
Birmingham, AL 35236
(205) 987-8811
www.alabamaforestowners.com

Alabama Forestry Association

555 Alabama Street
Montgomery, AL 36104
(334) 265-8733
www.mindspring.com/~alforest

Alabama Forestry Commission

513 Madison Avenue
Montgomery, AL 36130-2550
(334) 240-9300
www.forestry.state.al.us

Alabama TREASURE Forest Association

P.O. Box 145
Chunchula, AL 36521
(334) 679-6087
www.atfa.net

Alabama Wildlife Federation

46 Commerce Street
Montgomery, AL 36104
(800) 822-9453
www.alawild.org

Auburn University School of Forestry & Wildlife Sciences

108 M. White Smith Hall
Auburn University, AL 36849
(334) 844-1007
www.forestry.auburn.edu

The Nature Conservancy of Alabama

2821-C 2nd Avenue South
Birmingham, AL 35233
(205) 251-1155
www.tnc.org

USDA Forest Service

National Forests in Alabama
2946 Chestnut Street
Montgomery, AL 36107-3010
(334) 832-4470
www.r8web.com/alabama

USDA Natural Resources Conservation Service

P.O. Box 311
Auburn, AL 36830
(334) 887-4535
www.ga.nrcs.usda.gov/al

US Department of the Interior Fish & Wildlife Service

P.O. Drawer 1190
Daphne, AL 36526
(334) 441-5181
www.fws.gov

GLOSSARY

Canopy - layer formed by the leaves and branches of the tallest trees in the forest.

Cellulose - the main part of the cell walls of wood which produce fiber.

Composite panels - panel products made of wood particles (e.g., oriented strand board, medium density board, particleboard).

Coniferous - a tree that bears its seeds in cones. Usually refers to needleleaf trees.

Conservation - responsible use, protection, and improvement of natural resources for the present and future.

Deciduous - term describing a plant that sheds its leaves annually, usually in autumn.

Forest Management - the practical application of scientific, economic, and social principles to the use and care of a forest.

Hardwood - wood produced by deciduous trees such as maples and oaks. Also, another term for deciduous trees.

Harvest - managed removal of trees by selective or complete harvest methods.

Nonrenewable Resources - substances (e.g., oil, gas, coal, copper, and gold) which once used, cannot be replaced.

Recreation - the use of forestland for human enjoyment and relaxation.

Regeneration - the renewal of a tree crop whether by natural (seed trees, sprouts) or artificial (planting) means.

Renewable Resources - naturally occurring raw materials or form of energy, which can replenish itself through sound management practices in your lifetime (e.g., trees).

Sawtimber - size of trees yielding logs considered suitable in size and quality for producing lumber or sawn wood (logs cut into a square edged form).

Seedling - a young tree grown from the seed.

Softwood - wood produced by coniferous trees such as pines, cedars, and firs. A common but not strictly accurate term since the wood of some conifers is harder than some hardwood trees. Another term for a coniferous tree.

Sprout - healthy new trees growing from a stump or roots of a tree that has been harvested.

Stewardship - using wise management practices for many benefits and uses of forestland.

Succession - the gradual replacement of one plant community by another, through natural processes over time.

Sustainability - use and growth of natural resources to meet present and future needs.

Timber Cruise - a survey of a forest to identify health, types, and number of trees.

Understory - layer formed by the leaves and branches of the smaller trees under the forest canopy.

Urban Forest - an urban area that extends from town center to suburb's edge. The urban forest would include tree-lined roadways, open green spaces, undeveloped forests and parks, along with other public and private spaces within this urban area.

Veneer - a thin sheet of wood of uniform thickness produced by rotary cutting, slicing, or sometimes sawing.

Watershed - an area of land that drains water from small streams toward a major river or stream.

ANSWERS

Answers – Environment Section

1.a, 2.d, 3.e, 4.b, 5.c, 6.a, 7.b, 8.d, 9.b, 10.c

I. The forest provides habitat for thousands of different animals just like a zoo provides a place for animals to live. We can visit the zoo or the forest and enjoy seeing and learning about many different kinds of animals.

Answers—Products Section

1.d, 2.c, 3.a, 4.e, 5.b, 6.b, 7.d, 8.c, 9.b, 10.a

I. Wood products such as paper can be recycled by shredding and reprocessing to make recycled papers and cardboard products. Wood products may also be recovered and reused. For example, refinishing furniture or using old wood from buildings to build new structures. The boxes made from wood pulp can be reused many times to store items for many years while we are growing more trees for new fiber.

Answers – Balance Section

1.d, 2.b, 3.a, 4.d, 5.c, 6.T, 7.T, 8.F, 9.F, 10.T

I. The pine forest cycle has four stages, each with different groups of plants, animals and products. Stage one (seedling to 7 yrs.) has the greatest diversity of plant and wildlife. Products are Christmas trees, wildlife habitat, erosion control and clean air. Stage two (8-15 yrs.) when the first thinning usually occurs, creates products such as small poles and pulpwood for paper products. Small wildlife such as snakes, deer, fox, rabbits and turkey inhabit the area. Stages three and four provide lumber, pulpwood and all the other by-products of the tree. Wildlife continues to include deer, squirrel, quail, and numerous birds.

II. The hardwood forest cycle has four stages, each with different groups of plants, animals and products. Stage one (seedling to 20 years) provides the greatest diversity of plant and wildlife. Natural thinning will occur as the strongest seedlings will survive. Stage two (21 to 40 years) will allow for the first thinning and will provide lumber, plywood, and veneer. Wildlife includes deer, numerous birds, snakes and opossum. Stages three and four are mature hardwood forests and may be harvested for maximum use depending on the landowner's goals. Young saplings begin to grow or are planted to produce the next forest as wildlife continues to be abundant.

Answers – Recreation Section

I. Camping, hiking, boating, hunting, fishing, trout fishing, picnicking, swimming, horseback riding.

II. See list on CD-ROM

III. Talledega National Forest, Tuskegee National Forest, Conecuh National Forest, Bankhead National Forest

IV. (1) www.forestry.state.al.us
(2) www.dcnr.state.al.us/agfd/
(3) www.atfa.net

V. Well managed forests clean the air, conserve the land and prevent soil erosion. With healthy forests we will have more and better recreational opportunities within the forests for many people to enjoy.

Answers – Pre/Post Test

1.b, 2.d, 3.c, 4.d, 5.d, 6.c, 7.c, 8.b, 9.a, 10.c, 11.b

CAREERS IN FORESTRY

Forestry and related fields offer many challenging and rewarding career opportunities. Foresters are employed to manage land, timber and other resources; buy and sell timber; plan and implement public relations and promotional programs. They also teach and conduct research, extension and public service programs. Among the many diverse groups who look to those with forestry expertise for employees are pulp and paper companies, lumber and plywood producing firms, consulting firms, government agencies, conservation groups, public and private laboratories, and suppliers of forestry equipment.

Most entry-level positions in forestry require a minimum of a bachelor's degree in forestry or a related field. Today's foresters must be proficient in the technical aspects of managing forests and land. It is equally essential that they be able to understand, communicate and work effectively with people outside the forestry profession. This means that writing and presentation skills are a must.

Forestry graduates are most often employed in the forest products industry to manage land and by forestry consulting firms to assist landowners to achieve their varied management objectives. Federal and state government agencies and private conservation groups also hire professional foresters to manage lands and related resources in their care. Urban forestry is yet another employment source for the forestry graduate.

Almost anyone can find a niche in the forestry field. Auburn University's School of Forestry & Wildlife Sciences offers a well-rounded curriculum designed to prepare students for careers in forestry. Read the biographical sketches below for more information:

- **Jim is a unit manager** for a major pulp and paper company in the Southeast. He is responsible for all forest management activities on 30,000 acres of company-owned and leased lands. Six years out of college, he has been promoted to this position after various job assign-

ments involving forest inventory, harvesting, and regeneration. He has surveyed forest boundaries, estimated timber volumes, marked trees for harvest boundaries, supervised planting crews, fought fires, and checked permits giving access to company lands during hunting season. He now supervises all of these activities, administers timber sales contracts, negotiates leases, and prepares operational plans and budgets.

- **Helen is a district ranger** on a National Forest in the Pacific Northwest. She is the manager of a district covering over 200 square miles of both forests and grasslands. As such, Helen is responsible for managing these lands to assure wildlife habitat, sustained timber yields, forage production, watershed values and recreational opportunities for over one million forest visitors each year. In her job as a forester, Helen must be highly skilled not only in vegetation management but in planning and budgeting, personnel management and public relations. She oversees five foresters, four forest technicians and 25 other employees.
- **Steve is a consulting forester** in New England. He provides specialized services to private forestland owners. His clients are farmers, professional people and small forest-product companies. Steve has built his business over the past nine years, and is involved daily in such activities as preparing woodlot management plans administering timber sales, evaluating insect and storm damage and meeting with clients. Steve holds a real estate appraiser's license in his home state. He has also become an expert in forest taxation.
- **Joe is an urban forester.** With a degree in forestry, including special

courses in urban forest vegetation, communications, planning, city government, and urban sociology, he is one of a growing number of foresters bringing their special skills to the urban environment. Employed by a mid-size city in the East, he has just completed an inventory of all street-side and park trees. The inventory information, available from his computer, will aid the city forestry department in a systems approach to managing the urban forest.

- **Connie is a field forester** for a large land management company in the east central states. She has recently completed a computerized forest site inventory and is currently working with a wildlife biologist to enhance wild turkey habitat. Connie's company is also cooperating with forestry researchers from a local university to assess the long-term ecological effects of gypsy-moth infestations on the forest.
- **Miguel is a forest geneticist.** He has recently earned a Ph.D. and is now employed by a major university. Involved in both teaching and research, he is leading a long-term project in tree improvement – selecting, testing, and developing new trees for better quality, faster growth, and resistance to insects and disease. Miguel's area of research is a primary key to assuring an adequate supply of forest products in the future.
- **Gene works for a tree seedling** nursery in the Lake States. He earned an associate's degree in forestry four years ago and is now responsible for supervising seed collection, seeding and management of nursery beds, and lifting (digging) of seedlings.

continued on page 18

- **Carl is a forestry technician** for a state forestry department. After completing a two-year forestry program in his home state, he served two years in the Peace Corps. He is now responsible for vegetation management on four high-use recreation areas on state forestlands. He develops work schedules and supervises planting, pruning, fertilizing and other maintenance work of trees, shrubs and other vegetation. Carl has just completed a two-day refresher course in tree fertilization.
- **Carol works for NASA.** With a degree in forestry and specialized training in cartography (mapmaking), she is responsible for analyses of satellite photographs. She has recently developed a computer program to forecast the reactions of sub-arctic vegetation to predicted ozone layer changes.
- **Kim is a budget analyst** for the Office of Management and Budget in Washington, DC. She has a

Bachelor's degree in forestry and a Master's degree in public administration. She reviews natural-resource agency budgets to assure technical needs and correct procedures. She works closely with officials of federal agencies and Congress and meets often with special-interest groups and associations. In addition to her knowledge of forestry, Kim is skilled in interpersonal communications, budgeting, management and political science. She is thinking of running for Congress someday.

- **Danny is a public affairs officer** for a large western National Forest. He took this job after spending 19 years as a District Ranger and fire staff officer. His duties include preparing speeches for forest officers, furnishing information about the forest to the public, conducting meetings to provide forest users a chance to express their ideas about the forest's objectives and management, and issuing press, radio, and television news releases. You may have seen Danny on TV during the summer fire season.

There are more such examples. In fact, the Society of American Foresters lists over 700 job categories and nearly 14,000 separate employers among its members. These jobs show not only what foresters and technicians traditionally do, but also give a glimpse of the dynamic nature of forestry and of future career opportunities.

For more information about careers in forestry in Alabama, contact:

**Director of Student Services,
Auburn University, School of Forestry
& Wildlife Resources
108 M. White Smith Hall
Auburn University, AL 36849
334-844-1050**

The *Alabama Forests Forever Foundation* gratefully acknowledges the cooperation of the Society of American Foresters for allowing the use of information from the booklet, "*So You Want to be in Forestry*"* and the Auburn University School of Forestry & Wildlife Resources for providing additional resources.

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PROJECT LEARNING TREE ACTIVITY #69

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 be able to participate in a simulation designed to teach how forest resources are managed and to 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

PROJECT LEARNING TREE ACTIVITY #69

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.



PROJECT LEARNING TREE ACTIVITY #69

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.

PROJECT LEARNING TREE ACTIVITY #69

STUDENT PAGE

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.

PROJECT LEARNING TREE ACTIVITY #69

STUDENT PAGE

FOREST STAND PUZZLE

The puzzle consists of six panels, each a 5x5 grid with a small grey square in the bottom-right corner. The panels are labeled A through F:

- A:** A 5x5 grid of trees. Row 1: 4 trees, 1 small square. Row 2: 1 small square, 4 trees. Row 3: 5 trees. Row 4: 4 trees, 1 small square. Row 5: 5 trees.
- B:** A 5x5 grid with trees and squares. Row 1: 1 small square, 4 squares. Row 2: 1 small square, 1 tree, 3 squares. Row 3: 4 squares. Row 4: 1 small square, 1 tree, 3 squares. Row 5: 4 squares.
- C:** A 5x5 grid of 25 trees.
- D:** A 5x5 grid with trees and squares. Row 1: 1 small square, 1 tree, 1 small square, 1 tree, 1 small square. Row 2: 1 small square, 1 small square, 1 tree, 1 small square, 1 tree. Row 3: 1 small square, 1 tree, 1 small square, 1 tree, 1 small square. Row 4: 1 tree, 1 small square, 1 tree, 1 small square, 1 tree. Row 5: 1 small square, 1 tree, 1 small square, 1 tree, 1 small square.
- E:** A 5x5 grid with trees and squares. Row 1: 1 tree, 1 tree, 1 small square, 1 tree, 1 small square. Row 2: 1 small square, 1 small square, 1 tree, 1 small square, 1 tree. Row 3: 1 tree, 1 tree, 1 small square, 1 tree, 1 tree. Row 4: 1 tree, 1 small square, 1 tree, 1 small square, 1 tree. Row 5: 1 tree, 1 tree, 1 small square, 1 tree, 1 small square.
- F:** A 5x5 grid with a mix of trees and squares scattered throughout.

EVALUATION

Alabama Forests Forever CD-ROM and Instructional Guide

Please complete the following questionnaire to help us determine the effectiveness of the *Alabama Forests Forever* CD-ROM and Instructional Guide.

Name _____

Organization/
School _____

Mailing ad-
dress _____

City/State/
Zip _____

At what grade level(s) have you used the CD-
ROM? _____

In which subject areas?

Thank you for providing your reactions to the CD-ROM and *Instructional Guide*. The following information will help us plan future teaching tools and implement programs more effectively. Please comment when appropriate on the space provided.

1. **The CD-ROM is an effective teaching tool.**
Strongly agree 1 2 3 4 5 Strongly disagree
2. **I do not have the technology necessary to incorporate into my class room.**
Strongly agree 1 2 3 4 5 Strongly disagree
3. **The *Instructional Guide* is an effective tool.**
Strongly agree 1 2 3 4 5 Strongly disagree
4. **The resource materials will be helpful when I teach about the environment.**
Strongly agree 1 2 3 4 5 Strongly disagree
5. **I plan to use the CD-ROM with future classes.**
Strongly agree 1 2 3 4 5 Strongly disagree
6. **I plan to use the *Instructional Guide* to prepare for future classes on forestry issues.**
Strongly agree 1 2 3 4 5 Strongly disagree

The Alabama Forests Forever would appreciate any further comments you wish to share

_____ Check here if you are a trained PLT educator or facilitator.

_____ Check here if you are interested in receiving training in Project Learning Tree.

Mail To: Alabama Forests Forever Foundation
555 Alabama Street
Montgomery, AL 36104

