Wisconsin Forests Forever Teachers' Guide

Sponsored by

Wisconsin Forest Resources Education Alliance

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WFREA
Wisconsin Forest Resources Education Alliance

The mission of WFREA is:

- To provide a coordinated outlet for forestry education throughout Wisconsin.
- To teach sustainable forestry - the practice of managing dynamic forest ecosystems to provide ecological, economic, social, and cultural benefits for present and future generations.

By working in partnership with educators, university faculty, forest industry, and state and federal agencies to accomplish this mission, WFREA has successfully produced the first CD-ROM about Wisconsin's forests and an accompanying teachers' guide correlated to Wisconsin's Model Academic Standards. Enjoy!

To learn more about the WFREA program and its many educational tools, visit our website (www.wfrea.org). For further information, please contact WFREA coordinator, Eden Koljord, toll-free at (888) WFREA-64, or send e-mail to wfrea@newnorth.net.

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With special thanks to Judy Klippel for editing!

Grants obtained from Consolidated Papers, Department of Commerce (DOC), Wisconsin Department of Natural Resources (WDNR), and Lake States Resource Alliance (LSRA) paid for the development of this CD-ROM project.

Table of Contents

This symbol indicates that the activity uses the CD-ROM directly.

Recreation Section

Forests are great places to relax and have fun. Spend some time discovering gems in your own area of Wisconsin.

Balance Section

Forests provide us with valuable habitat, numerous products, indispensible jobs, wonderful recreation, and a huge challenge! Learn how sustainable forestry tries to meet that challenge by providing balance in management decisions.

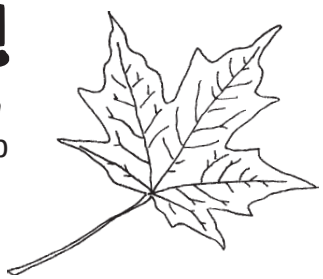
Don't Stop Now! 99

You've got the background, the momentum, and the perfect opportunity to involve your kids in an action project. Go for it!

Appendix

This symbol indicates that the activity uses the CD-ROM directly.

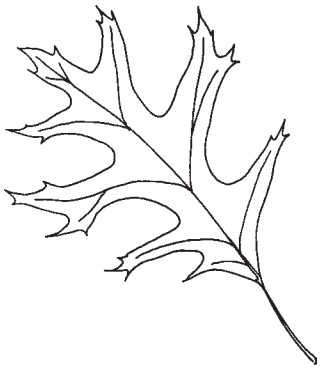
Welcome to the Forest!



This teachers' guide is designed to complement the ***Wisconsin Forests Forever*** CD-ROM. It contains 13 activities that will help your students appreciate our forest resources and understand the need for careful stewardship.

Grade Level

These activities are designed for students in **grades 4 - 6**. Some can be adapted for younger or older students.



Subjects

These **multidisciplinary** activities will help you teach forestry-related concepts across the curriculum. The **Subject Matrix** on page 6 will help you plan how to use this guide.

Sequence

The activities have been designed to **build upon each other**. Ideally, you would start at the beginning and teach all the activities in order. That not always being possible, here are some suggestions:

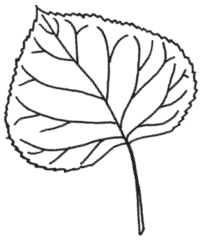
The Environment, Products, and Recreation Sections can each be pulled out and used independently. The Balance Section presents the big picture of sustainable forestry. It draws upon the concepts in the other sections and ties everything together.

Wisconsin Model Academic Standards

This guide references content standards for environmental education, science, social studies, language arts, and math. Within each content standard, one or more of the performance standards is addressed. For a copy of the standards, visit the Department of Public Instruction's website (www.dpi.state.wi.us).

Pre/Post Test

The CD-ROM includes a pre/post test. If you wish to record and compare your students' responses, please use the hard copy of the test found on page 114. Answers to the questions are on page 115.



Appendix

Refer to the appendix for complete information about resources referenced in this guide.

Subject Matrix

Activities	Science	Social Studies	Math	English/ Language Arts	Environmental Education	Visual Arts
Every Tree for Itself	●		◦	◦	●	
Timber!	●	●	◦	●	◦	◦
It Does What?	●			◦	●	
Get Connected	●			●	●	●
Nothing Succeeds Like Succession	●	◦		●	●	◦
Celebrate Trees!	●	●		●	◦	◦
Make Your Own Paper	●	◦		◦	●	◦
Would Wood Be Needed for My Job?	●	●		●	◦	
Where's MY Tree?	●		●	◦	◦	
Recreation Use Survey	●	●	●	●	●	
A Forest Near You!	●	●		●	●	●
Picture the Forest	●	●		●	●	●
What's Happening in Wisconsin's Forest?	●	◦		●		
Don't Stop Now!	◦	●		●	●	

● = Major Emphasis

◦ = Minor Emphasis

Think Forests!

Before you begin this look at Wisconsin's forest resources, take a few minutes to set the stage for learning. Here are some ideas for getting your classroom and kids ready to step into the forest.

Post the Posters

Take the time now to laminate the two posters in this packet. Use them to "green" up your room. You can also get a set of wonderful posters from the USDA Forest Service featuring Smokey and numerous plants and animals. Call America's Outdoors at (414) 297-3693.

Set Up a "Treerific" Nature Table

Ask students to bring in leaves, fruits, cones, twigs, and seeds from trees. Enjoy the diversity of trees. Include some library books on the table, such as ***Eyewitness Books: Tree***, to encourage further study.

Stock your Reading Corner

There are many wonderful books about forests in the library. You'll find a list of age-appropriate books on pages 109 - 112 of the **Appendix**. Ask your librarian to gather them for you.

Fill the Room with Music

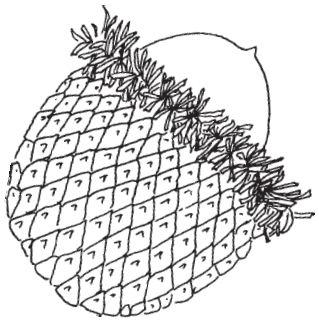
Choose some forest-inspired music to play during the day. Try "The Seasons" by Tchaikovsky, "Forest Murmurs" by Wagner, or "Woodland Sketches" by MacDowell. The popular recordings that combine music and nature sounds are also very inspiring!

Get Bulletin Boards Ready

Several activities in this guide will result in art or writing projects that you can post on a colorful bulletin board. Decorate the edges with leaves, twigs, or forest animal cutouts.

Find and Post a Map of Your School Grounds

Enlarge a map of your school grounds, school forest, or nearby park. It will be a great place to record the identity of trees, sightings of plants or animals, location of recreation facilities, or possible action projects.



Every Tree For Itself

What do trees need so they can grow? Some of their needs are the same as those of people and other animals. For example, trees need plenty of water. They also need plenty of nutrients, which they get from food. But trees and people don't get food in the same way. Plants make their own food by using energy from the sun.

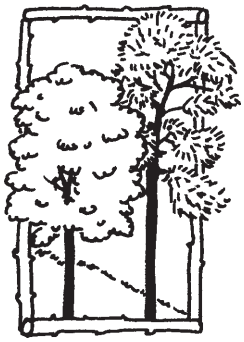
If trees don't get enough water, nutrients, or sunlight, they may grow slowly or die. Growth rings show this graphically. In general, wide rings indicate good conditions for growth (plenty of nutrients, water, and sunshine), while narrow rings often indicate less favorable conditions for growth (drought, insect damage, lack of nutrients, or competition).

Getting Ready

1. Cut two 3" x 3" (7.6 cm x 7.6 cm) squares out of blue, yellow, and green construction paper for each student. To save time, you could use colored poker chips or milk caps. These work much better than paper if you're doing the activity outdoors on a breezy day.

Doing the Activity

1. Pass out cross-sections from several trunks or branches (tree cookies), and have your students examine the growth rings. (If you don't have an actual cross-section, draw a big one on the chalkboard.) Explain that the number of rings indicates a tree's age.
2. Give a large piece of paper (at least 8.5" x 11" or 22 cm x 28 cm) or a white paper plate to each student.
3. Tell students to imagine that they are trees. Have them draw a cross-section of themselves, representing their age in growth rings. (You might laminate these drawings for durability.)
4. Have students stand about three feet (91 cm) apart on their cross-sections.
5. Equally distribute the colored squares (or poker chips) on the floor around the students so the squares are about one to two feet (30 - 61cm) apart.
6. Tell students that they'll be playing a game called "Every Tree for Itself." The object of the game is for the "trees" to gather as many squares as they can. Explain that each colored square represents a tree requirement. Blue represents water, yellow represents sunlight, and green represents a nutrient



Method

Students become trees competing for water, sunlight, and nutrients.

Key Concepts

The earth's atmosphere, water, soil, climate, and geology vary from region to region, thus creating a wide diversity of biological communities.

Organisms are interdependent; they all depend on nonliving components of the Earth.

Altering the environment affects all life forms—including humans—and the interrelationships that link them.

Objectives

- simulate how trees compete for their essential needs
- describe how varying amounts of light, water, and nutrients affect a tree's growth

Subjects & WI Academic Standards

Science:
A.4, C.4, F.4
A.8, C.8, F.8

Math:
A.4, B.4
A.8, B.8

Standards cont.

English/Language Arts:
B.4, C.4
B.8, C.8

Environmental Education:
A.4, B.4
A.8, B.8

Materials

- 8.5" X 11" pieces of paper or paper plates
- pieces of blue, yellow, and green paper or 3 colors of poker chips or milk caps
- markers or crayons
- tree trunk or branch cross-sections showing annual growth rings (optional)

Preparation Time

15 minutes

Activity Time

1 50-minute class period

Setting

classroom or outdoors

such as nitrogen, oxygen, or carbon dioxide. Make appropriate adjustments if you use poker chips.

7. Give a signal to start the first round. Have student trees reach with their roots and branches (arms and legs) to gather their requirements. Tell students that one foot (their tap root) must remain planted on their cross-section at all times. They are not allowed to slide their cross-section along the floor or step off it; they will be disqualified for doing so.
8. Allow student trees to gather these requirements for one 30-second round. (They can either collect all types of requirements at once or one type of requirement each round.) Have students use a notebook to record how many of each color requirement they gathered. Use the following questions to discuss the results of the first round:

   - How many requirements did each tree get?
   - Do any trees lack a particular requirement?
   - What might happen to a real tree that lacked one of its requirements? (It might grow slowly or eventually die. Point out to the students, though, that different species of trees have different requirements.)
   - Is there such a thing as too much water, sunlight, or nutrients? (Yes, every species has optimum levels beyond which the tree becomes stressed.)

9. Have students stand on their cross-sections in groups of three to five. Gather the colored squares and spread them around the room again. Play another round and have student trees record their results.
10. Compare the results of this round with those of the first. In most cases, students will notice that each tree gathered fewer requirements. Ask if they can reach any conclusions about trees that grow close to each other. (Such trees compete for requirements. Often they don't grow as well as trees that are more widely separated from one another.) Ask if any trees "died" because they couldn't get a particular requirement. (You can allow trees to fall down or look tired and droopy if they haven't received their vital requirements.)
11. Ask students how foresters might use their knowledge of competition in caring for a stand of trees. (Foresters plant trees a certain distance apart so the trees will be able to get enough nutrients. The distance varies depending on the species of the tree. Foresters also thin young stands of trees).

12. Try several more rounds, comparing the results each time. Here are suggestions for additional rounds:

    - Have all of the students stand closer together.
    - Put students closer together, but have only half of the class participate.
    - Use fewer water squares (representing a drought).
    - Use fewer sunlight squares (representing lack of sunlight for young trees because of overcrowding).
    - Use fewer nutrient squares (representing poor quality soil).

    As before, each student should examine his or her results in each round. Older students can record those results and later graph or chart the results of each round and draw conclusions.

Providing Enrichment

For a visual way to portray water absorption by roots, try the following:

1. Explain that, for many species of trees, the diameter of the spread of the tree's roots is roughly equal to the tree's height. Have students measure themselves and then make a circle (using chalk or string) with a diameter equal to their height.
2. Play the tree game with each student standing in the center of his or her circle. Tell the student trees they can gather water squares only within their circle of roots.
3. Play the game again using root circles, but this time have trees stand in clumps. Afterward, discuss the results of root competition.

Assessing Student Learning

Assign values to the amounts of requirements the students gather. For example, a collection of three or more of each requirement could represent superior growth. Two of each requirement could represent average growth. And one or fewer of each could represent poor growth. Using these values as a basis, have students record the numbers of trees that are growing very well, fairly well, and poorly for each round. Older students can use graphs to show results.

Extending the Learning

Plant a Tree

What if you wanted to plant a tree outside your school? What kind of tree would you plant? What would you need to consider? With your students, brainstorm a list of the needs of trees. Here are some things you should include in your list: soil conditions, sun exposure, moisture, and space (i.e., how big the tree will be when it is full-grown).

Now look at potential planting spots around your building. Where is there room to plant a tree? What obstacles to growth are present (e.g., locations of sidewalks and power lines)? For a small fee, you can even have the soil tested by the ***Soil and Plant Analysis Lab***, 5711 Mineral Point Road, Madison, WI 53705, (608) 262-4364, (http://uwlab.soils.wisc.edu).

Now take a look at some trees you might plant. Make a chart so that you can compare their advantages and disadvantages on your particular site. Down one side, list the trees you are considering. Across the top, list the qualities and requirements you are comparing. Columns might include: soil conditions; sun exposure; moisture; hardiness in winter; height when mature; width when mature; resistance to pests, diseases, pollution, or salt; and comments (e.g., lovely spring flowers or breath-taking fall foliage).

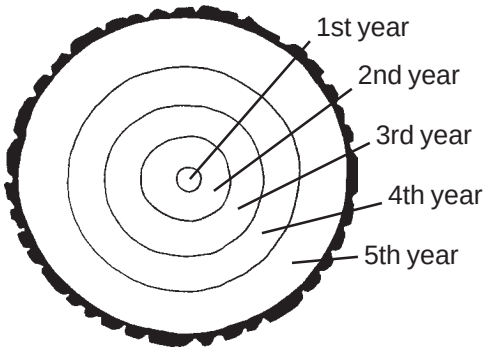
Divide into groups and allow each group to choose one or two trees to research. Provide your students with references on selecting the right tree for the right spot. You'll find some good ones in **Finding Out More!** later in this lesson. When the chart is complete, think about your site and circle all the matches. For example, if your site is in the full sun, circle all the places in the "sun" column that say "full sun." When done, look at the chart. Which trees are best suited to be planted on your site? In other words, which trees have the most circled conditions in their row?

Invite a local arborist or landscape specialist to talk to your class about how to choose a tree. Ask him/her to share basic information about how cultivars are developed and why people often choose them. If possible, follow through on your project and plant the tree you have chosen. You might ask for donations from a local nursery or raise funds to plant the tree.

Check out the ***Tree Musketeers*** website (www.treemusketeers.org) for information on how to plant a tree. Don't forget to register your tree in their "One in a Million" campaign.

Read a Tree's Rings

Interpreting the growth rings of trees can reveal a lot about the trees' growth and development. Here are several activities that make use of tree cross-sections:



Cross-section of a five year old tree

- The ***NatureScope*: *Trees Are Terrific!*** activity "Reading the Rings" asks students to match tree ring patterns with the factors that caused them, then to "read" the rings of a tree to solve a mystery. Grades 6 - 7.
- The ***Project Learning Tree*** activity "Tree Cookies" relates tree growth rings to environmental and historical changes. The assessment for this activity asks students to listen to a story about a tree's life and to draw its cross-section. Grades 3 - 8.
- The ***Lessons in a Land Ethic*** activity "The Good Oak" uses Aldo Leopold's writings to relate tree growth, environmental conditions, and historical events. Grade 6 and up.

Build a Tree

Not sure just how a tree really works? You and your students will understand it better after you've acted out the parts and functions of a tree. See the activity "Build a Tree" in Joseph Cornell's book ***Sharing the Joy of Nature***. If you can't find Cornell's book, try finding one of these adaptations of his activity: "Build a Tree" is in ***NatureScope: Trees are Terrific*** and "Tree Factory" is in ***Project Learning Tree***. Grades 3 - 6.

Finding Out More!

Selecting the Right Tree

A Guide to Selecting Landscape Plants for Wisconsin by E.R. Hasselkus. This booklet is available from your county's University of Wisconsin - Extension office. Ask for publication #A2865 or view it online.
www.uwex.edu/ces/pubs/trshrbcat.html

Landscaping for Wildlife by Carrol L. Henderson. This book is available from the Minnesota Department of Natural Resources, 500 Lafayette Road, Box 7, St. Paul, MN 55155, (651) 296-6157.
www.dnr.state.mn.us/information_center/books.html

Minnesota Power Electric - The Right Tree Handbook
www.mpelectric.com/treebook/

Wildlife and Your Land: A Series About Managing Your Land for Wildlife published by the Bureau of Wildlife Management. The booklet in this series titled “So, What Should I Plant?” gives good information for Wisconsin.

Wisconsin Department of Natural Resources
www.dnr.state.wi.us/org/land/forestry/nursery/order/descriptions.htm

University of Florida - The Right Tree for the Right Place
www.agen.ufl.edu/~foodsaf/dh104.html

Looking for Tree Cookies?

First ask your students if they or their parents cut firewood! Next try a local lumber mill or tree trimming service. You can also order tree cookies from several companies. The purchased cookies can save you time and frustration; they come dried and sealed with varnish, so they rarely crack.

Museum Products Co.
84 Route 27, Mystic, CT 06355
(800) 395-5400
www.museumproductsco.com

Nasco
901 Janesville Ave., P.O. Box 901, Fort Atkinson, WI 53538
(800) 558-9595
www.nascofa.com/prod/home

Timber!

The History of Forestry in Wisconsin

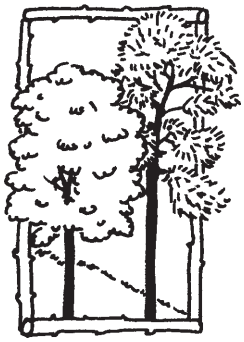
In the late 1700's, virgin forests covered about 30 million acres (86%) of Wisconsin. As settlers arrived, they cleared the land for agriculture. Beginning in the 1840's, logging crews harvested pine to build cities and settlers' homes on the American frontier. These crews were so efficient that white pine was nearly wiped out in Wisconsin by 1910. In the late 1800's, after many pines had been cut, logging crews began to harvest hemlock for the tannic acid located in the bark. Once the pines and hemlocks had been cut, the hardwoods—maple, beech, aspen, birch, and ash—were harvested to clear more land for farming. In addition to the cutting, wildfires took their toll, burning half a million acres per year. By 1915, only 380,000 acres (1%) of timberland remained in the entire state. At this time in history, people viewed the forest as an inexhaustible resource.

By the 1920's, the magnitude of the devastation was beginning to show. The cutover/burned over lands could not support forest products industries—nor were they good farmlands. A small group of people recognized the value of trees and forested lands for economic development, wildlife, water quality, and recreation. In the late 1920's, Wisconsin foresters, with support and cooperation from the public, the Legislature, lumber and logging associations, and conservation groups, began to reestablish Wisconsin's forests.

Today, Wisconsin's forests total over 16 million acres (46% of the state), and foresters are managing our forests in ways that will ensure continued productivity, habitat, and recreation opportunities. It took their commitment to establish the comprehensive forestry legislation and management practices that remain the foundation of our programs today.

Getting Ready

1. Make copies of the student page "How Well Do You Know Your State History?" on page 21 for each group of 2 - 4 students.
2. Make a copy of pages 22 - 26 and cut apart for use by student research groups.
3. Gather reference books on Wisconsin history listed under **Finding Out More!**



Method

Students create a "scrapbook" that interprets the history of Wisconsin's forests.

Key Concepts

Wisconsin's forests have provided for the needs of people for thousands of years.

The recovery of Wisconsin forests from overharvesting at the turn of the century is a success story.

Today's forests are the result of thousands of decisions made by forest property owners and users, each seeking different benefits from the land.

Objectives

- investigate a time period of Wisconsin history
- create a scrapbook page or other product that tells the story of a particular time period
- compare and contrast the way people have viewed the forest throughout Wisconsin history
- research local history

Subjects & WI Academic Standards

Science:
A.4, B.4, C.4, E.4, H.4
B.8, C.8, F.8

Social Studies:
A.4, B.4, E.4
A.8, B.8, E.8

Math:
A.4, A.8

English/Language Arts:
A.4, B.4, C.4, E.4, F.4
A.8, B.8, C.8, E.8, F.8

Environmental Education:
A.4, B.4, C.4
A.8, B.8, C.8

Materials

- copies of "How Well Do You Know Your State History?"
- 1 copy of time periods and questions found on pages 22 - 26
- reference books
- Internet access

Preparation Time

15 minutes

Activity Time

Part A: 15 minutes

Part B: 1 50-minute class period plus homework

Part C: 1 50-minute class period plus homework

Setting

classroom

Doing the Activity

Part A
Set the Stage for Learning

1. Help your students briefly review Wisconsin history. Give each group of 2 - 4 students a copy of page 21.
2. Ask students to cut apart the events and put them in chronological order. If they think they know the year of an event, encourage them to record it.
3. As a class, go over the events, allowing students to work together to establish the correct order of the timeline. See the key on page 26. As an alternative, you may want to use this activity to assess students' current knowledge of Wisconsin history.

Part B
Research Our History

1. Explain that the class is going to take a close look at the history of forestry in Wisconsin. Each group of 2 - 4 students will be assigned an historical time period. The groups will research their time periods and share their results with the rest of the class. Think about how the results might be shared. Don't decide yet! But do consider some of these options:

   Scrapbook. The groups could put together scrapbook pages that interpret their time periods. Invite a parent or retailer with experience in assembling memory books to give the students ideas about how they might put together their pages.

   Book. Each group could write and illustrate a page(s) for a book that the class could publish and place in the school library. See the book ***Paddle to the Sea*** by Holling Clancy Holling for ideas on how this book might look.

   Mural. Each group could contribute a panel to a linear mural that would show the history of our forests. You could display the mural in the classroom or a school hallway.

   Web page.

   PowerPoint or HyperStudio presentation.

2. Assign each group a period of time to investigate. See pages 22 - 26 for the different times. You can combine or split these time periods to meet the size and special needs of your class.
3. Discuss with students how they will research the time periods and events they have been given. Encourage them to use reference books, the Internet, history books, and

local historical resources. They should add other events they uncover to their lists. They should also add local events to their lists.

Part C
Put the Pieces Together

1. After they have pulled together interesting photos, quotes, newspaper articles, or other information from their time periods, meet together as a class to share preliminary findings. Ask each group:

   - What was it like during your time period?
   - What did our area of Wisconsin look like during your time period?
   - What else was happening in Wisconsin?
   - How did people feel about the forests?

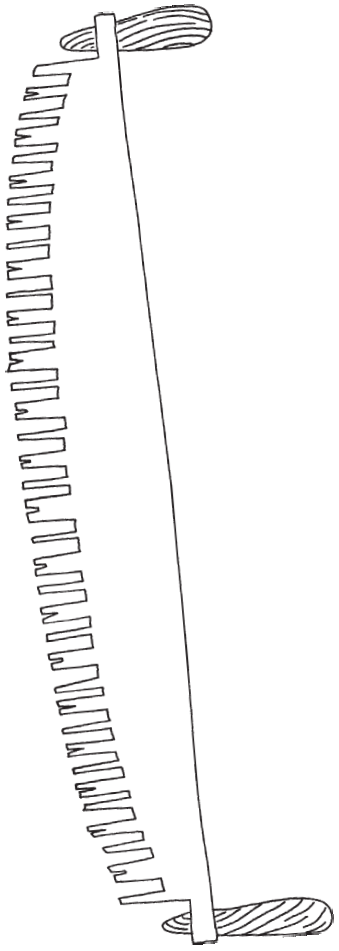
2. Looking at the whole history of forestry in Wisconsin, ask these questions:

   - Were the people who cut all the trees "bad" people or did they really believe that the trees were limitless?
   - What were the consequences of not thinking ahead?
   - When did we start to plan for the future use of forests and other natural resources?
   - What were some early steps toward conserving our forest resources?
   - Who were some of the early leaders promoting the conservation of Wisconsin's forests?

3. Ask each student to write a paragraph or two summarizing what was happening during his/her time period.

4. Decide how to organize and present the information. Look back at the options listed under Part B step 1. Are there other possibilities? Select the method and work cooperatively to produce the pieces of the final project.

5. Think of a way to share the final project with other students in your school, parents, or the members of your community.



crosscut saw

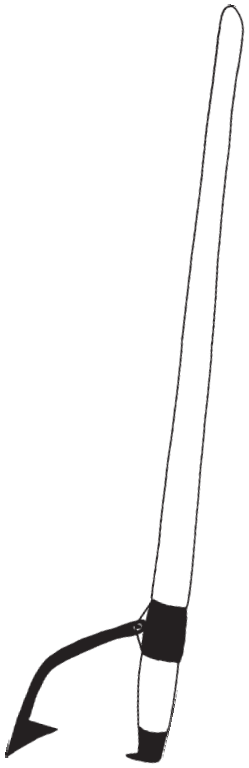
Assessing Student Understanding

Assess student participation in classroom discussions. Observe their research skills and the types of questions they pursue. Evaluate their individual written summaries and the final group products based on criteria that you have established with the students.

Extending Student Learning

Read Tree Rings

In the first activity, “Every Tree for Itself,” your students learned to interpret the cross-sections of trees. Go on a field trip to an area that was recently logged, or bring large cross-sections into the classroom. Look at the cross-sections. Assuming the tree was recently cut, figure out what year it began to grow. Use pushpins and yarn to date the rings, and label important historical events that the tree has witnessed. Can you find a cross-section of a 100-year-old tree? Do you think you could find a 200-year-old tree in Wisconsin? Challenge your group to find areas where such a tree might be located.



cant hook

Focus on Local Changes

The ***Project Learning Tree*** activity “Did You Notice?” encourages students to study changes in their local community over short and long periods and to identify patterns of change. Grades 3 - 8.

The ***Wisconsin’s Millennium Tree*** activity “School Grounds Timeline” looks at the school grounds or school forest to develop a timeline or diorama. Grade 4.

Discover a Famous or Historic Tree

You may have interesting trees in your park or community! Contact your local historical society or county forester. Check out the book ***Wisconsin’s Famous and Historic Trees*** by Bruce Allison and Elizabeth Durbin. It lists historic trees, hanging trees, homeplace trees, Native American trees, and surveyors’ trees. It also tells you where you can find trees made famous by legend, art, and individuals.

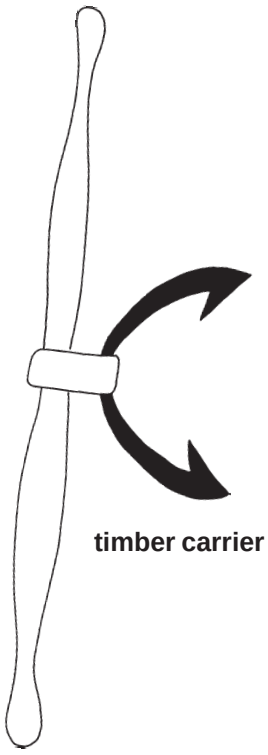
Do a Little tReesearch!

Try this idea from the ***NatureScope: Trees Are Terrific*** activity “Celebrate Trees.” Have teams of four or five kids research some ways trees have influenced our lives through time. Here are some examples of topics they can learn about: the first railroads, druids, iron smelting during the Iron Age, Johnny Appleseed, Paul Bunyan, and shipbuilding. Once they’ve finished doing the research, have the teams draw pictures, make collages, or create some other type of displays representing their topics. Then have them present what they’ve learned to the rest of the group.

Read All About It!

Share one or more of these "hisTREE" books with your class:

- ***The Big Tree*** by Bruce Hiscock
- ***Giants in the Land*** by Diana Appelbaum
- ***Little House in the Big Woods*** by Laura Ingalls Wilder
- ***Marven of the Great North Woods*** by Kathryn Lasky
- ***A Sand County Almanac***—"Good Oak" by Aldo Leopold
- ***A Tree in the Trail*** by Holling Clancy Holling
- ***A Tree's Tale*** by Lark Carrier



timber carrier

Finding Out More!

Searching for Historical Information

America's Forests: A History of Resiliency and Recovery. This is a well-researched video production on the history of American forests and the people who used them as they moved westward. Rare film footage and turn-of-the-century photographs graphically depict the forest, watershed, and wildlife conditions which led to our first national conservation movement. Contact the Forest Service Video Library, c/o Audience Planners, 5341 Derry Ave., Suite Q, Agoura Hills, CA 91301, (800) 683-8366. www.r5.fs.fed.us/video/fs.htm#history

Brevet's Wisconsin Historical Markers and Sites by Jane Hunt.

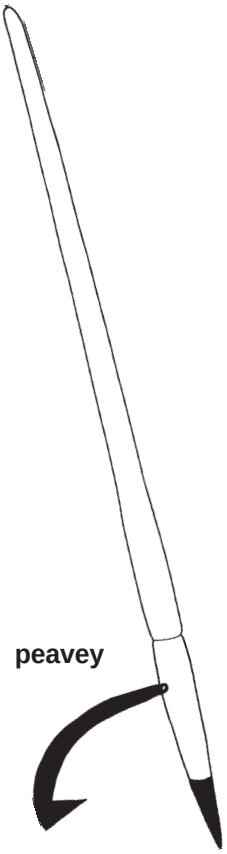
Conservation Hall of Fame. For more information, contact Schmeeckle Reserve, University of Wisconsin-Stevens Point, Stevens Point, WI 54481, (715) 346-4992.

Forestry History Association of Wisconsin, Inc.
403 McIndoe Street, Wausau, WI 54401

Forest History Society
www.lib.duke.edu/forest

Library of Congress
http://lcweb2.loc.gov/ammem/collections/finder.html

The State Historical Society of Wisconsin. Visit their website to find out about some wonderful collections. They offer numerous books, kits, old photos, newsclippings, and period documents.
www.shsw.wisc.edu/oss



peavey

- ***Badger History.*** This series of booklets is written for kids. Titles of special interest include: ***Wisconsin Indians, French in Wisconsin***, ***Wisconsin Pioneers***, ***The Fur Trade***, ***Wisconsin Explorers***, and ***Wisconsin Lumbering***.

- ***The History of Wisconsin*** edited by William Fletcher Thompson. This six-volume set contains photos, newsclippings, and excellent maps showing the growth of Wisconsin.
- ***Learning from the Land: Wisconsin Land Use*** and ***The Great Peshtigo Fire: an Eyewitness Account***.

Wisconsin Natural Resources. The February 1994 issue of this magazine included the insert "It Started with Fire: The Origins of Forestry in Wisconsin."

Wisconsin Pathways to Prosperity by Shiela Reaves. This book is filled with photographs, drawings, and maps.

Learning About Wisconsin Forests

National Forests (Chequamegon - Nicolet)
United States Forest Service (715) 362-1300
www.fs.fed.us/r9/cnnf

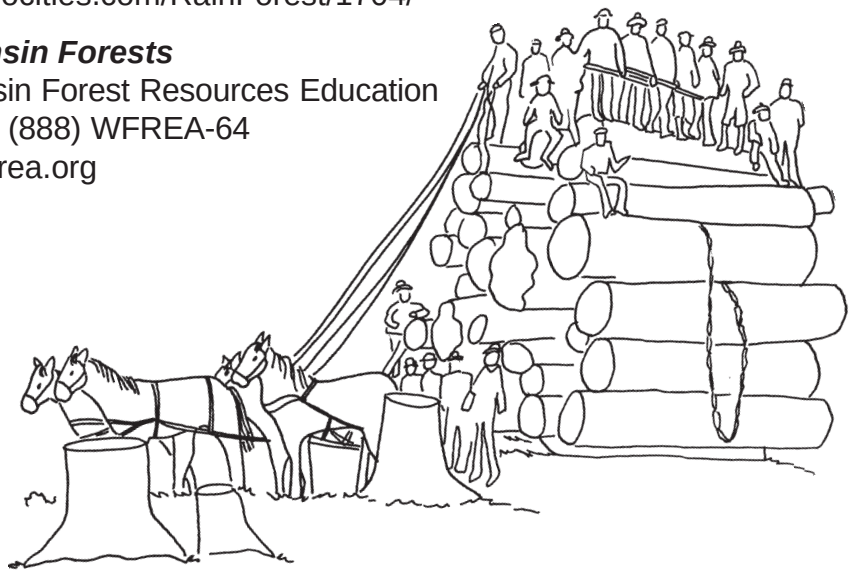
State Forests
Wisconsin Department of Natural Resources (608) 267-7494
www.dnr.state.wi.us/org/land/forestry/stateforests

County Forests
Wisconsin's County Forests Association (715) 453-9125
www.wisconsincountyforests.com

Industrial Forests
Wisconsin Paper Council (920) 722-1500
www.wipapercouncil.org

Private Forests
Wisconsin Woodland Owners Association (715) 346-4798
www.geocities.com/RainForest/1704/

Wisconsin Forests
Wisconsin Forest Resources Education Alliance (888) WFREA-64
www.wfrea.org



How Well Do You Know Your State History?

Smokey Bear in his first parade	Peshtigo Fire
Wisconsin's first state forest – Brule River State Forest	First sawmill built near DePere on the Fox River
First forest fire law	Crosscut saw invented
Earth Summit held in Rio	Civil War ends and settlers come to Wisconsin
Jean Nicolet explores Green Bay	First official state observance of Arbor Day
Wisconsin becomes a territory!	Last buffalo killed in Wisconsin
Mechanical tree-planting machines invented	First school forest in the nation – Crandon and Laona School District
Wisconsin becomes a state!	First state forest rangers
Wisconsin's first towns recognized as Tree City USA communities	First Wisconsin groundwood pulp mill

Presettlement & Fur Trade

Presettlement

Trees, Prairies, and Wildlife!

Of the 35,000,000 acres which would later become Wisconsin, approximately 30,000,000 are forested. Native Americans regularly set fire to parts of the land.

1634

Jean Nicolet Looks for Passage to China

The first governor of New France sends Jean Nicolet to visit the untraveled Northwest and discover a passage to China. Instead, he lands somewhere on the shores of the Bay of Green Waters.

1673

Joliet and Marquette Cross the Portage

On their way to discovering the Michissipi, Joliet and Marquette travel on the Fox and Meskousing Rivers. The mysterious land has been crossed by the first European explorers!

1763 - 1783

British Defeat French at Quebec

Now the British own the Ouisconsing wilderness, but little changes. However, there is a sense of uneasiness among the Indians. The French have only wanted furs; the British have shown interest in the land.

1783

Treaty of Paris Signed

With the signing of the Treaty of Paris, the Northwest Territory officially becomes American.

1800

European Population in Ouisconsin = 200

Questions you might try to answer:

Why did Native Americans start fires?
How did Native Americans use the forest?
How did the fur traders use the forest?
When did the first European build a cabin in Wisconsin? Where?
What was the life of a fur trader like? Can you find a picture of one?
Who were some of the other explorers of this time?
Can you find written descriptions or paintings of what Wisconsin looked like before settlement?
How did the area where you live look in the late 1700's?

Early European Settlement

1809

First Sawmill Built Near DePere on the Fox River

1814

American Flag Flies Over Fort Shelby

The war of 1812 reestablishes American ownership of the lands of Ouisconsin. It also opens the land for settlement. For the first time, an American flag flies over this land at Fort Shelby in Prairie du Chien.

1817

First Forest Fire Law

There is a new law against starting a fire on someone else's land or allowing a fire to spread to someone else's land.

1822

Badgers Invade Area

The United States Government leases land in southwestern Wisconsin for mining. This opens the rich lead mines to speculators and prospectors eager to try their luck. Many bring their families, set up homesteads, clear the land, and take up farming on the leased land.

1832

Buffalo Days Over for Wisconsin

The last buffalo east of the Mississippi River is killed in Trempealeau County.

1832

Black Hawk Surrenders

The end of the Black Hawk War in 1832 opens the lands south and east of the Wisconsin and Fox Rivers to settlement. In 1834, land offices open at Mineral Point and Green Bay. Settlement changes the face of Wisconsin. People pour in, living off the land and its resources. Farming becomes the major occupation. Land is cleared and prairie sod turned into wheat fields.

Questions you might try to answer:

The population of Europeans was about 200 in 1800. How many Europeans were there in 1830?
Why was the first sawmill built on the Fox River?
What did the American flag look like in 1814?
What other large animals were disappearing from the state during this time?
Why were lead miners called Badgers?
Can you find a map of Wisconsin in the early 1800's?
How did the area where you live look by the early 1800's?

Wisconsin Becomes a State

1836
Wisconsin is a Territory!
A census finds that about 12,000 people live in the area which will become Wisconsin. These settlers depend almost entirely upon the land to provide them with food, clothing, and shelter.

1837
Metal Plows Break Ground
The metal plow has replaced the wooden plow! Trees are removed from the land and used in construction of homes and barns. However, most of the trees are burned to get rid of them.

1848
Wisconsin Statehood
Wisconsin is a state with 200,000 proud people living within its borders. A growing number of these people live in small towns and urban areas. Farmers, market hunters, lumbermen, and miners supply food and raw materials to the growing urban populations. At this time the frontier lies along the Fox and Wisconsin Rivers.

1860
The Frontier is Advancing!
The frontier line corresponds roughly to an arc drawn from Green Bay to Hudson by way of Stevens Point.

1860's
Settlers Coming!
With the Civil War over, settlers rush to Wisconsin to homestead parcels of land.

1860
Buzzzz!
Forty sawmills are operating in Sheboygan, Manitowoc, and Kewaunee counties. Most of the lumber they produce is going by boat to the fast-growing cities of Milwaukee and Chicago.

Questions you might try to answer:
What did a metal plow look like? Why was it better?
Look at a state map. What waterways were being used to get lumber from Wisconsin's sawmills to Milwaukee and Chicago?
Find a map of Wisconsin territory in 1836.
On a map, show how the frontier changed from 1848 to 1860. How did this change affect the forests?
What was the population of Wisconsin in 1860?
How did our state flag look in 1848? Has it changed?
How did the area where you live look by the 1860's? Had your town been founded?

Growing Too Fast?

1867
Legislature Worried
The legislature asks for a study of forest destruction in the state. They report that the forests of southern Wisconsin "no longer yield a supply adequate for the wants of the present inhabitants; and the forest of the northern regions, heretofore considered inexhaustible . . . will soon be so reduced that the people must look elsewhere for their supplies." No steps were taken to fix the problem.

1870
Two Can Work Faster Together
The invention of the crosscut saw has greatly increased Wisconsin's production of lumber. Over one billion board feet of lumber are harvested this year alone!

1870
First Railroad to the North
The lumber industry has entered the northwoods on the Wisconsin Central! Logging is now a year-round activity. Loggers can harvest pines that had been located too far from streams. They also have been removing hardwoods by rail. Hardwoods had been ignored before this time because they would not float.

1870
Stumplands or Bust?
Settlers are moving into the cutover forests in northern Wisconsin. They are trying to farm the land, but the danger of fires, the hard work of removing stumps, the short growing season, and the poor soil are making life hard. The frontier line can now be drawn roughly as an arc extending from Green Bay through Stevens Point and Eau Claire to Hudson on the St. Croix River.

1872
First Wisconsin Groundwood Pulp Mill
The new paper mill in the Fox River Valley is using hemlock discarded by nearby lumber mills.

Questions you might try to answer:
Why do you think no one paid attention to the warning given in 1867?
How does a crosscut saw work?
Find a map showing the location of railroads in 1870.
What was the population of Wisconsin in 1870?
Can you find a picture of the cutover?
How did settlers remove tree stumps from their land?
Using a state map, draw the frontier line in 1870.
What did papermakers use to make paper before they tried wood in 1870?
How did the area where you live look by 1870?

Up in Smoke!

1871
Peshtigo Fire
The Peshtigo fire has claimed 1200 - 1500 human lives. In addition, 1,280,000 acres of timber have been lost. No attempts have been made to tally the loss of livestock or wild game.

1871
First "Closed Season" on Burning
It is now illegal to burn woods, prairies, and cranberry bogs between August 1 and November 30. Unfortunately, no one is enforcing this new law.

1887
Marshfield Burns to the Ground in Forest Fire

1892
First Arbor Day Observed in Wisconsin

1892
Peak Year for Timber Industry
Four billion feet of lumber are cut in Wisconsin forests! The lumbering business is rapidly providing openings and the eventual clearing of the wilderness.

1894
Fire Sweeps Through Phillips

1895
State Board of Immigration Encourages Agricultural Settlement of Cutover

1895
Fire Protection
The Legislature says that town supervisors and road superintendents will also be fire wardens. They have the power to hire firefighters and prohibit burning when it is too dry.

Questions you might try to answer:
On a state map, blacken the areas destroyed by forest fires. How many acres were destroyed by fire?
What equipment did firefighters have?
Why were there so many fires? If the trees had been cut and removed, what was left to burn? What does a forest look like after a fire?
Why did settlers go to northern Wisconsin? Did they know it was a land of stumps and fires?
Why do you think people wanted to clear the wilderness?
Where was the first Arbor Day observance?
What was the population of Wisconsin in 1895?
How did the area where you live look in 1895? Had your town been founded?

Oops! Did We Make a Mistake?

1897
State Forestry Warden
The state has begun a serious effort to conserve and restore our forests. A state forestry warden is now responsible for finding fires and putting them out.

1897
Commission Recommends Big Changes
The Legislature appoints a commission to investigate the "rapid disappearance of timber." The commission recommends big changes, but nothing comes of it.

1899
Wisconsin Produces 9.7% of All Lumber in U.S.—Four Billion Board Feet!

1903
State Forestry Department Established
The first major forestry law passes. It creates a Forestry Commission, hires a superintendent of forests, and establishes a forest reserve.

1907
First State Forest—Brule River—Established

1910
U.S. Forest Products Lab Opens in Madison

1911
First State Nursery and State Forest Rangers
Trout Lake is the state's first tree nursery. It begins with 192,000 seedlings purchased from Michigan.

1914
First National Fire Prevention Day

1915
First Aerial Fire Detection
Jack Vilas flies over northern Wisconsin in a Curtis Flying Boat searching for forest fires. This is the first time that an airplane is used for finding forest fires.

Questions you might try to answer:
What was it like to be a forest ranger in the early 1900's?
What did firefighting equipment look like back then?
What is the Forest Products Laboratory? What did it do? Is it still there?
On a state map, mark the first state forest, first state nursery, and other places of important forest-related events.
What was the population of Wisconsin in 1915?
What do you think Wisconsinites thought about their forests in the early 1900's?
How did the area where you live look by 1915?

Rethinking the Forests

1920's
Farming Goes Bust in Cutover
Many landowners can't make a living and have stopped paying their property taxes.

1924 - 1929
Money for Forestry Program
First, a state referendum allows the legislature to use money to buy, preserve, and develop forests. Then, a Forestry Mill Tax on real estate establishes a steady source of funding for forestry in Wisconsin.

1927
Fire Protection Expanded
Responsibility for all fire protection, detection, and control is placed in the State Conservation Commission.

1927
Forest Crop Law
The Forest Crop Law is encouraging tree farming by delaying taxes on privately-owned land until the timber is harvested.

1927 - 1929
First County Forests
Counties can now create forests from tax delinquent land. Langlade County and Marinette County are the first to take advantage of the new law.

1928
Wisconsin's First National Forest
The federal government begins buying land for the Nicolet and Chequamegon National Forests.

1928
Fire Lookout Towers in Northern Forests = 54

1928
First School Forest in Nation Started in Crandon and Laona School District

1930 - 1935
Two Million Acres of Forests Burn in Five Years

Questions you might try to answer:
What happened during this time to encourage growing trees?
On a map, locate the first school forest, the first county forests, and Wisconsin's national forests. Why are these forests so important?
How many school forests are in Wisconsin today?
Can you find pictures of homesteads in the cutover?
What was the population of Wisconsin in 1930?
How did the area where you live look in 1930?

On the Right Track

1933
CCC Makes a Difference
With the Civilian Conservation Corps, Wisconsin finally has enough people to control fires.

1935
Fire Hazard Along Roads Reduced
Ash containers are now required in cars. New laws prohibit throwing burning tobacco or matches from autos.

1936
First Statewide Forest Inventory
Forests are being cataloged and recorded as part of a cooperative effort between state, federal, county, and industrial forestry organizations.

1938
Radios Improve Fire Control
Communication from towers to ground crews improves with the purchase and use of ultra-high frequency radios.

1939
Timber Production Down to 336 Million Board Feet

1944
Tree Planting Process Improved
Foresters use mechanical tree-planting machines for large-scale reforestation in state, county, and industrial forests.

1950
Smokey on Parade
Smokey Bear makes his first public appearance at the Fireman's Convention Parade in Hurley, Wisconsin.

1950
First Forest Entomologists Employed by the Wisconsin Conservation Department

Questions you might try to answer:
Who worked for the CCC? What did they do for Wisconsin's forests?
Why were radios such an important improvement in fire control? Remember: Before this time, the only means of communication was by phone. Note: This was before cell phones!
What has Smokey Bear's job been? Find out the true story of Smokey.
How were trees planted before the invention of the mechanical tree planter?
Why was a forest inventory an important step?
What was the population of Wisconsin in 1950?
How did the area where you live look in 1950?

Think Globally—Act Locally

1976
Wisconsin's First "Tree City USA" Communities
Five cities receive recognition from the National Arbor Day Foundation—Eau Claire, Racine, Sheboygan, Stevens Point, and West Allis.

1985
Managed Forest Law Enacted
Under this improved forest tax law, landowners must write a management plan for their forest lands. The plan has to be approved, and landowners must follow the plan to receive tax advantages.

1992
Forest Service Changes Its Management Plan
The National Forest Service adopts a new philosophy. It is called ecosystem management.

1992
Earth Summit in Rio
More than 120 of the world's governments agree on the goal of sustainable development. In 1993, the United States says it will sustainably manage U.S. forests by the year 2000.

1993
Forest Stewardship Council Forms
This organization oversees certification of "green" wood products. These products cost more, but some consumers are willing to pay more for a product that comes from a sustainably managed forest.

1994
Forestry Best Management Practices (BMP)
Forest resource experts develop guidelines and a monitoring program to be sure that forestry practices don't harm Wisconsin's water resources. The BMP manual tells loggers, landowners, and foresters how to plan timber harvests, build roads, and replant harvested areas in ways that protect water quality.

1995
State Forests Set the Pace
New legislation defines sustainable forestry and revises how state forests will be managed.

Questions you might try to answer:
Was the United States one of the nations to agree to sustainable development at the Earth Summit?
What does a "green" label look like?
What is the definition of sustainable forestry?
Who owns the forests near you?
Is your town or city a Tree City USA?
What is the current population of Wisconsin?
It's a new millennium! How do people view the forests?

Answers to
How Well Do You Know Your State History?

1634
Jean Nicolet explores Green Bay

1809
First sawmill built near DePere on the Fox River

1817
First forest fire law

1832
Last buffalo killed in Wisconsin

1836
Wisconsin becomes a territory!

1848
Wisconsin becomes a state!

1860s
Civil War ends and settlers come to Wisconsin

1870
Crosscut saw invented

1871
Peshtigo Fire

1872
First Wisconsin groundwood pulp mill

1892
First official state observance of Arbor Day

1907
Wisconsin's first state forest - Brule River

1911
First state forest rangers

1928
The first school forest in the nation - Crandon and Laona School District

1944
Mechanical tree-planting machines invented

1950
Smokey Bear in his first parade

1976
Wisconsin's first towns recognized as Tree City USA communities

1992
Earth Summit held in Rio

It Does What?

Imagine a towering forest that stretches as far as the eye can see. Imagine a humble woodlot in the corner of a farmer's field. Imagine an urban forest planted along streets and overflowing into backyards. Imagine a forest that you and your students have come to love and enjoy. We need these forests. We need them for recreation and wood products. We need them for beauty and clean air. Animals need them. The earth needs them.

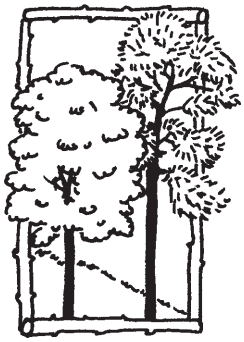
Why?. . . because, in addition to the numerous social and economic benefits, forests provide us with priceless ecological benefits! Some are obvious. Some are a little harder to figure out. Maybe some everyday items will help you and your students understand the many things that forests do for the earth.

Getting Ready

1. Gather as many objects listed under **Materials** as possible. If you can't find an item, glue a picture of it on a card or simply write the word on a card. You should have at least one item for every two students.
2. Place all the items under a blanket or in a box.

Doing the Activity

1. Talk briefly with your students about forests near your school or around your community. Ask students why these forests are important. For example, brainstorm what happens in the forest during a severe thunderstorm. What effect do the trees have on the torrential rain and strong winds? Briefly discuss erosion and how a forest helps to slow down and absorb the rainwater. Consider a tree near your school or home. What effect does the tree have on the surrounding temperature, air quality, and noise level? Does a forest provide these same benefits?
2. Tell the students that today they are going to think about the ecological benefits of forests with the help of some everyday items. Each team of two students will choose an item from inside the box or under the blanket. Teams will have 5 - 10 minutes to think about what their object does and how that object represents an ecological benefit of the forest. Then they will share what they have learned with the class. You might



Method

Students relate the function of everyday objects to the ecological benefits of a forest ecosystem.

Key Concepts

Forests are a vital part of ecological processes. They help to recharge oxygen, recycle nutrients, prevent erosion, purify water, provide wildlife habitat, and modify the climate.

Objectives

- describe the ecological benefits of a forest ecosystem
- relate the functions of everyday objects to the functions of a forest ecosystem

Subjects & WI Academic Standards

Science:
C.4, E.4, F.4, H.4
E.8, F.8, H.8

English/Language Arts:
B.4, C.4
B.8, C.8

Environmental Education:
A.4, B.4
A.8, B.8

Materials

- box or blanket for hiding items
- dollhouse or tent
- ear plugs
- snack food (candy bar)
- tent stake
- renewable battery
- coffee filter
- sponge
- air conditioner
- windbreaker
- air filter from car or furnace
- umbrella
- padlock
- rear-view mirror
- air freshener

Preparation Time

30 minutes

Activity Time

1 or 2 50-minute class periods

Setting

indoors or outdoors

want to model the thought process and reporting. For example, an air conditioner cools a room by removing heat from the air. This could represent how forests cool the air through transpiration. The answer "because forests are really cool" shouldn't count!

3. Allow each team to take an item. Give teams time to brainstorm for a few minutes. Listen to their thought processes and offer suggestions as needed.
4. Ask the teams to show their items to the class, explain the functions, and tell how they might represent functions of a forest ecosystem.
5. Discuss this statement: "If forests are so important, can we afford to cut them down?" What are the implications of not cutting any trees? The earth and all its inhabitants depend on forests. We do need to conserve forest ecosystems, but we also need to harvest trees for the wood and wood products that they provide. Can we do both?
6. Introduce the concept of sustainable forestry. Advocates for sustainable forestry say that we must be good stewards of our forest resources so that we can grow and harvest trees **and** conserve the soil, air, water, flora, and wildlife of the forest ecosystem.

Stuck?

Here are some forest benefits to help you if you run out of ideas before you run out of items!

- Forest soils soak up water and recharge the water table. They help control flooding by regulating water flow within a watershed. (sponge)
- Leaves of forest plants help trap and hold small airborne particles such as dust, ash, pollen, and smoke that can damage our lungs. (air filter from car or furnace)
- Tree leaves provide shade and cool the forest. (umbrella)
- Forests "recharge" themselves through the processes of death, decay, and rebirth. (renewable battery)
- Forest plants absorb thousands of gallons of water through their roots and release them through their leaves. This transpiration has an incredible cooling effect. (air conditioner)
- Forests provide shelter and food for birds, mammals, reptiles, amphibians, and insects. (dollhouse or tent)

- The roots of forest plants anchor the soil in place, reducing or preventing erosion. (tent stake)
- Forest plants absorb and hold nutrients from the soil until they die. Then the nutrients are unlocked for use by other plants. (padlock)
- Forests muffle noises from traffic. (ear plugs)
- Forest plants remove carbon dioxide from the air and release oxygen during photosynthesis. (air freshener)
- Forests slow down forceful winds, protecting homes and habitats. (windbreaker)
- Forests provide many foods for people—from nuts and berries to white-tailed deer. (snack food)
- Forests improve water quality by slowing the flow of water and filtering out pollutants. (coffee filter)
- Forests have provided beauty and enjoyment for generations. With careful management, they will continue to do so for years to come. (rear-view mirror)

Assessing Student Understanding

Observe student participation in class activities. Evaluate level of understanding and ability to communicate knowledge.

Ask students to come up with other everyday objects that demonstrate the functions of a forest ecosystem. They should write about the connections or present their findings to the class.

Extending the Learning

Plant a Renewable Resource!

Arbor Day has been an American tradition since 1872. Wisconsin residents have celebrated it since 1889. Each year, the state nurseries of the Wisconsin Department of Natural Resources offer free tree seedlings for distribution to each fourth grade student in celebration of Arbor Day. You can order trees for your fourth grade students by sending in the form sent to your school in late October. For more information on Wisconsin's Arbor Day Free Tree Program, contact the Griffith State Nursery, 473 Griffith Ave., Wisconsin Rapids, WI 54494, (715) 424-3700.

Enter the Arbor Day Poster Contest

The Department of Natural Resources Forestry program sponsors an annual Arbor Day Poster Contest for all state fifth graders. The contest is part of a national competition sponsored by the National Arbor Day Foundation and is the culmination of an Arbor Day curriculum unit that will be provided to each fifth grade teacher. One copy of the contest and curriculum materials, addressed to "5th grade teacher," is sent to all public and private elementary schools in October. Additional copies are available by writing Arbor Day Poster Contest, PO Box 7921, Madison, WI 53707.

Enter the Forest Appreciation Writing Contest

Each year the Wisconsin Department of Natural Resources sponsors a writing contest for fourth grade students. Students can enter essays, poetry, or other types of creative writing that follow the theme for that year. Contest packets with rules and judging criteria are sent to fourth grade teachers in January. The deadline is usually the first week of March. For more information, contact: Forest Appreciation Week Writing Contest, Wisconsin DNR, Bureau of Forestry, PO Box 7921, Madison, WI 53707.

Be a Tourist in Your Own Town

Find out if you live in a Tree City USA. Visit the Wisconsin Department of Natural Resources website (www.dnr.state.wi.us/org/land/forestry/uf/awareness) for a complete list of Wisconsin cities. If you do, how did your community qualify? If you don't, what are the qualifications? Is anyone in city government aware of the program or working toward the goal of becoming a Tree City? Take a walk through your community. Where are trees growing? Talk about what the community would be like without any trees. Invite your city forester or someone from the city maintenance department to talk to your group about how trees are planted, why they are planted where they are, and how people in the community can help care for trees.

Care for the Trees on Your Street

Read ***Pearl Moscowitz's Last Stand*** by Arthur Levine. Sometimes one tree is very important. Pearl is a "grandmother" who has seen enough changes. She's determined to save the last tree on the street. You might follow up this story with a walk around the block to check on your own neighborhood trees. Each one serves a vital purpose. The ***Project Learning Tree*** activity "Trees in Trouble" helps you identify some special problems that city trees face.

Get Connected

When you think about forests, do you just think about trees? A forest **is** a large area of land covered by trees, but that's not all! A forest is a community of **many** different living things.

But that's not quite it yet! All forest communities are **not** alike! A forest community in northern Wisconsin will be much different from a forest community in southwestern Wisconsin. In fact, a mature forest will be much different from a young forest just a few miles away.

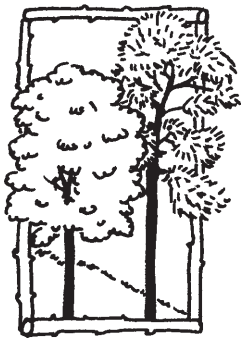
The key is habitat! A habitat is the place where a plant or animal gets all the things it needs to survive, such as food, water, shelter, and space for having and raising offspring. Animals and plants that share the same basic habitat form a community. Within the community, the living things are connected to each other—they depend on each other. Totally! In this activity, your students will investigate two forest habitats—a mature, mixed forest and a young forest.

Getting Ready

1. Check to ensure the CD-ROM is installed and working properly.
2. Make a copy of the **Get Connected** worksheet for each student.
3. Collect several children's reference books focusing on forests.

Doing the Activity

1. Be sure that each student or small group of students has a chance to use the CD-ROM. They should go to the main menu and select the *Environment* section. After a short introduction, they will be instructed to visit two virtual forests. One is a mature, mixed forest of evergreen and broad-leaved trees. The second shows a young forest that has been harvested and is regrowing.
2. After everyone has had a chance to visit the virtual forests, discuss the conditions in the two forests and the different animals that live there. Talk about how a young forest—with its thicker understory—provides more food and cover for wildlife than a mature forest. Remind students that there are also some animals that must have large areas of mature forests to survive. Point out that a diversity of forests is needed to support a diversity of animals.



Method

Students research forest animals and discover how they are connected to other organisms in the forest ecosystem.

Key Concepts

Forest ecosystems contain many habitats that support diverse populations of organisms.

Everything in a forest ecosystem is connected in an intricate web of interdependency.

Diversity in the types, sizes, and density of forest trees promotes diversity in wildlife.

Objectives

- recognize the diversity of life present in a forest ecosystem
- investigate how one animal is connected to many other plants and animals in a forest food web

Subjects & WI Academic Standards

Science:
A.4, B.4, C.4, E.4, F.4
C.8, F.8

Standards Cont.

English/Language Arts:
A.4, B.4, C.4, E.4, F.4,
A.8, B.8, C.8, E.8, F.8

Environmental Education:
A.4, B.4
A.8, B.8

Materials

- CD-ROM
- copies of student page
- children's forest reference books

Preparation Time

15 minutes

Activity Time

2 50-minute class periods

Setting

classroom

3. There are 19 animals represented on the CD-ROM. Ask each student to choose one animal. Be sure all of the animals are chosen at least once. Here is a list of the animals for your reference:

   Mature, Mixed Forest
   black bear
   wild turkey
   bald eagle
   eastern gray squirrel
   barred owl
   raccoon
   wood duck
   wood turtle
   loon
   beaver

   Early Successional Forest
   white-tailed deer
   ruffed grouse
   red fox
   fox snake
   red-tailed hawk
   cottontail rabbit
   badger
   eastern chipmunk
   downy woodpecker

4. Students should research the animals they have chosen. Hand out the student worksheets and go over the questions. Talk about where students should go to find out the information they need. There will probably be some unfamiliar organisms on the worksheet. Work together as a class to figure out what each organism does and how it might fit into the forest ecosystem. Try to provide good resources for students to use. See the **Appendix** for a list of forest reference books.

5. Ask students to draw their animals in forest scenes. Refer them to the CD-ROM if they need help depicting either the mature or young forest where their animals live. Using the information they have gathered, ask them to add other plants and animals to the pictures. They should add everything their animals need to survive.

6. Share the finished pictures with each other and post them on a bulletin board.

Assessing Student Understanding

Assess student ability to conduct independent research.

Evaluate students' research for accuracy and completeness and their presentations for creativity and organization.

Extending the Learning

Explore a Local Community

In many ways, a forest community is like a human community. The ***Wisconsin's Millennium Tree*** activity "Forest Community" compares the two types of communities and explores the habitats of animals and plants in a forest community.

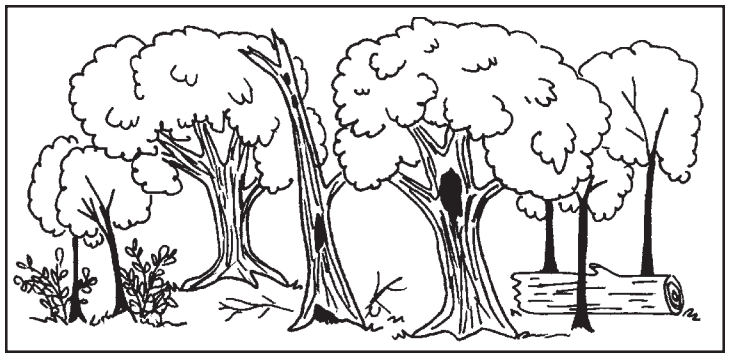
Share a Story

Your students can read about the forest to students in younger grades. Choose some of the books from the listing of children's fiction in the **Appendix**. Good books about the forest community include:

- ***Birth of a Forest*** by Millicent Selsam
- ***The Gift of the Tree*** by Alvin Tressalt
- ***The Grandpa Tree*** by Mike Donahue
- ***Once There Was a Tree*** by Natalia Romanova

Create a Forest Mural

Using a refrigerator box or large bulletin board, draw a forest scene. Select a few students to do the initial outline drawing. It might look something like this drawing.

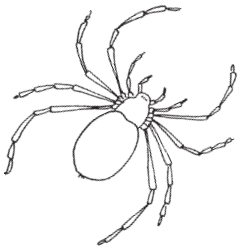


Meanwhile other students can be drawing and coloring pictures of forest plants and animals. Glue or tape the animals in place. Place a push pin next to each plant or animal. Use yarn to connect each member of the forest community to the other parts of the community it needs to survive. Form food chains and food webs with different colored yarn or string. For more ideas, see the activity "Web of Life" in ***Project Learning Tree***.

Investigate a Mini-Habitat

A forest community is actually made up of many smaller interrelated communities. Try one or two of these activities to help your students understand this concept:

- The ***Project WILD*** activity "Learning to Look, Looking to See" encourages a close look at the environment. Grades K - 8.
- The ***NatureScope: Trees Are Terrific!*** activity "Rottin' Place to Live" investigates a fallen log community. Grades K - 7.



- The ***Project Learning Tree*** activity "The Forest of S. T. Shrew" takes a "shrew's eye view" of life in the woods. It will help your students gain an appreciation for the variety of habitats within forests. Grades 1 - 6.
- The ***NatureScope: Trees Are Terrific*** activity "Under Cover!" looks at the animals that use a tree by making a "peek-a-tree." Grades K - 5.

Investigate Endangered Species

Focus on Wisconsin's endangered and threatened species that live in the forest. Visit the Endangered Resources website (www.dnr.state.wi.us/org/land/er/rare.htm) for an up-to-date listing. The greatest problem that threatened and endangered animals face is habitat loss. Learn more about this need for space in these activities:

- The ***Project WILD*** activity "Too Close for Comfort" investigates the amounts of space different animals need.
- The ***Project Learning Tree*** activity "Life on the Edge" encourages students to become advocates for endangered species of plants or animals. After learning about habitat loss, students create "public relations campaigns" for these species.

Bring the Forest into Your Backyard

Sustainable forestry practices are just as important in urban, suburban, and rural backyards as they are in large forests. Plant native trees, shrubs, and wildflowers. Add water, and voila . . . you have the perfect habitat for many birds, amphibians, reptiles, insects, and small mammals. Check out these resources:

- ***DNR Service Centers*** and your local state park can provide you with construction plans for wild houses! Bluebirds, wood ducks, and bats will appreciate your efforts.
- ***DNR - Division of Forestry*** offers two publications to help you plan: "Woody Cover for Wildlife" (FR-066) and "Wind Breaks that Work" (FR-070).
- ***National Wildlife Federation's Backyard Wildlife Habitat*** program and ***Schoolyard Habitats*** program also offer good suggestions for enhancing wildlife habitat. www.nwf.org/habitats
- ***School Nature Area Project (SNAP)*** is a cooperative project between St. Olaf College and several Minnesota schools designed to enhance school areas. www.stolaf.edu/other/snap

- ***Wildlife and Your Land: A Series About Managing Your Land for Wildlife*** published by the WDNR's Bureau of Wildlife Management. It offers many suggestions for improving wildlife habitat.

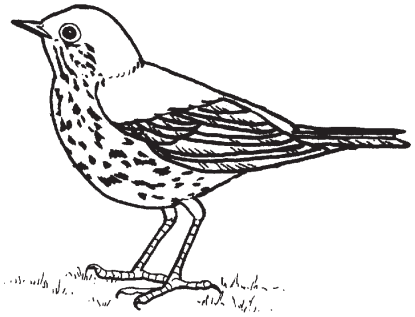
Get Involved with Wildlife Research

Since animals depend on forest ecosystems, we can learn a lot about the forest by monitoring animal populations. Find out about these opportunities for students to be involved in gathering data:

- ***Christmas Bird Count***
  Wisconsin Audubon Society
  3118 N. Oneida Street, Appleton, WI 54911, (414) 735-9903
- ***Classroom FeederWatch***
  Cornell University
  http://birdsource.cornell.edu/cfw
- ***Fourth of July Butterfly Count***
  North American Butterfly Association
  www.naba.org
- ***Journey North***
  Journey North
  www.learner.org/jnorth
- ***Midwest Sandhill Crane Count***
  International Crane Foundation
  P.O. Box 447 Baraboo, WI 53913-9778, (608) 356-9462
  www.savingcranes.org
- ***Wisconsin Frog and Toad Survey***
  Wisconsin Department of Natural Resources
  Bureau of Endangered Resources
  P.O. Box 7921, Madison, WI 53707, (608) 267-0849

Volunteer Your Muscles!

Help at a habitat restoration "work day." Here are some possibilities for involvement:



- ***Adopt-A-Lake***
  UW-Extension, College of Natural Resources
  University of Wisconsin - Stevens Point
  Stevens Point, WI 54881
  http://uwexlakes.uwsp.edu/Adopt-A-Lake
- ***DNR's Natural Areas Program***
  Wisconsin Department of Natural Resources
  P.O. Box 7921, Madison, WI 53707
  www.dnr.state.wi.us/org/land/er/snas.htm

- ***The Nature Conservancy***
  633 W. Main Street, Madison, WI 53708, (608) 251-8140
  www.tnc.org

- ***Water Action Volunteer (WAV) Program***
  Wisconsin Department of Natural Resources
  P.O. Box 7921, Madison, WI 53707, (608) 264-8948
  http://clean-water.uwex.edu/WAV

Remember . . . Be a Good Steward Every Day

Put into practice the things you believe will help the earth and its inhabitants. Set a good example for your students. Pick up litter, recycle, conserve energy, shop wisely, and always look for new ways to care for the Earth.

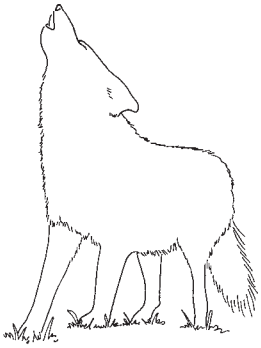
Finding Out More!

eNature. This new nature portal offers online searchable field guides to over 4,800 plant and animal species. It is derived from 35 different Audubon Society Field Guides, Regional Guides, and Nature Guides. The database is keyword-searchable by group (mammals, amphibians, fishes, trees, etc.) or browseable within subheadings for each group. The field guide entries include a large thumbnail image, description, and varying additional information. While the field guides alone make the site worth a visit, there is more, including an Ask an Expert message board, Habitat Guides, news features, tips for teachers, personilized “life lists,” and in the future, a comprehensive Outdoor Planner.
www.enature.com

NatureScope: Trees are Terrific. The background information in “The Forest Community” contains good basic information about forest ecology.

Student Page

Get Connected



I chose a _____

It can be found in a . . .

❑ mature, mixed forest ❑ young forest ❑ almost any forest

I found at least three references about my animal.

Here are the sources I used in my research (List title, author, website, or publication):

I know that my animal could not survive on its own.

It depends on other living things in the forest community.

My animal depends on the following types of animals.

Check all that apply. On a separate piece of paper, make notes about how your animal depends on them.

___ Sponges
___ Hydras
___ Flatworms
___ Nematodes
___ Rotifers
___ Moss Animals
___ Earthworms & Leeches
___ Snails & Slugs
___ Mussels & Clams
___ Crustaceans (Fairy Shrimps, Crayfishes, Sowbugs, & Water Fleas)
___ Arachnids (Scorpions, Daddy Longlegs, Ticks, & Spiders)
___ Centipedes
___ Millipedes
___ Insects (Grasshoppers, Dragonflies, Bugs, Beetles, Butterflies, & many, many more)
___ **Other Invertebrates**
___ Fishes (Trout, Bass, Chub, Lampreys, etc)
___ Amphibians (Salamanders, Frogs, & Toads)
___ Reptiles (Turtles, Lizards,& Snakes)
____ Birds (Birds of Prey, Songbirds, Waterfowl, Shore Birds, Game Birds, Woodpeckers, etc.)
___ Mammals (Carnivores, Rodents, Bats, Deer, Weasels, etc.)
___ **Other Vertebrates**

My animal depends on the following types of plants.

Check all that apply. Make notes about how your animal depends on them.

___ Liverworts
___ Mosses
___ Ferns
___ Horsetails
___ Club Mosses & Spike Mosses
___ Ginkgoes
___ Coniferous Trees (Pines, Spruces, Firs, Hemlocks, Cedars, etc.)
___ Deciduous Trees (look for differences in the leaves to separate the species)
___ Shrubs (look for leaf variations)
___ Vines
___ Wildflowers (count the number of petals or compare leaves to separate the species)
___ Grasses & Sedges
___ Aquatic Plants (Pondweeds & Duckweeds)
___ **Other Green Plants**

My animal depends on the following strange organisms.

Check all that apply. Make notes about how your animal depends on them.

___ Bacteria
___ Blue-green Algae
___ Euglenoids
___ Parameciums
___ Amoebas
___ Green Algae
___ Brown Algae
___ Yellow-green Algae
___ Golden-brown Algae
___ Diatoms
___ Dinoflagellates
___ Red Algae
___ Stoneworts
___ Slime Molds
___ Algal Fungi
___ Yeasts
___ Molds
___ Mildews
___ Morels
___ Lichens
___ Bracket Fungi
___ Puffballs
___ Mushrooms
___ **Other things that are not like familiar things!**

The most interesting thing I learned about my animal is . . .

Note:

This list includes most of the groups of living things that can be found in North America. Wow! Just the list alone reminds us of all the living things that share this planet with us. That's a lot of biodiversity! You won't find representatives of each group in a forest ecosystem. (You can't even see some of these living things without a microscope!) Just use the list to remind you of the categories of living things you might consider. Good luck!

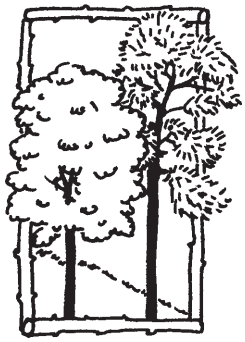
Nothing Succeeds Like Succession

Succession is the orderly replacement of plant and animal species through time in a given location, leading to a relatively stable biotic community. In a landscape that lacks both vegetation and soil (such as a sand dune or a recently cooled lava flow), primary succession may begin. In primary succession on land, living organisms slowly, often over hundreds or thousands of years, build soil. The first plants to arrive, sometimes called pioneer species, are usually fungi, lichens or mosses, and ferns, which are the oldest types of land plants. Over time, rock is weathered to soil; mosses and ferns cover the landscape; and small seeds, carried by animals or blown by wind, take root. Small shrubs and plants become established. Eventually, if conditions are right, this will be a healthy plant community with mature trees and plants. Secondary succession occurs on landscapes previously occupied by vegetation and can be considered an extension of primary succession (the soil building phase). Grass may begin to grow, followed by herbaceous and small woody plants, followed by shrubs and trees.

Each successional stage is accompanied by its characteristic animal species. Early-successional animal species find food and shelter among the weedy pioneer plants that invade areas cleared by natural or human causes. Mid-successional species are found in partially open areas. Openings in the forest canopy promote the growth of plants that are favored as food by many mammals and birds.

These openings provide edge habitat where field and forest meet, allowing animals to feed on the vegetation in the opening and to escape quickly into the forest. Late-successional animal species require mature forest habitats to provide the food and cover they need. Many species thrive in other types of mature plant communities such as grasslands, tundra, or deserts.

In some cases, whole regions are undergoing succession. For example, in the eastern United States, most of the trees were once cut down for timber and cleared for agriculture. When the fields were left fallow, native plants slowly began to recolonize the old fields. Today, whole new forests stand where the original ones used to be. A mature forest isn't always the stable climax community in succession. For example, because the redwoods of California live to be hundreds of years old, ecologists traditionally



Method

Students study the connection between plants, animals, and successional stages in local ecosystems.

Key Concepts

While every organism goes through a life cycle of growth, maturity, decline, and death, its role in the ecosystem also changes.

Ecosystems change over time through patterns of growth and succession. They are also affected by other phenomena such as disease, insects, fire, weather, and human intervention.

Objectives

- explore basic relationships between species diversity and ecosystem stability.
- identify successional stages in ecosystems based on plant and animal species
- draw conclusions about the process of succession based on study test plots in different stages of succession

Subjects & WI Academic Standards

Science:
A.4, C.4, F.4
A.8, C.8, F.8

Social Studies:
A.4, B.4, A.8, B.8

Math:
A.4, B.4, D.4
A.8, B.8, D.8

English/Language Arts:
A.4, B.4, C.4, F.4,
A.8, B.8, C.8, F.8

Environmental Education:
A.4, B.4
A.8, B.8

Materials

- chart paper
- crayons and pencils
- fencing (or rope)
- grass clippers
- stakes
- hammer
- string
- colored felt
- felt board
- clear plastic transparencies
- permanent or erasable ink markers
- copies of student pages
- camera (optional)

Preparation Time

30 minutes

believed that they were a climax species. Ecologists now believe that redwood forests that do not undergo periodic disturbances, such as fire or windstorm, will eventually give way to forests of hemlocks, which thrive in the shade of the redwoods. However, if the hemlock forest burns, it will grow back as a redwood forest, since redwoods have thick bark and are fairly fire resistant.

Sometimes, people purposely hold back succession to allow one stage to dominate, as when a farmer continually harvests and plows a field. Abandoned lots and neglected lawns, as well as parks, all show signs of secondary succession. When human-caused "setbacks" such as mowing or plowing are discontinued, new species of vegetation appear or begin to dominate the landscape. The first stage of secondary succession includes the plants we call weeds.

Getting Ready

1. Identify a nearby area that exhibits several stages of succession or plan this activity to correspond with a field trip to a natural area. If a field trip or walk is not possible, use the pictures of various stages of succession provided on page 44, cut additional pictures from magazines, or obtain pictures from land-use agencies (e.g., forestry, soil conservation, parks).
2. Make copies of student pages 45 - 46.

Doing the Activity

Part A

In the Classroom

1. Hand out the story "Tree Tops Valley" to each student. After reading it, discuss the changes that took place during the course of the story. (Forest burned and slowly grew back; people grew up, got old, had children and grandchildren, died . . .)
2. Hand out copies of the succession sequence on page 44 to let students see how succession typically proceeds in a forested area. Point out how each successional stage has its characteristic plants and animals.
3. Divide your group into teams. Using transparent overlays and colored markers, each team will create a sequence of pictures to show succession.

   The base drawing on a piece of 8 1/2" x 11" white paper should show a disturbed area (e.g., burned by fire or bulldozed). For example,

the base picture could show blackened ground with stumps of trees (perhaps with an animal passing through).

- Overlay drawings on transparencies should show successive phases of growth.
- Transparency 1 could display grass, flowers (seeds borne by wind or animal), and small animals returning.
- Transparency 2 could add small bushes, shrubs, and more animals.
- Transparency 3 could add young, small trees with characteristic animals.
- Transparency 4 could add full-grown, mature trees with characteristic animals.
- Have each team tape or staple the overlays to the base picture.

4. When finished, the teams can demonstrate their work to the group and describe what is happening in each successive scene.

Part B
In the Field

1. Take your students on a field trip through an area that has several types of vegetative communities (e.g., an urban park with wooded areas). Have them try to find plant communities in different stages of succession. Tell them not to worry about plant or tree names, only types (i.e., grasses, non-woody herbaceous plants, woody shrubs, trees). Have them look for animals and signs or sounds of animals. They should also look for evidence of disturbance (such as erosion, tire tracks, fire, construction) that might have altered the natural succession. They can look for the following stages of succession:
   - Grasses and nonwoody plants only
   - Grasses, and woody and nonwoody plants
   - Grasses and shrubs, with young tree saplings (stem < 1/2")
   - Ground vegetation and young trees (stem l/2" to 2")
   - Mature trees (stem > 2", can still be under canopy)
2. Call the group together and define the stages of succession evident at your site. Discuss what factors might alter succession at your site, including disease, insects, fire, wind, lightning, pollution, and drought.
3. Divide the class into teams with three members each. Have students draw a general map of the study area, including major

Activity Time

Part A: 1 50-minute class period

Part B: 1 or 2 50-minute class periods

Part C: small intervals of time over the course of the year

Setting

indoors and outdoors

landmarks (e.g., major trees, trail junctions, parking lots, benches, and creeks) and then identify areas on the map that fall into the different categories of succession identified in the preceding step.

Part C
In Your Backyard

1. For your study, get permission to designate three areas that are 10.75 square feet (1 m^2) on the school grounds or at a site nearby. The first area should be a non-blacktopped area that has been trampled. The second area should be a patch of lawn that is untrampled and is regularly mowed and watered. The third area should also be a lawn or grassy area that you will fence off and leave untouched (no mowing, watering, or fertilizing).

   NOTE—You will need to coordinate with your school's maintenance staff to designate this plot so it is not disturbed.

2. For an extended period of time (e.g., the school year), ask students to make written journal observations, drawings, or photographs of these three areas on a regular basis, about once a week. The camera position should be marked on the ground, so the same position can be used for each photo. This pictorial record should be displayed in the classroom. Photos can show the following:

   - Types of plants (record changes)
   - Plant growth rate (measure in centimeters and graph each week)
   - Changes in plant density (number of stems per square meter)
   - Changes in species composition (Do some plants gradually become more abundant and others less abundant?)
   - New plant species
   - Evidence of animal or human life

3. After each observation period, ask the students to make a general statement about apparent succession and differences in species diversity in all three sites. Create a wall chart to graph observations and measurements.

Enrichment – Say It on Felt

Assign teams for each of the stages of succession that were studied in the activity. Have teams use different colors of felt to cut out the shapes of plants and animals that are characteristic of their assigned stages of succession. Ask teams to write brief

stories describing them. Create a large felt board, in which the bottom third is brown (for soil) and the top two-thirds are blue (for sky). Have groups come up in order, place their plants and animals in appropriate places on the felt board, and tell their stories (felt naturally sticks to felt). Your class can re-create the story of succession, stage by stage.

Assessing Student Understanding

At the end of the designated observation time in Part C, ask students to write a summary report of what happened at all three sites and what stages of succession they observed. Look for descriptions of the life cycles and stages of plant growth, disturbance factors, and evidence of animal life.

Extending the Learning

Read About Succession

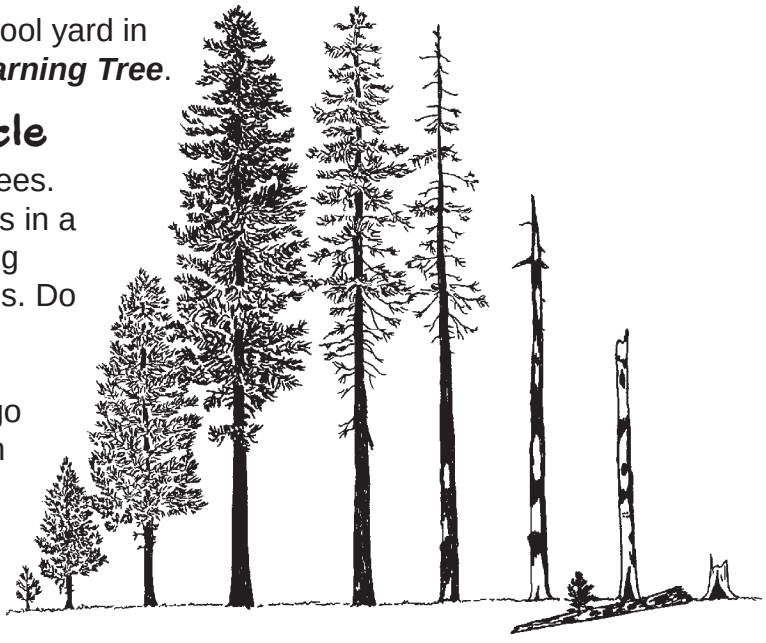
How the Forest Grew by William Jaspersohn tells the story of the gradual transition of a cleared farm field into a dense forest over the course of 200 years.

Explore Your School Grounds

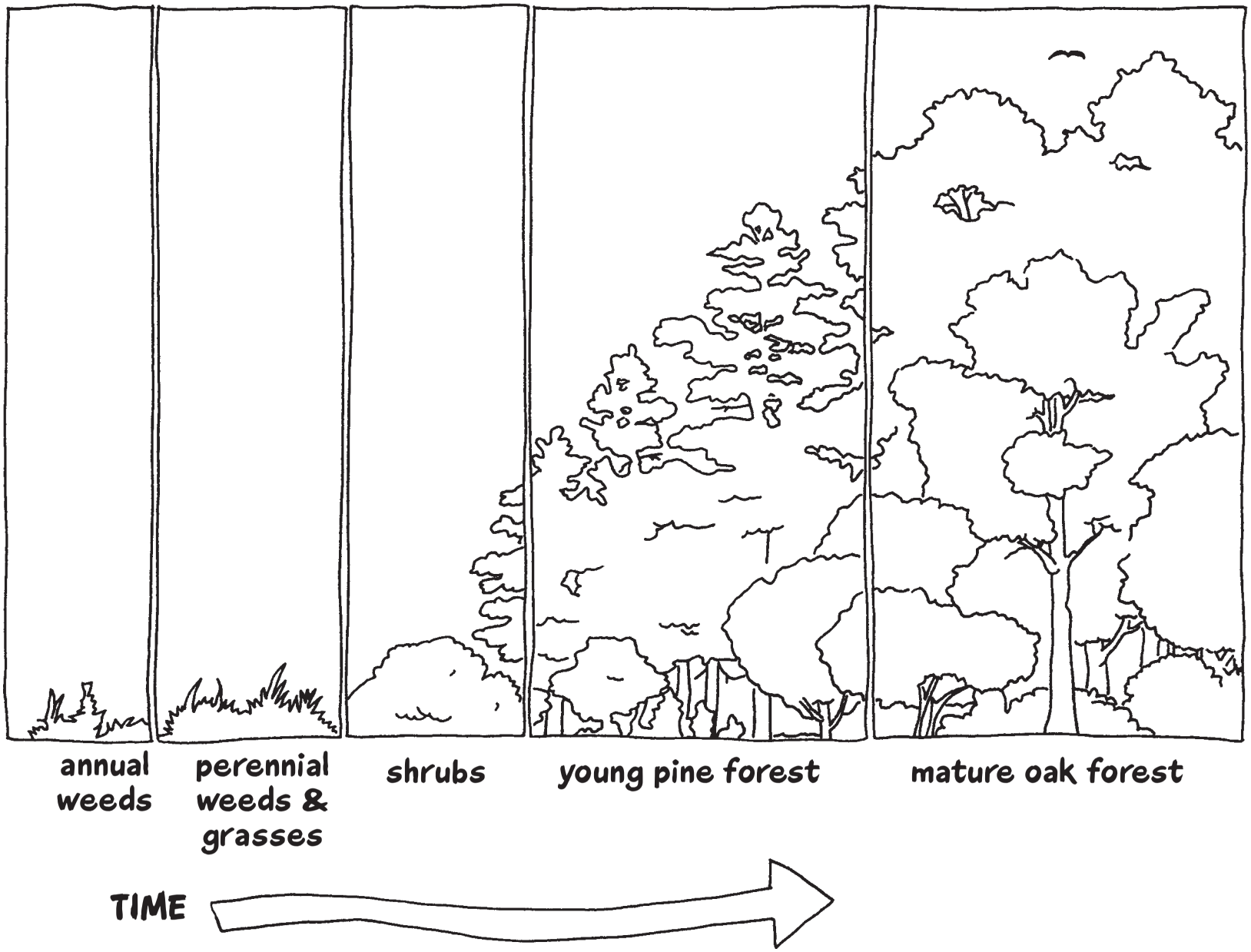
Find more ideas for studying your school yard in "School Yard Safari" from ***Project Learning Tree***.

Check Out a Tree's Life Cycle

Go stand in a forest and look at the trees. Because trees are the dominant plants in a forest, what happens to them has a big impact on the other plants and animals. Do you see tree seeds, saplings, young trees, mature trees, dying trees, or maybe an old snag or two? As trees go from birth to death, their physical form changes, as well as their role in the forest ecosystem. Think of all the different plants and animals that might use a tree as it goes through its life cycle from birth to death.



Picture of Succession



Tree Tops Valley

Once upon a time, a boy and a girl lived with their parents at the edge of a beautiful green valley in the Pacific Northwest. Their names were Sara and John.

The valley was filled with a vast evergreen forest. Its trees towered over the log cabin where John and Sara lived. Sara and John loved the forest. Every day they went exploring. They paddled in the forest's cool streams and made trails under the giant conifers.

They also liked to have picnics at the top of a hill near their home. Up there, they could look down on the tops of the valley's huge trees.

One day when they were up on the hill, they decided to give the valley a name. They called it Tree Tops Valley.

Then, in the middle of a hot summer day, everything changed. A lightning storm started a fire in the forest. Luckily, the wind blew the flames away from Sara and John's home. But when the fire went out, they saw it had burned their Tree Tops Valley. All the tall trees were burned. The tender little seedlings that had grown on the forest floor were gone. All that was left was the burned remains of trees.

They both wanted to cry. Sara said, "I just can't look at it. Our beautiful forest is gone forever. I never want to sit on our hill again." After the fire, the family moved away to a settlement where other families lived. There were children there, and Sara and John made new friends.

Then, five years after the fire, their father said, 'Why don't we visit the valley? It would be good to see it again."

Sara and John didn't want to go. They remembered how the valley had looked after the fire. But they agreed, and one day, the family saddled their horses and rode up to the valley.

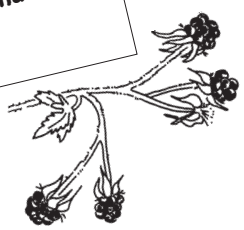
What a surprise! Things had happened since the fire. Winds had blown seeds into the valley. Birds had dropped them from the air. The seeds had sprouted. Now, instead of bare, burned ground, there were mosses, weeds, grasses, and ferns growing everywhere. The children rode back home feeling much better about Tree Tops Valley.

The years went by. Before they knew it, Sara and John had grown up. The settlement where they lived was much bigger now. John became a teacher and taught at the one room school that the settlers had built

Sara decided to be a prospector. She had heard stories about people who were finding gold farther north. So Sara bought supplies and one day was ready to leave. She promised John she would write him.

John didn't hear from Sara for many months. Then, finally, a letter arrived. In the letter, Sara wrote,

> On my way north, I passed through Tree Tops Valley. You would be amazed at how the valley looks now! Our old cabin is still there, but everything else has changed. The whole valley is full of berry bushes. I had a feast!



The letter gave John an idea. He thought, "When I have children of my own, I'll take them berry picking in the valley. That would be fun!"

Soon after that, John got married. When his oldest son was 10 years old, he remembered his idea. He took his family to the valley to pick berries. His children loved the valley. But there were no berries to pick. Most of the bushes were gone.

Instead, the valley was filling with deciduous trees. John wrote to Sara about them. He wrote,

> There are lots of leafy green trees in the valley. And I saw some conifer seedlings. The leafy trees have shaded the berry bushes and choked them out. I don't know what the trees are called, but they have made the valley all green again."

Many years passed. John's children grew up and had families of their own. One summer, when John was 75 years old, he received a letter from Sara. It read:

> Dear John,
>
> Remember how we loved Tree Tops Valley when we were young? Last month I decided to visit it again, before I got too old to make the trip. It was a long ride, but I made it! You would be happy to see our valley now. It's beautiful!
>
> Remember those leafy green trees you saw on your last trip there? Well, most of them are gone. Now the valley is full of young coniferous trees. Who knows? Maybe our grandchildren will see the valley looking the way we once saw it.
>
> Love, Sara

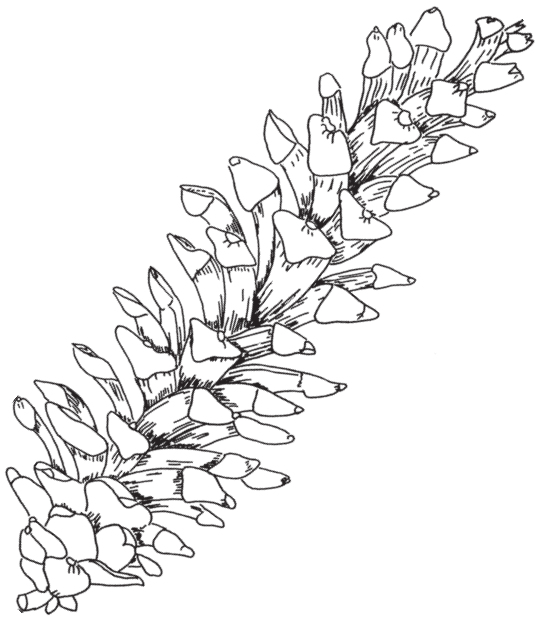
The years went by. It was now 100 years since the fire had swept through Tree Tops Valley.

One day, John's granddaughter, Jennifer, was looking at some old family letters. She found the letter Sara had written to John after her last visit to Tree Tops Valley.

"Look at this,"Jennifer said to her husband. It's a letter that belonged to my grandfather John. His sister wrote it to him. It's all about a place called Tree Tops Valley. I wonder if we could find the valley. Why don't we try?"

And that's what they did. Jennifer and her husband found the valley. They even found the hill where Sara and John had taken their picnics.

From the hill, they could see tall conifers filling the whole valley. They climbed down and explored. Jennifer and her husband didn't know it, but Tree Tops Valley was well into the long journey of rebuilding the same kind of forest that Sara and John had enjoyed so many years before.



Celebrate Trees!

Forest products are everywhere! They are in our food, our clothes, our homes, and even in our personal care items. Over 5,000 products that we use every day come from trees!

Some products, such as fruits, nuts, and sap, are harvested from living trees. But most of the forest products we use are made from trees that have been cut down. When a tree is logged these days, little goes to waste. Even wood chips and shavings are made into useable lumber.

Wood and tree products are important to our economy. We use more wood by weight than all other raw materials combined (i.e., plastics, steel, aluminum, concrete). Maybe it's time we celebrated this dependence on such a great renewable resource!

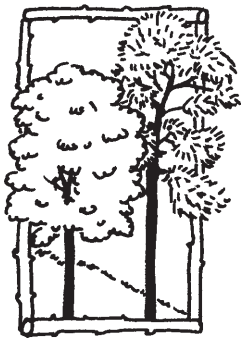
Getting Ready

1. Be sure the CD-ROM is installed and working properly.
2. Set up a learning station near the computer. Include copies of the assignment **Celebrate Trees!** (page 55) for each student, a copy of **You Won't Believe What Grows on Trees** (pages 53 - 54), and a box labeled "Cool Stuff From Trees."
3. Gather samples of wood products that are produced in your community. Contact paper mills, furniture factories, and other businesses for examples of local products.

Doing the Activity

1. Be sure that each student or small group of students has a chance to use the CD-ROM. They should go to the main menu and select the *Products* section. After a short introduction, they will play the game *I Wood if I Could*. Ask students to follow the directions on the assignment sheet.
2. After everyone has had a chance to play the game and bring in their forest products, continue with this activity. Ask students to share their items and the reasons they chose them. Show the local products that you collected. Using the information that the students learned about their items, sort them by one or more of the following criteria:

   - What part of the tree did the product come from (i.e., leaves, fruits, flower, wood, bark, sap, or roots)?
   - How much of the product is made from trees



Method

Students use the CD-ROM to discover extraordinary forest products and celebrate how those products are a part of their daily lives.

Key Concepts

People benefit from the wide variety of forest products that they use every day.

Objectives

- gain appreciation for the abundance and variety of forest products
- identify and categorize forest products

Subjects & WI Academic Standards

Science:
B.4, C.4, D.4, H.4
C.8

Social Studies:
D.4, D.8

English/Language Arts:
A.4, B.4, C.4, E.4, F.4
A.8, B.8, C.8, E.8, F.8

Environmental Education:
A.4, B.4
A.8, B.8

Materials

- CD-ROM
- copy of student worksheet for each student
- Copy of *You Won't Believe What Grows on Trees*
- box labeled *Cool Stuff from Trees*
- samples of local forest products
- other materials as needed to carry out chosen activities

Preparation Time

20 minutes for basic lesson plus time to prepare for chosen activities

Activity Time

varies with chosen activities

Setting

varies

(e.g., totally from trees, half, or only a small part)?

- How is the item used (e.g., recreation, personal care, job)?
- Is the item renewable, recyclable, reusable, or disposable? (Remember that trees are renewable, but the item may contain additional raw materials that are nonrenewable).

3. Now it's time to celebrate. Choose one, two, or many of the ideas listed under **Extending the Learning**. Each will help your students appreciate the many things we get from trees. You will find activities for most of the major subject areas. You could plan to celebrate trees all day!

Assessing Student Learning

Observe student participation in classroom activities.

Ask students to write down a list of all the forest products that they used from the time they got out of bed until they arrived at school. Ask them to indicate what part of the tree each product came from.

Extending the Learning

Science

Invent a new tree product. Scientists are developing new medicines, adhesives, and other products every day. What new products would your students like to see? Ask them to design new products that use some part of a tree. They should draw pictures and label the resources that would be needed to produce their products. Ask them to tell whether the resources are renewable or nonrenewable.

Scientists are also learning new ways to use trees more efficiently. These advances help us make the most of the trees we have. Visit the homepage of the USDA Forest Service - Forest Products Laboratory (www.fpl.fs.fed.us) to find out about brand new discoveries and products!

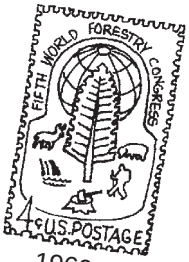
Play with tree products. Write the names of several unusual tree products on index cards. Use the cards to play charades or 20 questions. See the activity "Tree Treasures" in ***Project Learning Tree*** for a variation of 20 questions. In this game, each child has a tree product taped to his/her back and must figure out what it is by asking "yes/no" questions. Grades 2 - 6.

Social Studies

Learn about tree products from other countries and climates. Discover trees of the tropical rainforest and search for their products in your school and home. As a class, figure out which candy bar contains the most tree products (e.g., nuts, cocoa, coconut, paper wrapper). Map the possible origin for each product.

Eat Tree Treats. Celebrate the foods we get from trees with a "tree treats" snack. First, brainstorm a list of all the foods we get from trees. Ask each person to pick a food on the list. They should find out where the product comes from and how it is grown and harvested. Ask for volunteers to bring in samples of tree foods. Try fresh coconut, mangoes, figs, real maple syrup, pistachios, or other unusual tree foods. See the ***NatureScope: Trees Are Terrific*** activity "Tree Treats" for more ideas.

Collect tree stamps. Stamps (made from paper, of course!) have commemorated Smokey's birthday, the World Forestry Congress, common trees, and flowering trees. You might also ask your students to design and issue their own commemorative stamps encouraging care of our forest resources.



1960

1984

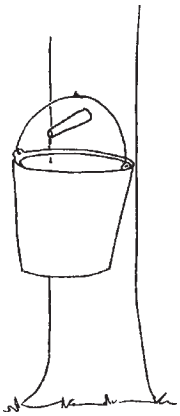
1978

Math

Inventory your classroom "forest." How many trees are in your classroom? (Note: You will need several scales for this activity.) The goal is to estimate the weight in pounds of all the paper and wood products that are in the classroom and then convert the pounds to trees. This activity will involve weighing, averaging, estimating, and multiplying. You will probably want to start by asking the students to list what needs to be weighed. Your list might include paper products in students' desks, books, shelves, wooden desks and chairs, paper in storage cabinets, and so on.

Divide the students into teams and assign each team a task. Before they start weighing, each team must prepare a plan that they will share with the class. For example, the students in charge of desk contents (i.e., books, notebooks, writing paper, pencils) might suggest weighing the contents of 3 desks, taking an average, and multiplying by the number of desks in the room to come up with their estimate. The students should discuss each plan and decide whether it will give a good estimate. Be sure to weigh and record paper products and wood products separately. Once each group has an approved plan, start weighing and estimating. When everyone is done, you will have an estimate of the pounds of paper and wood products in the classroom.

- Use this information to convert pounds of *paper products* to trees: On the average, a 70' tall tree that is 10" in diameter produces about 200 pounds of paper.
- Use this information to convert pounds of *wood products* to trees: A board foot weighs about 2.9 pounds. (This is based on a composite of timber types with an average moisture content.) How many board feet of wood do you have in your classroom? A 70' tall tree that is 10" in diameter would yield at least 55 board feet using a Scribner table. (This is the amount of useable lumber available after the tree is manufactured.) How many 70' trees does it take for you to have class?



Boil down maple syrup. In late winter or early spring, when warm days are followed by cool nights, the maple sap begins to flow, and it's sugaring time! You can make small amounts of maple syrup in the classroom. You will need a large sugar maple tree, a hand drill with a 1/2" bit, a hollow tube called a spile, a hammer, a nail, a bucket for collecting sap, a kettle, and a burner. You can make your own spile by using a coat hanger wire to punch the pith out of a 5" piece of sumac.

Drill a hole into the south-facing side of the tree. It should be about 2" deep and slanting up slightly. Insert the spile, tapping it in firmly. From the nail, hang the bucket so that it catches the drips. When you have collected a little more than a gallon of sap, take it indoors. Be sure everyone has a chance to taste the plain sap. Now begin to boil it. Watch it carefully so it doesn't burn. A candy thermometer helps. Boil until the sap reaches 219° F. Have a taste test comparing your syrup, commercially made maple syrup, and regular "maple-flavored" syrup.

The UW-Extension booklet ***Maple Syrup Making for Beginners*** or ***The Maple Sugar Book*** by Helen and Scott Nearing will tell you everything you ever wanted to know about making maple syrup and its history. Contact the Wisconsin Maple Syrup Producers Association, c/o Henry and Gretchen Grape, Route 2, Box 54, Holcombe, WI 54745 for a free packet designed for fourth grade students. It contains activities and a color poster on making maple syrup.

Reading

Sponsor a classroom "Read-In!" You'll find a list of good books on pages 109 - 112 of the **Appendix**. Gather as many as you can and read, read, read. Read to your students. Have your students read to younger students. Ask students to share their favorite parts of books they've read. Read just for the fun of it!

Where Would You Be Without Trees?

soap
wax - lumber - jam
syrup - pet food supplements
lacquer - oil spill control agents - toys
essential oils - printing inks - gummed tape
rocket propellants - polishes - textiles - balls
pallets - chewing gum - toothpaste - detergents
bats - sausage casings - baby foods - turpentine
draperies - bedspreads - carpet - rubber - shampoos
varnish - oxygen - bowling pins - insecticide - recreation
football helmets - cereal - photographic films - vitamins
candy wrappers - baskets - cooking utensils - ceramics
appliance housings - toilet paper - plywood adhesives
pharmaceuticals - milk containers - soil conditioners
plastic fillers - dinnerware - firewood - cosmetics
jelly - hockey sticks - cleaning compounds
particle board - tires - roofs - oils
paper - skis - asphalt
mulch
cider
yarn
wax
glue
inks
fruit
shade
resins
veneer
furniture

from the Sept/Oct 1999 issue of ***School Forest Newsletter*** - request a copy at www.wfrea.org

"Many a tree is found in the wood,
And every tree for its use is good.
Some for the strength of the gnarled root,
Some for the sweetness of flower or fruit;
Some for the shelter against the storm,
And some to keep the hearthstone warm.
Some for the roof and some for the beam,
And some for a boat to breast the stream.

In the wealth of the wood since the world began,
The trees have offered their gifts to man."

-Van Dyke

Language

Write a tree poem. Encourage your students to write about trees and the amazing things we get from them. Try to do this writing in a park or school playground where the children can lean against or stare up at a tree. See the activity "Poet-Tree" from ***Project Learning Tree*** for more ideas. Grades 3 - 8.

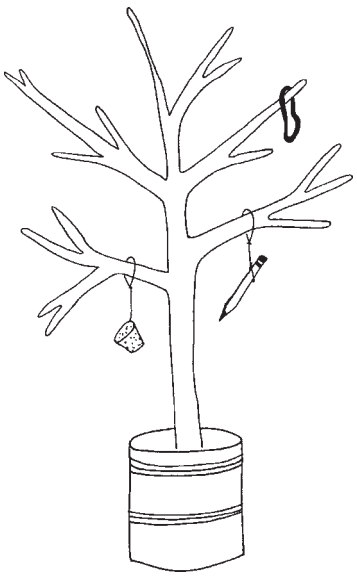
Market your favorite forest product. Ask students to share their favorite forest products. Working alone or in groups, have students come up with advertising campaigns to sell their products. To add interest, have each person pretend to be the tree that his or her product comes from. For example, an aspen might advertise CD lyric inserts or a maple tree might advertise bowling alleys.

Physical Education

Organize some "Tree Olympics." Brainstorm all of the sports which need trees. Some examples include: baseball - balls and bats, snowshoeing - shoes, bowling - pins and alleys, canoeing - canoes and paddles, tennis - rackets, tobogganing - toboggan runners, flying - airplane propellers.

As a class, invent your own tree-related Olympics. Include some regular competitions such as distance-hitting a baseball or throwing a "javelin" (dowel rod). Also include some invented "sports" such as building the highest tower with popsicle sticks and rubber bands or making a pencil last the longest. You might create banners with the Olympic "rings" and slogans for advertisers.

Sponsored by a Forest Near You!



Art

Create a forest products alphabet book to share with younger students. The forest "products" could include the benefits of living forests and the things we make from trees. For example, "A is for animals," "B is for baseball bats," "C is for clean air". . .

Display your collection. Think of a creative way to display the *Cool Stuff from Trees* that students brought in. They might make a museum-type exhibit or a bulletin board display. They could also place a small tree in cement or plaster of Paris and decorate it with small tree products.

Music

Learn about musical instruments made from trees. Violins, guitars, dulcimers, and pianos are just a few. Many people from other countries make simple instruments from trees and play them. Discover what a digeradoo is! Try to make simple percussion instruments.

Enjoy a story. Read ***The Voice of the Wood*** by Claude Clement. Then listen for the deep voice of the cello in Suite No. 3 in C Major for Unaccompanied Cello by J. S. Bach.

Finding Out More!

Resources Today - WOOD by Kathryn Whyman (Glouchester Press, 1987). This book shows how wood is harvested and turned into useful products.

TIMBER! From Trees to Wood Products by William Jaspersohn (Little, Brown & Company, 1996). This book explains how people and machines turn trees into a variety of wood products.

Great websites that list products:

Forest Products Laboratory
www.fpl.fs.fed.us

Temperate Forest Foundation
www.forestinfo.org
Follow the links: Discover→Cool Facts→From a Tree

Wisconsin Department of Natural Resources
www.dnr.state.wi.us
Follow these links: Natural Resources→Forestry→Uses of Wisconsin's Forests→Forest Products→Primary Wood Vendors and Secondary Wood Vendors

Wisconsin Paper Council
www.wipapercouncil.org/funfacts.htm

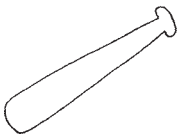
You Won't Believe What Grows on Trees

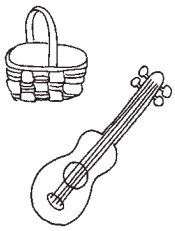
Here are just some of the 5,000 products that we need and use every day. Which ones are too weird for you to believe?

Wood Products

When wood is used directly to make products, we can usually see the grain of the wood.

baseball bats
baskets
bedding for animals
bookshelves
bulletin board frames
cabinets
canes
canoes
caskets
cedar chests
chairs
counters
doors
fences
firewood
flooring
masonite
matches
musical instruments
particle board
pencils
picture frames
plywood
tables
telephone poles
tennis rackets
tool handles
toy blocks
toys
veneer
window frames
wooden barrels

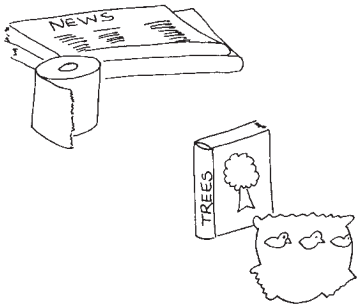




Paper Products

Paper is manufactured from the cell walls found in wood. The cell walls contain cellulose. The cellulose from chopped-up trees is cooked with chemicals to form pulp. This pulp is washed, drained, pressed, and dried to form all kinds of paper.

books
candy wrappers
cardboard boxes
disposable diapers
drawing paper
filter paper
gift wrap
grocery bags
magazines
milk cartons
newspapers
paper plates
paper towels
tissue paper
toilet paper
wallpaper



Bark Products

In addition to supplying cork and cork products, bark also contains many special chemicals that have amazing uses.

baseballs
corks
corkboard
dyes
floats
heat shields for space vehicles
medicines
mulch
oils
tannin

Miscellaneous Products

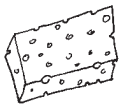
Various tree parts and combinations of parts can also be used in the manufacturing of these products.

animal feed
asphalt
baby food
briquets
charcoal
cleaners
decorations
dyes
inks
kites
medicines
pencil erasers
pesticides
pitch
stuffing for life jackets
tar

Cellulose Products

When mixed with certain chemicals, cellulose can be used to make many plastic-like products or to make liquids thicker.

artificial hair (wigs)
buttons
carpets
cellophane
combs
conveyor belts
curtains
explosives
eyeglass frames
ice cream
imitation leather
luggage
photographic film
ping-pong balls
plastic pens
telephones
rayon
sausage cases
shampoo thickeners
shatterproof glass
sponges
steering wheels
toothbrushes
upholstery
wallpaper paste



Sap Products

The sap of some trees is special! Gums, resins, and latex are used to make many things.

adhesives
chewing gum
coatings for vitamins
make-up
disinfectants
crayons
electrical insulation
explosives
flavorings for food
flooring
garden hose
glass cement
insecticides
latex
mouthwash
ointments
paints
paint thinner
perfumes
printing ink
rosin
rubber gloves
rubber tires
shoe polish
soap
turpentine
varnishes
waxes

Food Products

Did you ever eat a tree? Probably so! We eat many tree parts directly. We also eat many tree foods which have been processed in some way.

allspice
almonds
apples
apricots
avocado
cashews
cherries
chestnuts
chocolate
cinnamon
cloves
coconuts
dates
figs
grapefruits
lemons
limes
mangoes
maple syrup
molasses
nectarines
nutmeg
olives
olive oil
oranges
peaches
pears
pecans
persimmons
pistachios
prunes
salad dressing
sassafras tea
vanilla flavor
vinegar
walnuts

Student Page

Celebrate Trees!

After you play the game on the CD-ROM . . .

Look at the "You Won't Believe What Grows on Trees" list.

Write down 3 things from the list that are a total surprise to you.

I can hardly believe that these things come from trees . . .

1.

2.

3.

Write down 2 things that you have never even heard of.

Find out something interesting about them. Try a dictionary or online encyclopedia, or ask your parents for more information.

I've never heard of a _____.

Now I know

I've never heard of a _____.

Now I know

Bring at least one of the items you have listed on this page to class.

Put it in the ***Cool Stuff From Trees*** box. **Don't bring anything valuable!** Find out as much as you can about the item. For example, what part of the tree does it come from? What other raw materials are needed to make it? Is it recyclable? Can you reuse it or is it disposable?

My *Cool Stuff From Trees* item is _____

Here's what I found out about it!

Make Your Own Paper

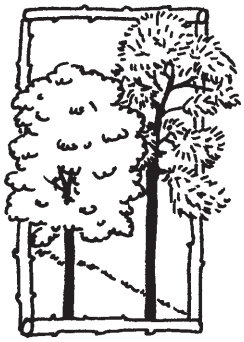
Paper is a simple material. It is essentially a mat held together by a fiber's roughness, and can be made from almost any fibrous material such as cotton, hemp, flax, wood, or recycled paper. And yet, this simple product has a tremendous effect on our lives. Imagine how different your day would be without paper!

The process for making paper was invented in China in the second century A.D., and all paper was made one sheet at a time until 1798. With the Industrial Revolution and the papermaking machine, papermaking became a major industry providing countless products, from books and newspapers to packaging and note pads. Some modern machines can make a sheet of paper 26 feet (8.8 m) wide and nearly 40 miles (64 km) long in just one hour! While the technology has changed dramatically over the centuries, the basic steps are simple enough for your students to do in class.

The process begins when trees, grown especially for papermaking, are harvested and transported to a paper mill. At the mill, large machines strip away bark and shred the logs into millions of chips the size of breakfast cereal. The wood chips travel on conveyors to gigantic "pulp cookers," where chemicals and steam are added. The mixture is heated and pressurized, breaking the chips into smaller and smaller pieces and finally forming a dilute water suspension of wood fibers called pulp. The pulp then passes through cleaners and screens and sometimes goes through a bleaching process that will give it the whiteness needed for the grade of paper being manufactured. Other chemicals like dyes, pigments, sizings, or resins are sometimes added to provide the paper or paperboard (thick paper for boxes) with the appropriate finish.

The pulp is then pumped through pipes to a paper machine where it is sprayed onto a wide, moving wire screen. After the water in the pulp drains through the holes, a damp mat of wood fibers remains: the paper. It is picked up from the end of the moving belt and dried over steam-heated rollers.

Commercial papermaking affects the environment in several ways. The energy needed for papermaking comes primarily from fossil fuels, which are nonrenewable. Burning those fuels can put carbon dioxide and other pollutants in the air. However, for public safety, there are state and federal guidelines that control emissions. Most of what you see coming out of the mill's smokestacks is steam, not pollutants. Many mills recycle the



Method

Students investigate the papermaking process by trying it themselves. While papermaking can be rather messy, it is well worth the effort.

Key Concepts

Conservation technology enables humans to maintain and extend the productivity of vital resources.

By reducing waste and recycling materials, individuals and societies can extend the value and utility of resources and promote environmental quality.

Objectives

- make recycled paper from scrap paper
- describe the steps of the papermaking process and identify the elements and outputs of the process
- compare making paper by hand to the process used in factories

Subjects & WI Academic Standards

Science:
A.4, C.4, D.4, E.4, G.4, H.4
C.8, D.8, E.8, G.8

Social Studies:
B.4, B.8

English/Language Arts:
B.4, C.4
B.8, C.8

Environmental Education:
A.4, B.4, C.4
A.8, B.8, C.8

Materials

- scrap paper torn into 1" X 1" pieces (paper towels, construction paper, and toilet paper work well; avoid glossy finishes or paper with ink in it, like newsprint)
- a large bowl or tub
- a wooden frame about 5" X 7" or 8" X 10"
- nylon or wire window screening
- staples
- a plastic basin at least 2.5 gallons in capacity, that is larger than the frame
- liquid starch
- cloth dishtowels (felt, blotting paper, interfacing, or newspaper may be substituted)
- blender
- sponge
- household iron
- strainer
- towels for cleaning up water
- colored paper, pieces of colored thread, or dried flowers or herbs (optional)

waste paper they produce, and use wood waste to generate their own electricity for the process.

The waste water from papermaking can cause pollution problems. However, in the United States and Canada, the water discharged from mills is tightly monitored and controlled. Additionally, the pulp-cooking process creates strong odors that can be smelled in the vicinity of the mill. Most mills have odor control systems to lessen this problem, although these sometimes fail.

Paper comes from trees, which are a renewable resource. Wisconsin forests produce 82% of the pulpwood used by the pulpmills in Wisconsin. Of the pulpwood produced in Wisconsin, 30.7% is aspen and 10% is red pine. The rest is a mixture of many other species. More than half of the fiber used for paper comes from residue left when lumber and other wood products are made and from paper which has been collected for recycling.

Paper is easily recycled, which helps reduce the amount of land space needed to store the 200 million tons of solid waste Americans generate each year. However, no matter how much paper we recycle, new trees still will be needed for paper products, because paper cannot be recycled indefinitely. Each time paper goes through the manufacturing process, the fibers deteriorate. After repeated recycling, the fiber is no longer suitable for papermaking.

Getting Ready

1. Decide how you will conduct the activity. If you are short on materials or adult supervision, you can demonstrate; but, ideally, you should try to find a way for the students to participate. Middle school students might use stations so some students can make paper while others do a different activity. For younger students, you might ask a parent or aide to help at stations, or have an activity for the rest of the class while you help small groups make paper.
2. The papermaking process is a wet one, so plan to use a work space that won't be harmed by moisture. You might want students to wear "wet gear"—an apron or smock, or old clothing.
3. Remove any plastic or staples from the scrap paper, and tear it into small pieces (1" or 2.5-cm squares). Soak the paper in hot water in the large container for at least 30 minutes or, if you can, overnight.
4. Buy or build a wooden frame, which you will prepare for papermaking. Tightly staple or tack nylon or wire window screening to the frame, making a "deckle," which is the surface on which you will layer the fibers.

Doing the Activity

1. Introduce the activity by asking students what they think paper is made of and how it is made.
2. Fill the blender halfway with warm water, then add a handful of the soaked paper. Blend at medium speed until you no longer see pieces of paper, and the pulp has a soupy consistency. You can blend in a piece of construction paper for color; or stir in short pieces of thread, dried flowers, or herbs for texture.
3. Pour the mixture into the large basin and then fill the basin with warm water, mixing thoroughly until the ingredients are evenly dispersed. Adding a few ounces of liquid starch will help make the paper firm.
4. Slide the deckle into the basin. Put some pulp onto the screen and, still holding the deckle underwater, gently move it back and forth to get an even layer of fibers on the screen.
5. Lift the deckle out of the mixture, keeping it flat. Allow it to drip until most of the water has drained off. You should have a uniform layer of pulp mixture on the deckle. Press the pulp gently with your hand to squeeze out excess moisture (rubber gloves will help). Soak up any excess water from the bottom of the screen with a sponge.
6. Place a clean dishtowel (or newspaper) on a flat surface and turn the screen paper-side-down on the cloth. Lift the screen gently, leaving the paper.
7. Quickly cover the paper with another cloth or piece of felt, and iron it at a medium-dry setting. When the paper is dry, pull the cloth gently from both ends, stretching it to loosen the paper from the cloth. Gently peel off the paper.
8. When you're finished making paper, collect the leftover pulp in a strainer and dispose of it in a wastebasket, or freeze it in a plastic bag for future use. Don't pour the pulp down the drain!
9. Discuss these questions:

   - What materials did we use in making paper?
   - What forms of energy did you need to make the paper? (electricity and students' own energy)
   - What types of wastes resulted from making paper? (dirty water, leftover pulp)
   - What did we do with the waste products?

Preparation Time

30 minutes, plus time to gather materials

Activity Time

2 50-minute class periods

Setting

classroom

- What were some problems with making paper? (cleaning up the mess)
- What would it be like in a paper mill, where tons of paper are being made a day? Why do you think recycling paper is important? What about reducing the amount of paper you use?
- How is the new paper different from the old paper that you recycled?

Enrichments

Experiment with Papermaking

Students can use different types of materials to make paper, then compare the papers. Students might try newspaper, paper towels, typing paper, or cotton balls. Which paper is the strongest? Which is water-resistant? Which is best for writing? What other comparisons can students make? What kinds of uses can they think of for their new paper? What materials can they use that might otherwise be thrown away?

Recycle Your Homemade Paper

To demonstrate the principle that paper cannot be recycled forever but requires the infusion of new fiber, try recycling the homemade paper once or several times. Using a portion of the paper your students made as the pulp, make a batch of paper, and have students compare the first batch of paper with the second. Which is stronger? Which is more useful? Students can then take a portion of the second batch and use it to make a third, comparing the batches for texture and durability. Does this demonstration tell the students anything about how many times paper can be recycled? (In general, estimates say fiber cannot withstand recycling more than five or six times.)

Assessing Student Understanding

Ask younger students to write the directions for making paper on the piece of recycled paper that they made.

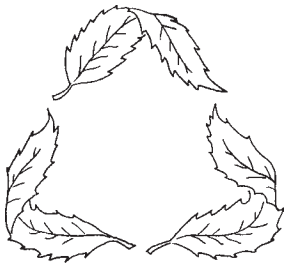
Ask older students to guide younger students in a papermaking activity. If possible, the class can make an instructional video on papermaking using a home video camera.

Extending the Learning

Visit with a Papermaker

Wisconsin is America's #1 papermaking state! If you live near a paper mill, invite a representative to help your class make paper. Ask him or her to bring samples of wood chips, pulp, and paper, if possible. After the visit, try the ***Paper Makes Wisconsin Great!*** activity "What Should I Be? What About a Papermaker?" In the activity, students investigate career possibilities in the papermaking industry by creating a poster about a specific career.

Close the loop!



Whenever possible, we should purchase items manufactured from recycled materials. Recycling our glass, plastic, paper, and aluminum is not good enough. If there isn't a market for products made from recycled materials, recycled resources will go to waste. Assign students the task of finding products made from recycled resources. Check to see if your school is buying paper made from recycled paper. Go to neighborhood stores and check the shelves for recycled products and recycled packaging. Ask students to check at home to see if their families are purchasing any products made from recyclables.

Hold the Paper, Please

Learn about school children in other countries who have little or no paper in their classrooms. What do you think they use for assignments and notes? Try to have one class period or one day that you don't use paper. Brainstorm with the students the day before. What will you use as paper substitutes? How will you do things differently? Did any of your ideas work? Could you permanently reduce the amount of paper you use?

Finding Out More!

Paper By Kids by Arnold Grummer. This book offers great ideas on making and using recycled paper. Find out how often paper can be recycled. It might surprise you to learn how paper companies are using the pulp that can't be recycled again. Here are some hints: kitty litter, fuel pellets, soil conditioners, and animal bedding.

300 Years of American Papermaking by Helena Wright (Smithsonian Institution, 1991).

Papermaking-related Websites

American Forest and Paper Association. This website features colorful, printable PDF files, including factsheets for kids focusing on paper and recycling.
www.afandpa.org

American Museum of Papermaking
www.ipst.edu/amp/

Forest Products Laboratory
www.fpl.fs.fed.us

Wisconsin Paper Council. This website has suggestions for simple ways to make paper.
www.wipapercouncil.org

Would Wood Be Needed for My Job?

Forests are an integral part of Wisconsin's economy. Not only do we depend on them for thousands of products, we also depend on them for thousands of jobs.

Getting Ready

1. Either write the following paragraph on the board or put it on a transparency:

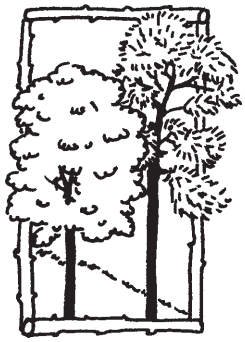
   "Forest industries are the largest manufacturing employment sector in 28 Wisconsin counties, second in 9 counties, and third in 5 counties. In addition to the 97,000+ direct employees, another 200,000 jobs are dependent on the forest products industry."

   From ***A Look at Wisconsin's Forests*** published by the Wisconsin Department of Natural Resources Division of Forestry

Doing the Activity

1. Read the quote from the brochure about state employment or ask the students to read the quote. Ask the students what types of jobs might be related to the forest industry.
2. Have students brainstorm a list of jobs that are related to the forest industry in their community. To assist with this, students can use employment ads and/or the yellow pages to find local jobs that are dependent on forests, such as a local siding company that sells cedar siding or the copy store that prints invitations and newsletters. The following is a suggested list of headings from the yellow pages:

   books
   cards
   construction
   Christmas trees
   consulting foresters
   printers
   antiques
   log homes
   arboretums
   tree services
   landscapers
   boats/docks
   furniture
   cardboard & packaging
   paper
   and many more!



Method

Students search for forest-related jobs in their community.

Key Concepts

The managing, harvesting, processing, transporting, and marketing of forests and forest products provide employment for many people and economic benefits to local and regional economies.

Objectives

- realize the impact forests have on employment
- view the value of forests as they relate to statewide employment figures
- realize there are diverse community jobs that are dependent on the forest industry

Subjects & WI Academic Standards

Science:
B.4, C.4, E.4, G.4
C.8, E.8, G.8

Social Studies:
D.4, D.8

Standards cont.

English/Language Arts:
A.4, B.4, C.4, D.4, F.4
A.8, B.8, C.8, D.8, F.8

Environmental Education:
A.4, B.4
A.8, B.8

Materials

- newspaper employment ads and/or yellow pages from the telephone book for each group of 3 students

Preparation Time

15 minutes

Activity Time

1 50-minute class period

Setting

classroom

3. You may want to have students work in groups of three, assigning each person a task such as reader, writer, and reporter as they list names of local services and businesses that are dependent on the forest industry.
4. Have the groups report back during group discussion.

Assessing Student Understanding

Have students write descriptions of the jobs they found most interesting and how they were related to the forest industry. Prepare the report for others.

Extending the Learning

Take it a Step Farther

Some industries and their associated jobs are directly connected to the forest. Sawmills, veneer manufacturers, and paper mills employ forest managers, lumberjacks, and papermakers. These are primary vendors, depending directly on the forest. Other industries are secondary users of the forest. These include cabinet makers, pallet companies, and container factories. Visit the Wisconsin Department of Natural Resources website (www.dnr.state.wi.us) and follow these links: Natural Resources→ Forestry→Uses of Wisconsin Forests→Forest Products→ Primary Wood Vendors and Secondary Wood Vendors. The site lists businesses from all over the state by name, number of employees, products, and materials. You can select your city, county, or zip code and find out both the primary and secondary vendors. Cool!

Check out Careers

These activities will help your students learn about forestry-related careers:

- The ***Project Learning Tree*** activity "Who Works in this Forest?" invites students to read about and discuss six careers related directly to forestry and begin to examine other occupations that are indirectly related to forests.
- The ***Paper Makes Wisconsin Great!*** activity "What Should I Be? What About a Papermaker?" encourages students to

investigate career possibilities in the papermaking industry by creating a poster about a specific career.

- The ***Wisconsin's Millennium Tree*** activity "So You Want to Be a Forester?" gives suggestions on how to invite a forester into your classroom to discuss his/her career.

Find Out About a Forest Ranger's Job

Read ***A Day in the Life of a Forest Ranger*** by David Paige. This story is about a forest ranger from Nicolet National Forest—right here in Wisconsin! Grades 3 - 5.

Dye Some Wool Yarn

You don't have to be a logger or forester to depend on forests in your profession. Writers, singers, and artists look to the forest for inspiration and raw materials!

Tree bark, roots, leaves, and nuts can dye wool yarn a variety of natural shades. The easiest and most foolproof dye material is also the messiest. Walnut husks dye yarn, cloth, fingers, and clothes a beautiful dark brown. Collect husks after they have turned brown. Place in water and boil gently for several hours. Remove from heat. Place wet wool yarn into the dyebath. Check every 10 minutes or so until the yarn is a little darker than you wish (some color will wash out). Rinse the wool under running water until the water is clear. Use the wool in natural weavings. Please note: Natural dyeing is an art. This is a very crude way to show how colors from nature can dye wool. However, it is effective as a classroom demonstration when formulas, chemical reactions, and precise measurements are really not necessary. ***NatureWatch*** by Adrienne Katz includes some more advanced, yet still relatively simple, directions for natural dyeing.

Finding Out More!

A Look at Wisconsin's Forests produced by Wisconsin Department of Natural Resources. This resource should be in your packet. If it is missing, you can order publication PUB-FR-122 from your local WDNR Forester.

Forestry Career Websites

Society of American Foresters
www.safnet.org/about/careers.htm

Wisconsin Paper Council
www.wipapercouncil.org/funfacts.htm

Where's MY Tree?

In the United States, every person uses about 74 cubic feet of wood each year. This wood becomes newspapers, books, toilet paper, fences, pencils, furniture, plywood, fuelwood, and all the other timber products we consume. (Source: USDA Forest Products Laboratory General Technical Report - *U.S. Timber Production, Trade, Consumption, and Price Statistics, 1965 - 1997*)

A *cubic foot* is a piece of lumber measuring 12" X 12" X 12". Multiply that size of board by 74 and you've got a big stack of wood! Maybe you can imagine how big that stack would be, but can you imagine the size of the tree that it came from? After learning how to measure trees, your students will be challenged to find trees big enough to supply them with wood and wood products for one year.

Getting Ready

1. Gather the materials needed.
2. Make one copy of the **Volume in Cubic Feet** chart on page 71 for each group of 2 - 3 students.
3. Locate a safe place where you can conduct the activity. An ideal spot would have about 10 trees that are 20" or more in diameter.

Doing the Activity

Part A
In the Classroom

Talk through the measurement process with your students. Explain that to calculate how many cubic feet a tree has, we must know the diameter and the height of the tree.

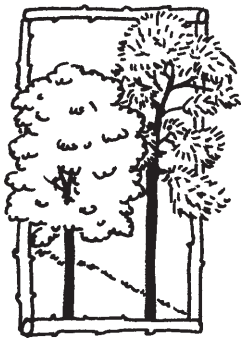
Part B
In the Field

In a large group, show how to use the measurement tools. Choose one tree to measure together.

Find the Diameter

1. Using a tape measure, mark a spot on the trunk that is 4' 6" above the ground.
2. Measure the circumference (distance around the trunk) in inches at this height.
3. Use this formula to find the diameter in inches:

$$\text{diameter} = \frac{\text{circumference}}{3.14}$$



Method

Students use common measuring tools to find trees large enough to supply them with wood and paper for one year.

Key Concepts

Every consumer is responsible for the ways forests are used.

As populations expand, the demand for paper, lumber, and other forest products results in increasing pressure to harvest trees.

Because forests are renewable and most forest products are recyclable, their use is critical to sustainable development.

Objectives

- measure trees using tape measures and rulers
- calculate the number of cubic feet in a tree
- find a tree or trees that contain about 74 cubic feet

Subjects & WI Academic Standards

Science:
A.4, C.4, G.4
C.8

Math:
A.4, B.4, C.4, D.4
A.8, B.8, C.8, D.8

English/Language Arts:
B.4, C.4
B.8, C.8

Environmental Education:
A.4, B.4
A.8, B.8

Materials

For each group of 2 - 3 students, you will need:

- tape measure or string
- 12" ruler
- Volume in Cubic Feet chart
- paper and pencil
- clipboard

Preparation Time

10 - 20 minutes

Activity Time

Part A: 10 minutes

Part B: 1 50-minute class period plus travel time

Setting

park, school forest, or school grounds where mature trees are present

Note: If you do not have access to tape measures, you can wrap a string around the trunk. Then measure the length of string with a ruler to find the circumference.

Find the Height

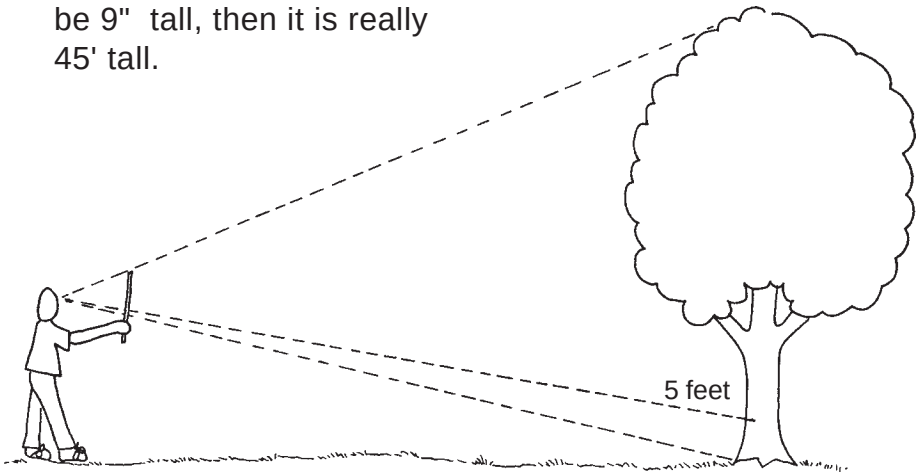
1. Use the tape measure or ruler to measure 5' up the tree trunk. Mark this spot or ask a friend to hold something on the spot.
2. Back away from the tree, holding the ruler at arm's length. Keep backing until, in perspective, 1" on the ruler covers the distance from the ground to the mark.
3. Without moving the ruler, measure the height of the tree in inches. Each inch on your ruler represents 5'. If the tree appears to be 9" tall, then it is really 45' tall.

Calculate the Number of Cubic Feet

Now you can figure out how many cubic feet are in your tree! Use the **Volume in Cubic Feet** chart. For example, a 16" diameter tree that is 70' tall would contain 41 cubic feet.

Find Your Tree!

Now that your students know how to measure a tree and to calculate the number of cubic feet, challenge them to find THEIR tree containing about 74 cubic feet. Look at the chart. Show them how they could find an 18" tree that is 100' tall or a 23" diameter tree that is just over 60' tall to equal about 74 cubic feet. Good luck! Note: If you are in a young forest, your students might have to find two trees that add up to about 74 cubic feet.



Assessing Student Understanding

Observe student participation in the activity. Review their measurements, calculations, and conclusions. Assess their ability to grasp the measuring process.

Extending the Learning

Go Figure!

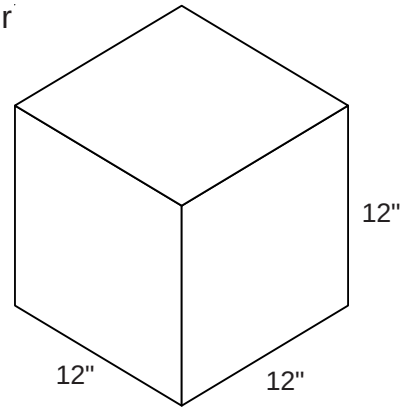
If each person in America uses one mature tree in a year, and there are 240 million Americans, why haven't we run out of trees? Discuss why trees are so important to sustainable development. Be sure the concepts of renewable and recyclable resources enter your discussion.

Think Globally

If all the trees in the forest you visited were cut down, how many Americans would have enough wood and paper products for one year? How many Europeans? How many Africans? Americans are huge consumers. Challenge students to find out how our use of resources compares with other peoples around the globe. Check out the book ***Material World: A Global Family Portrait*** by Peter Menzel.

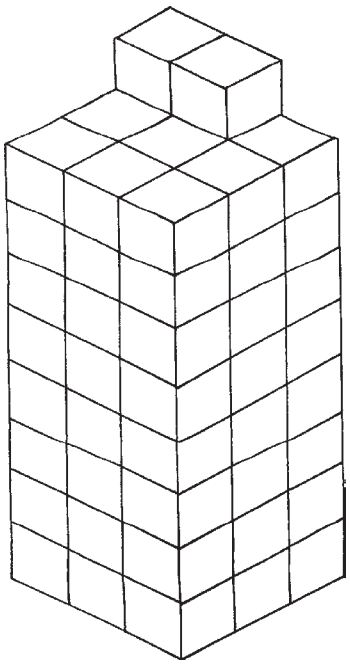
Rethink Ownership

Read ***Once There Was a Tree*** by Natalia Romanova. This story from Russia tells of a tree stump and the animals that call it home. It beautifully says that the tree belongs to all because it grows from the earth that is home for all. What does this mean about how we use forest resources? *Reading Rainbow* featured this book. The videotape is probably available through your local library.



One cubic foot

One cubic foot is a piece of lumber 12" X 12" X 12"



74 cubic feet

The average American uses 74 cubic feet of lumber each year. That's a pile of wood about 3' X 3' X 8'

Find a Champion

Wisconsin keeps records of the largest trees in the state for each species. Finding a state champion tree is rare, but you and your students might have a great time finding the local champs in your own community or school forest. Measuring trees is a good hands-on math activity, and you can practice some of the measuring skills you learned in this lesson. The booklet ***Wisconsin's Champion Trees*** contains information on how to measure a tree and compare it to the state records. It also includes a detailed listing of the largest trees in the state organized by species. You can get a copy by contacting your local Wisconsin Department of Natural Resources Forester and asking for publication number PUB-FR-115 98. Or find it online (www.dnr.state.wi.us/org/land/forestry/UF/champion/). You can also find directions for measuring trees in the following activities: "Tree Champs" in ***NatureScope: Trees are Terrific!***, and "How Big is Your Tree?" in ***Project Learning Tree***.

Volume in Cubic Feet

Diameter in inches at 4' 6"	Stem volume (in cubic feet) when total height is:								
	20 feet	30 feet	40 feet	50 feet	60 feet	70 feet	80 feet	90 feet	100 feet
3	0.5	0.6	0.8	1					
4	0.8	1.1	1.5	1.8	2.2				
5	1.3	1.7	2.3	2.9	3.4	4			
6	1.9	2.5	3.3	4.1	4.9	5.8			
7	2.6	3.4	4.5	5.6	6.7	7.8	9		
8		4.4	5.9	7.3	8.8	10.3	11.7	13.2	
9		5.6	7.4	9.3	11.1	13	14.9	16.7	18.6
10		6.9	9.2	11.4	13.7	16	18.3	20.6	22.9
11			11.1	13.9	16.6	19.4	22.2	24.9	27.7
12			13.2	16.5	19.8	23.1	26.4	29.7	33
13			15.5	19.4	23.2	27.1	31	34.9	38.7
14			18	22.4	26.9	31.4	35.9	40.4	44.9
15			20.6	25.8	30.9	36.1	41.2	46.4	51.5
16			23.5	29.3	35.2	41	46.9	52.8	58.6
17			26.5	33.1	39.7	46.3	53	59.6	66.2
18			29.7	37.1	44.5	51.9	59.4	66.8	74.2
19			33.1	41.3	49.6	57.9	66.2	74.4	82.7
20			36.7	45.8	55	64.2	73.3	82.5	91.6
21				50.5	60.6	70.7	80.8	90.9	101
22				55.4	66.5	77.6	88.7	99.8	111
23				60.6	72.7	84.8	96.9	109	121
24				66	79.2	92.4	106	119	132
25				71.6	85.9	100	115	129	143
26				77.5	93	108	124	139	155
27				83.6	100	117	134	150	167
28				89.9	108	126	144	162	180
29				96.4	116	135	154	174	193
30				103	124	144	165	186	206

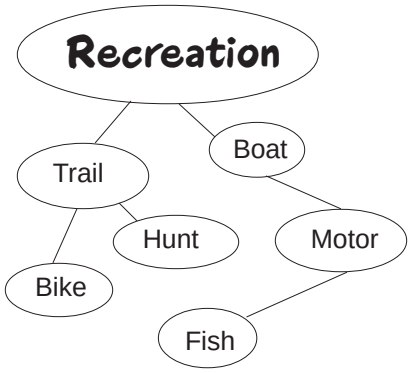
Recreational Use Survey

National, state, county, and city forests contain thousands of acres of land open to recreational opportunities. These areas usually contain features, such as trees, wildlife, rivers, and lakes, that people value and want to conserve. Some may also be of educational or historical value.

There may be a recreational place that your students and their families enjoy on a regular basis. Many of these places may be located within the community where they live; others may be located great distances away. Surveying the attitudes of your students is a good way to record and graph where students and their families travel to enjoy recreational areas and the activity they participate in the most.

Doing the Activity

1. Ask the students what they think of when they hear the word *recreation*. Have them brainstorm components that make up a recreational area. Have the students work together at the board to create a word splash around the word *recreation*. Feelings, descriptive words, site names, and activities will be used to make up the word splash.

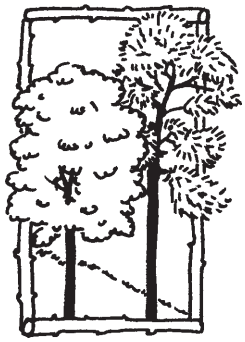


2. In small groups, have students develop a set of survey questions that will identify:

   - Favorite recreational areas and characteristics
   - Favorite recreational activities
   - Frequency of visits

   Surveys can include any information about recreational opportunities that interest the students. Have students record several possible questions. *Focus on the use of forested areas important for recreational activities!*

3. Assist groups with narrowing the number of questions to a reasonable number. Create survey



Method

Students survey teachers and fellow classmates to find out about recreational opportunities.

Key Concepts

Forests are one of our favorite places to recreate: hiking, camping, wildlife watching, skiing, boating, snowmobiling, swimming, biking, horseback riding, fishing, and hunting.

Objectives

- describe the characteristics of the students' favorite recreational areas
- develop a recreational survey
- graph the results of the students' survey

Subjects & WI Academic Standards

Science:
A.4, B.4, C.4, H.4
A.8, B.8, C.8, F.8, G.8

Social Studies:
A.4, A.8

Math:
A.4, B.4, E.4
A.8, B.8, E.8

Standards cont.

English/Language Arts:
B.4, C.4, E.4, F.4
B.8, C.8, E.8, F.8

Environmental Education:
A.4, B.4, C.4
A.8, B.8, C.8

Materials

none

Preparation Time

none

Activity Time

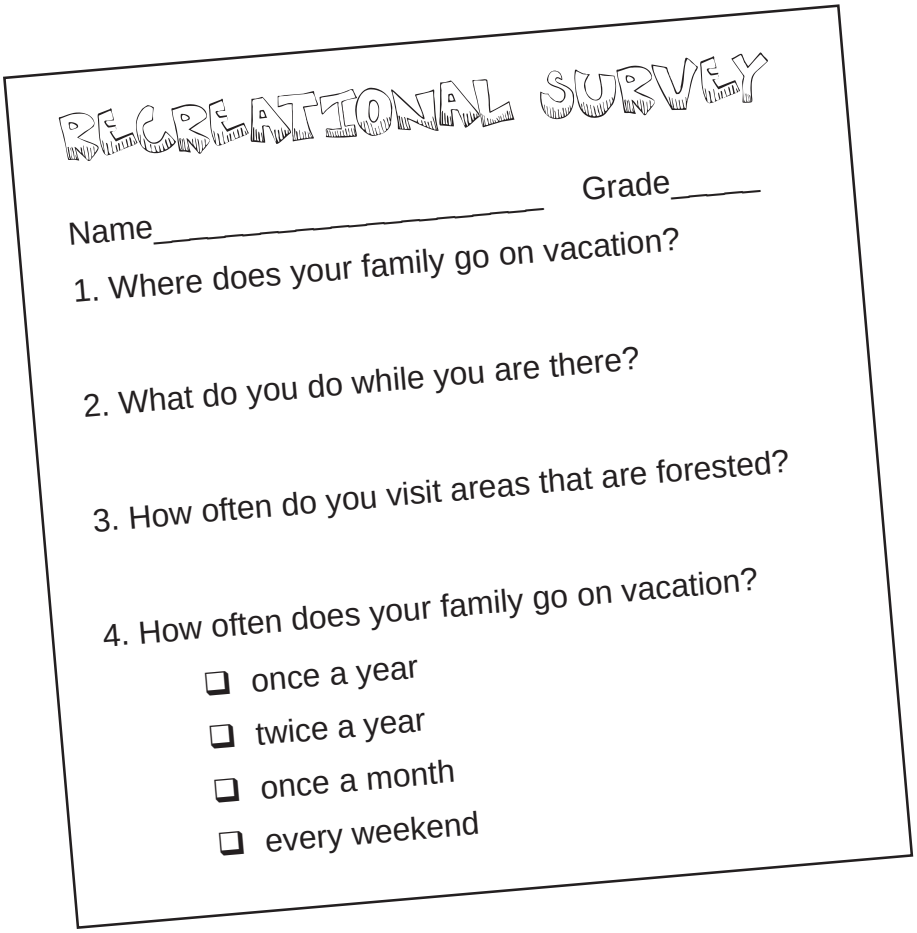
1 50-minute class period to develop survey, homework time, and 1 50-minute class period to compile data

Setting

classroom

forms. Ask groups to determine who their target audience will be.

4. Require each student to return five surveys completed by other students or staff members from the school building.
5. Survey information should be compiled in a simple data table using the top five responses for each question.
6. Instruct each group to select at least one item from the survey to be graphed.
7. Students should present the compiled survey results to the class.



Assessing Student Understanding

The teacher will assess the groups based upon the quality of their surveys and presentations. All students will be graded on participation.

Extending the Learning

Investigate the Impacts of Recreation

Recreation isn't all fun and games! The activities we choose to do often have a negative impact on the forest. Mountain biking can cause erosion on trails. Snowmobiling can disturb forest animals. Overeager wildlife watchers can interfere with nesting songbirds. The list goes on! Talk with your students about how some of their favorite recreational activities can affect the forest. Is there anything your students can do to eliminate or reduce the negative impacts of their recreation?

Visit with a Recreation Specialist

Invite a person from your county or city parks department to talk about local recreational opportunities. How do they plan for recreation on the land they are responsible for? Do they manage any forested lands? Are forests treated differently? Are there any local issues involving recreational land use? Are there ever conflicts between groups of recreational users? How are conflicts settled? Is there a master plan for the parks and other green spaces in your community? Ask your visitor to share briefly the master planning process and the ways citizens are involved in land use planning. If there is a hot local issue regarding recreational use of land, watch the local papers and plan to attend a planning meeting with your students.

Find out about master planning on state-owned properties by visiting the Wisconsin Department of Natural Resources website (www.dnr.state.wi.us/master_planning).

Finding Out More!

A Matter of Space is a 12-minute video produced by the USDA Forest Service. The National Forests have been a setting for almost every kind of outdoor activity one could imagine, but the forests have also experienced a meteoric rise in popularity of outdoor recreation. This film looks at some popular activities on National Forests and goes "behind the scenes" to examine some problems those activities cause. The video is available from the Forest Service Video Library for the cost of return postage. Contact: Forest Service Video Library, c/o Audience Planners, 5341 Derry Ave., Suite Q Agoura Hills, CA 91301, (800) 683-8366. www.r5.fs.fed.us/video/recreation.htm

A Forest Near You!

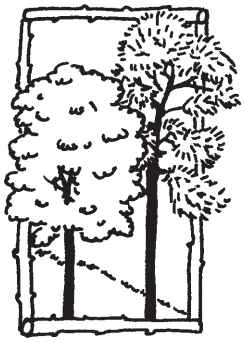
Sometimes we overlook the precious natural gems in our own backyards. Local forests can be valuable places to relax and have fun. Because they are close, people can enjoy them when time and money are limited. This activity encourages you and your students to investigate the forest resources right next door!

Getting Ready

1. Be sure the CD-ROM is installed and working properly.
2. Gather information about local forest/recreation areas. You can usually get information from your local Chamber of Commerce or Tourism Bureau. If these are not available locally, try getting county-wide information. Also, collect travel brochures featuring local attractions. You can find these at area motels, grocery stores, and other public places.

Doing the Activity

1. Be sure that each student or small group of students has a chance to use the CD-ROM. They should go to the main menu and select the *Recreation* section. They can search Wisconsin's State Parks and Forests by location and by recreational activity.
2. After everyone has had a chance to use the CD-ROM, lead a class discussion on recreation in Wisconsin. Refer to the results of the surveys students conducted in the activity "Recreation Use Survey." What were some favorite recreational activities? What local recreation areas were mentioned? Did you find any local forests on the CD-ROM that you didn't know about?
3. List on the board all of the nearby forest recreation lands. Be sure to include city, county, and national forests as well as other forested recreation areas. Students can use the CD-ROM, the resources you collected, and resources listed under **Finding Out More!** to help them. If you have a school forest, be sure to include it on the list. Explain that the list on the board is a working list and that it will probably grow as you explore the forests near you.
4. Ask groups of students to choose one of the forests listed on the board to investigate further. Using the resources you have gathered and the resources listed under **Finding Out**



Method

With the help of the CD-ROM, students "visit" forests around the state and then create a brochure to promote their favorite local forest.

Key Concepts

Forests are one of our favorite places to recreate: hiking, camping, wildlife watching, skiing, boating, snowmobiling, swimming, biking, horseback riding, fishing, and hunting.

Wisconsin's 16 million acres of forested land provide many opportunities for recreation - some right outside your door.

Objectives

- realize that Wisconsin is endowed with many forest recreation opportunities
- research local forest resources
- create a marketing tool to promote a favorite local forest

Subjects & WI Academic Standards

Science:
A.4, B.4, C.4, H.4
A.8, C.8, F.8, G.8

Social Studies:
A.4, A.8

English/Language Arts:
A.4, B.4, C.4, E.4, F.4,
A.8, B.8, C.8, E.8, F.8

Environmental Education:
A.4, B.4, C.4
A.8, B.8, C.8

Materials

- CD-ROM
- information about forests/recreation areas in the area
- travel brochures featuring area attractions

Preparation Time

20 - 30 minutes

Activity Time

1 50-minute class period, homework time, and in-class presentation time

Setting

classroom

More!, ask them to gather as much information as possible.

5. Show students examples of some brochures that promote area attractions. Tell them they are going to produce a brochure to market a local forest. If you have a school forest, you might want everyone to create a brochure for this important resource. Talk about what they might want to include and how they will make the information useful and interesting. Here are some ideas:

   - State clearly the main attractions and reasons for visiting.
   - Design an attractive brochure.
   - Be sure the information is easy to read.
   - Include photos, drawings, and other graphics.
   - Use grammar and punctuation thoughtfully.
   - Include contact information so readers can find out more.

   Note: Printed brochures aren't the only way to market an attraction. If you prefer, you can leave the assignment more open. Allow students to market the forest resource in any way they choose (e.g., radio spots, PowerPoint or HyperStudio presentations, web home pages, TV commercials, printed media, or music videos).

6. Allow students to present their final products to the rest of the class. If it seems appropriate, share your final products with the landowners of the forests.

Assessing Student Understanding

Monitor student involvement in class discussion.

Evaluate student projects based on the criteria that you established when giving the assignment. See step 5 for several suggestions. You might want to add:

Use at least 3 resources.
Use class time wisely.
Submit final project on time.
Present the final project in an organized way.

Extending the Learning

Get Out!

Plan a school trip to enjoy your own school forest or a nearby park. Think about the impacts of your recreation before you do it! How will you choose what to do and when to do it? How many

people will participate? Does the number of people make a difference? Talk about how sledding on a slushy hillside in early spring might cause more harm than sledding on the same hill on a cold January day. Which is more likely to damage plants and animal homes? How might mountain biking in spring on muddy trails differ from biking the same trail in late summer? What is the impact of an ice skating party with a big bonfire? Try to come up with a fun activity that doesn't do permanent harm to our beautiful forest resources. Check out the ***Leave No Trace*** website (www.lnt.org). Their mission is to promote and inspire responsible outdoor recreation through education, research, and partnerships.

Enter the Forest Appreciation Writing Contest

Each year the Wisconsin Department of Natural Resources sponsors a writing contest for fourth grade students. Students can enter essays, poetry, or other types of creative writing that follow the theme for that year. Contest packets with rules and judging criteria are sent to fourth grade teachers in January. The deadline is usually the first week of March. For more information, contact: Forest Appreciation Week Writing Contest, Wisconsin DNR, Bureau of Forestry, PO Box 7921, Madison, WI 53707.

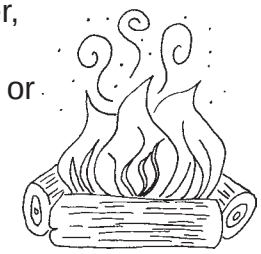
Can We Overuse Our Forests?

The ***Project Learning Tree*** activity "Loving It too Much" looks at some of the problems caused by too many people in America's national parks. Grades 6-8.

Be a Volunteer

Consider volunteering to help cleanup or maintain a recreation area near you. The ***Project Learning Tree*** activity "I'd Like to Visit a Place Where . . ." gives good background information and a plan for organizing a volunteer project.

You can also consider the ***Adopt-A-Trail*** program at a nearby state park, forest, or trail. Volunteers are needed to pick up litter, repair trail surfaces, control alien plant invaders, or help out in other ways as needed. Contact the superintendent for the park or trail you're interested in.



Design Your Ideal Forest

Every visitor to a forest has his/her own ideas about how to manage the land. Most public forests have a plan. Wildlife and fish managers, foresters, recreation specialists, local residents, and forest visitors have the opportunity to help write these master plans. It's not easy getting people with so many diverse opinions to agree on a plan. Master plans are compromises. What if it was

your class's job? What kind of forest would your students want? Encourage them to create it on paper and share it with several people. Don't be surprised if there is disagreement about the "look" of an ideal forest!

Read!

Read ***My Father Doesn't Know About the Woods and Me*** by Dennis Haseley. This fascinating picture book tells of the adventures of a boy and his dad in the forest.

Imagine a World Without Trees

The ***Project Learning Tree*** activity "Three Cheers for Trees" asks students to compare drawings of landscapes with and without trees to facilitate a discussion about the benefits of trees in public places. Grades 1 - 6.

Finding Out More!

Find a Forest on the Web

County Forests
www.wisconsincountyforests.com

Recreational Opportunities on Federal Lands
www.recreation.gov

State Forests
www.dnr.state.wi.us/org/land/forestry/stateforests

Wisconsin Department of Tourism. This website includes links to travel destination websites that are searchable by region, county, and community.
www.travelwisconsin.com

Find a Forest in a Book

Wisconsin DNR's Public Wildlife Recreation Land published by Wisconsin Department of Natural Resources—Bureau of Wildlife Management. Find public lands that are open for hunting, fishing, hiking, canoeing, and wildlife watching.

Wisconsin Wildlife Viewing Guide by Mary K. Judd. This guide covers many of the state parks, natural areas, sanctuaries, nature centers, and wildlife areas around the state.

Learn About Recreational Planning

Wisconsin's Statewide Comprehensive Outdoor Recreation Plan (SCORP) for 2000 - 2005. Read about the current uses of our state parks and forests and plans for their future in this Wisconsin Department of Natural Resources publication (PUB-PR-448-99).

Picture the Forest

Wisconsin's forests cover 46% of the state. That's 16 million acres of forests! With all those trees, forests should be able to meet everyone's needs, right?

Well, it's not that simple. We demand a lot from our forests. We expect our forests to be beautiful places to relax and enjoy the great outdoors. At the same time, we want forested lands to remain wild—undisturbed and able to support diverse species of wildlife. On top of that, we demand that forests produce wood, paper, and other forest products for our use. That's asking quite a bit—even from 16 million acres!

Goals of forest management have always varied by landowner. However, to meet the many demands placed on Wisconsin forests, landowners typically manage their woodlands for a variety of goals. For example, private individual landowners, who own about 57% of the forests in Wisconsin, manage their woodlands for goals ranging from personal income to increasing biodiversity. Private corporations and the forest industry own about 11% of the forests in the state. Besides managing their forests for products, they also manage them to provide wildlife habitat, to protect water quality, and to provide places for all of us to recreate. And of course the 32% of Wisconsin forests in public ownership is managed to provide as many benefits as possible.

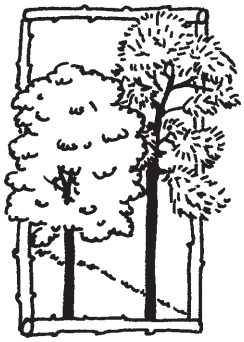
Today, we realize more than ever that forest resources are limited. With the growing population and increasing demands, the resiliency and productivity of forests will be put to the test. It's time to plan for the future!

Today's forest managers and resource professionals try to manage forests to provide ecological, economic, and social needs both today and in the future. That's what sustainable forestry is all about. It means making choices. The choices aren't always easy ones, but through sustainable forestry, we can enjoy **all** the benefits of forests.

The idea of managing a forest to reach certain goals is difficult for students to grasp. This activity starts out by finding out how your students picture a forest. Then it challenges them to include the many goals of sustainable forestry in their idea or "picture" of a forest.

Getting Ready

1. Reproduce the student page, **Picture the Forest,** on page 87.
2. Post the ***Sustainable Forestry*** poster.



Method

Students draw pictures of forests as a springboard to discussing how demands on forest resources are balanced.

Key Concepts

There are economic, ecological, and social/cultural consequences for every act of production and consumption.

Sustainable forestry balances the needs of today with those of the future.

Objectives

- identify ways that people use forest resources
- realize that forests are managed to satisfy a variety of social, economic, and ecological goals
- explore how different forest uses can be balanced with each other

Subjects & WI Academic Standards

Science:
A.4, B.4, C.4, H.4
B.8, C.8, F.8, H.8

Social Studies:
A.4, B.4, D.4
A.8, B.8, D.8

English/Language Arts:
A.4, B.4, C.4, D.4, F.4
A.8, B.8, C.8, D.8, F.8

Environmental Education:
A.4, B.4, C.4, D.4, E.4
A.8, B.8, C.8, D.8, E.8:

Materials

- drawing paper
- pencils, crayons, colored pencils, and/or markers
- ***Sustainable Forestry*** poster
- copies of the student page "Picture the Forest" for each student
- ***Sustainable Forestry*** newsletter reprints

Preparation Time

10 minutes

Activity Time

2 50-minute class periods

Setting

classroom

Doing the Activity

1. Ask students to draw a picture of a forest. It could be a forest they have visited regularly or an ideal forest of their imagination. Note: The forest should be real—not imaginary.
2. Invite students to share their pictures with each other and tell what is happening in their forests. Comment on the artwork and focus on their feelings about the forests they have pictured.
3. Now look closely at the pictures from a different viewpoint. Ask students to share ways they included people in their forest pictures. Record the different ways people were using or enjoying the forest. Talk about our need for recreation as a group or society. Title this list "**Social Goals**."
4. Now look at the pictures from the standpoint of the environment. Ask students to list the ways they showed forests being important to the environment. Record their ideas under the heading "**Ecological / Environmental Goals**." Did they include pictures of plants and forest animals? Are there streams or lakes in the pictures? Is the sky clear and free of pollution? Look back at the activity "It Does What?" for more ecological benefits.
5. Forests are also important for our economy. Look at the pictures from an economic viewpoint. Ask how the pictures show people working in the forest or harvesting products from the forest. List the ways forests meet "**Economic Goals**" on the board. It is very possible that no one included scenes of trees being cut down. Talk about why that might be. Refer to pretest question about the cutting of trees. Discuss the students' responses.
6. Look at the ***Sustainable Forestry*** poster included in this packet. Can you add any more words/ideas to the three lists you have on the board? Brainstorm other possibilities. You may need to list some things in more than one category. For example, snowmobiling might be listed under social goals because of the value of recreation **and** under economic goals because snowmobilers spend money in nearby towns.
7. Pass out copies of the three-circle diagram from page 87. Discuss what each circle represents and ask students to color in the circles as you talk about them.

   Ecological / Environmental Goals: Forests are an important

part of Wisconsin's environment. They provide habitats for plants and wildlife and help keep our air and water clean. Color this circle blue. Look back at your list and reinforce the idea of ecological goals with examples from the students' pictures.

- **Social Goals**: Forests are great places for people to have fun and relax. They give us many social benefits. Color this circle yellow. Discuss examples of social goals from your list.

- **Economic Goals**: Forests are an important part of Wisconsin's economy. We need the products and jobs (i.e., direct and indirect) that trees provide. Color this circle red. Talk about how forests are vital to our economy and our way of life.

8. Now, look closely at the circles. Point out the areas of overlap. Talk about how the colors have combined in these areas. In the same way, we can combine uses of forests. Through careful planning, one forest can do many things. Share some of the articles from the ***Sustainable Forestry*** newsletter that are reprinted in this guide on pages 89 - 92. They show how we can use one forest to meet several goals:

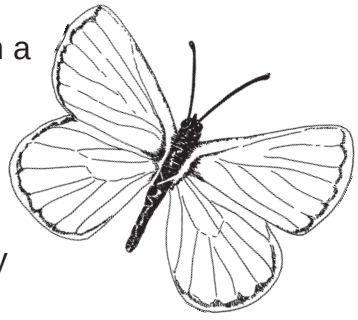
   - "Saving Habitat May Save Butterflies"
   - "DNR Works to Keep Forests Good-Looking"
   - "Forests Offer Outdoor Recreation Opportunities"
   - "Sustainable Forests in Cities and Communities"

9. Now look at the center of the circle diagram. This is where everything comes together—both colors and ideas! When forest owners and managers consider the social, economic, **and** ecological goals of a forest, they are beginning to think sustainable forestry. When they also consider the future of the forest and how their land fits into the big picture of forests in a whole area, they are really thinking sustainable forestry.

10. Share the article "Planning for the 7th Generation" from the ***Sustainable Forestry*** newsletter reprint on page 92. Talk about how the Menominees have kept the future in mind as they manage their tribal forests. How are they meeting social goals? Economic goals? Ecological goals?

11. As a class, come up with a definition of sustainable forestry. Your definition should include these ideas:

    - Forests are constantly changing.



- Forests need to be managed and used wisely.
- Forests must provide ecological, economic, and social benefits.
- Forests must meet our current needs.
- Forests must be used so that they retain their diversity and beauty.
- Forests will be needed by future generations.

Assessing Student Understanding

Back to the drawing board! Ask students to draw a different forest picture. This time tell them they must draw a picture of a forest that is managed sustainably. The forest must meet social, economic, and ecological goals. It must also be managed so that the forest can provide those goals far into the future. Students should write a paragraph about how the different demands on the forest are kept in balance.

Extending the Learning

Investigate Sustainable Consumption

Sustainable forestry, sustainable development, and sustainable future are current buzz words, but what do they really mean to each of us? Discuss and research some of these questions with your students:

- How has the use of forest products changed over time? Ask students to interview their parents and grandparents. Here are some possible interview questions: Do you use more or fewer forest products today than you did 10/25/50 years ago? Do you throw away more or less than you did 10/25/50 years ago? Do you think you use just the right amount, too few, or too many forest products?
- Consider how the demand for and consumption of forest products affects the management of forests. Do you think the stewardship of forest resources includes being careful consumers of forest products?
- What do you think will happen to the forests when the world's population reaches seven or eight billion? Can each of us continue to use the same amount?
- Depending on your students' level of understanding, you might want to investigate global distribution of resources and/or predictions of population growth.

Read About Different Forest Viewpoints

Read ***The Singing Fir Tree*** by Marti Stone. This is a Swiss folktale about a woodcarver and his quest to find the perfect wood for his masterpiece. When he wants to cut down the town's beloved singing fir tree, he learns that trees mean different things to different people. This story will spark a good discussion about how different people view the forest.

Make a Concept Map

See the activity "Sustainable Forestry - Concept Mapping" in ***Sustainable Forestry: Commitment to the Future.*** This activity uses the three-circle diagram as the basis for a sustainable forestry concept map. Students build the map based on their ideas about forest uses and the ideas represented on the ***Sustainable Forestry*** poster in this packet. See the sample concept map on page 86. Grades 6 - 12.

Create a Collage

See the ***NatureScope: Trees are Terrific!*** activity "We All Need Forests." A good discussion of multiple use management is followed by suggestions for how to make a forest collage showing all the different uses of a forest. Grades K - 5.

Be a Forest Manager for a Day

See the ***Project Learning Tree*** activity "A Forest of Many Uses." Students will learn about multiple use management by listing the ways forests are used and then pretending to manage a forest for different uses. They will think about how decisions to use the forest are made and analyze which uses are compatible. Grades 1 - 8.

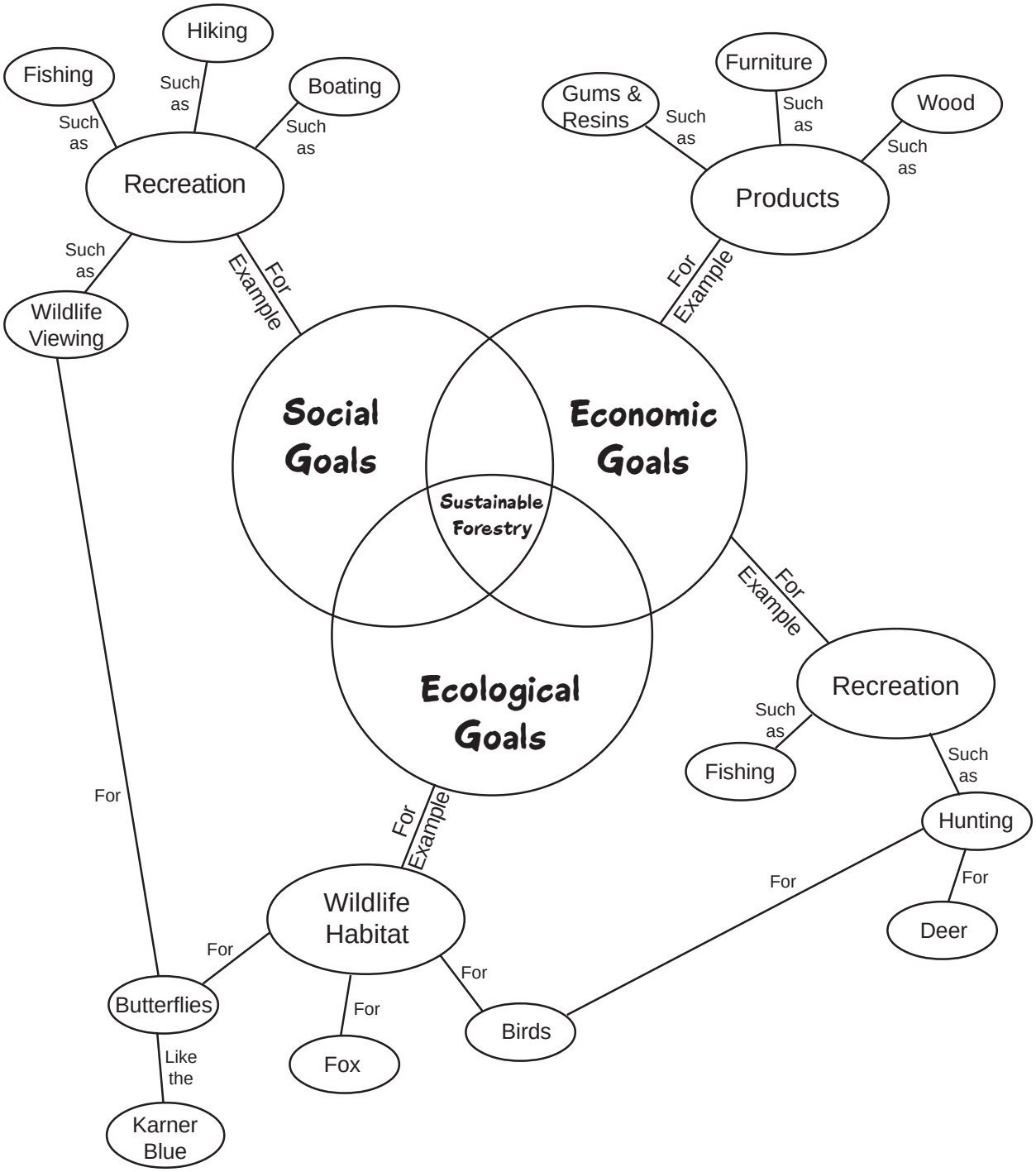
Finding Out More!

American Forests and Paper Association
www.afandpa.org/forestry/sfi_frame.html

College of Menominee Nation—Sustainable Development Institute. The Menominee's SDI shares information on sustainable forestry and challenges others to look closely at difficult choices. Contact the College of Menominee Nation, P.O. Box 1179, Keshena, WI 54135, (715) 799-1336.
www.menominee.edu/sdi/forestry.htm

Wisconsin Forests: Resource & Industry. This video examines the many roles forests play in our lives. It illustrates how managing our forest resources to satisfy many needs is a delicate balancing act. This and several other videos are available for loan from the Department of Natural Resources Forestry Training AV Library through your local WDNR forester.

Sample Concept Map



Student Page

Picture the Forest

SUSTAINABLE FORESTRY

COMMITMENT TO THE FUTURE

Saving Habitat May Save Butterflies

Some delicate, tiny blue butterflies that live in Wisconsin are under federal protection. Wisconsin is believed to support most of the remaining Karner blue butterflies in the eastern U.S. and Canada. They are found in the central and northwestern sand counties—where wild lupine grows. In fact, the butterflies' survival here depends on habitats that can grow wild lupine flowers.

The Karner blue was added to the endangered species list in December of 1992. Federal listing of the Karner blue butterfly means that it is now illegal to kill, collect, harass or harm it, or to destroy its habitat.

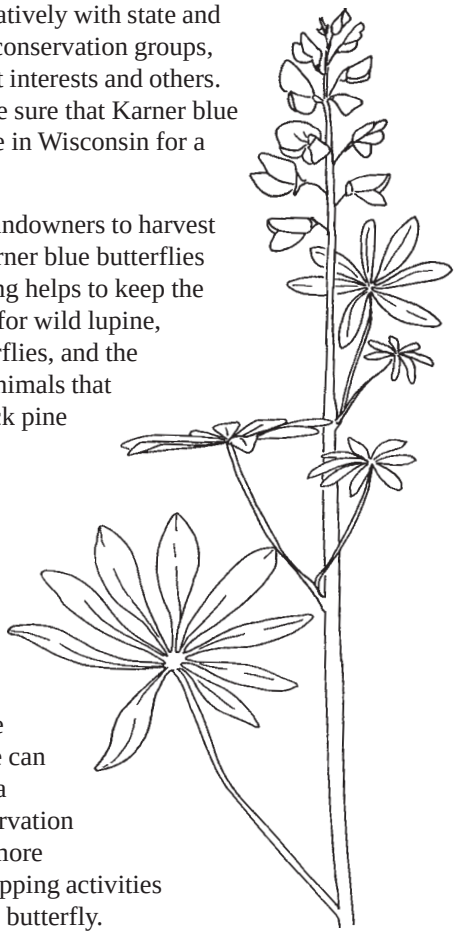
That sounds easy enough. In many cases, if the habitat of endangered species is protected—the animals are protected. But this isn't an easy situation. Here are some of the problems:

- Wild lupine is the Karner blue's only known larval food plant. That means that its caterpillars will only eat wild lupine. Many animals that depend on only one thing for survival are endangered. They just don't have many choices. For example, compare a panda that eats only bamboo with a raccoon that eats almost anything!
- Lupine grows in oak and jack pine "barrens." These communities depend on disturbance. They need to be logged or burned to stay an oak or jack pine community. If they aren't disturbed, other plants begin to grow in, and wild lupine can no longer grow there. Remember, no lupine—no butterfly.
- When loggers cut trees, a few butterflies are probably going to be killed. It is illegal to kill an endangered species.

It sounds like there isn't any answer at all. If nothing disturbs the butterflies' habitat, it will change (or succeed) to the point that it is no longer good butterfly habitat. If the habitat is disturbed, some butterflies will die.

Fortunately, the federal Endangered Species Act (ESA) allows for people to develop plans that will conserve the habitat of endangered species, even though those plans may "take" or kill a Karner blue butterfly or alter its habitat. These special plans are Habitat Conservation Plans (HCP).

An HCP is a detailed plan that provides for the conservation of a federally listed endangered species. Wisconsin's Karner Blue Habitat Conservation Plan was developed by the Department of Natural Resources cooperatively with state and federal agencies, conservation groups, landowners, forest interests and others. Its purpose is to be sure that Karner blue butterflies can live in Wisconsin for a long time.



The plan allows landowners to harvest trees in places Karner blue butterflies live. The harvesting helps to keep the area good habitat for wild lupine, Karner blue butterflies, and the other plants and animals that live in oak and jack pine communities.

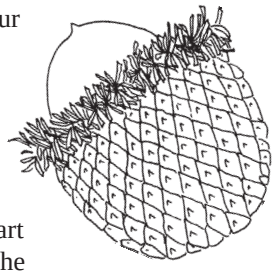
By conserving the butterfly's habitat, or living environment, planners hope that the butterfly itself will survive and flourish. If the species as a whole can be saved through a cooperative conservation approach, that is more important than stopping activities that might kill one butterfly.

DNR Works to Keep Forests Good-Looking

Most people think they know what a forest should look like—dense stands of tall, green trees, wildflowers coloring the forest floor, perhaps a shaft of light beaming down on a clearing, and a white-tailed deer skittering through the scene.

Today's multi-use, working forests may not look so picture-perfect. Loggers cut trees. Skiers and snowmobilers travel on trails and roads. Foresters control pests and diseases.

We know our forests must do a lot of things at once, but we still want our forests to be beautiful!



Kenneth R. Sloan is a DNR forestry employee at Woodruff. "Sustainability is a mode of (forest) management that we can continue forever," he said, "but part of that is going to be affected by the public's view of how it looks."

For example, some people don't want trees cut in certain areas, such as along interstate highways or near park entrances. If foresters leave these trees, that will affect how many trees can be cut and how much timber the forest can produce.

A committee formed in 1979 to develop a management program that considered the beauty of the forest. They published a document called the Forest Aesthetics Handbook.

"Our approach was to look at each individual forest stand, the attributes of its trees, and how long they would live," Sloan explained.

Trying to balance the need for wood products with the need for beautiful forests isn't always easy. Sometimes trees that are ready for harvest must be left to keep an area looking attractive. Every decision is important. Even the location of logging roads and stream crossings can make a difference in how the area looks after logging.

Since a variety of sizes, shapes, ages, and colors of trees is more eye-pleasing, the guide recommends leaving a variety of trees in an area. It also suggests changing harvest patterns and shapes so the area still looks interesting and diverse.

But that's not all! Foresters can't forget the other plants and animals that live in the forest. What would happen if they made a decision that kept the forest beautiful, but harmed the other members of the forest community? As they make decisions about where to harvest trees, they must think about the people who enjoy the forest **and** the ecology of the forest!

Forests Offer Outdoor Recreation Opportunities

Wisconsin's forests are places for many outdoor recreation activities. From hikers to bikers, canoeists to campers, birders to skiers, people are taking to the woods for outdoor recreation in increasing numbers. An important element of sustainable forestry is meeting the needs of people today and in future generations. Recreation is one of those needs.

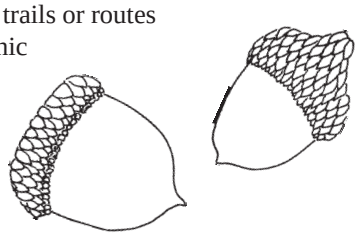
A survey conducted in the early 1990's found that approximately 2.11 million adults—about 54% of the adult population—had enjoyed at least one outdoor activity in the past 12 months. A fair amount of that activity took place in and near Wisconsin's 55 state parks, 10 state forests, 28 county forests, and 2 national forests.

While state parks are intended primarily for recreation, state forests serve a multitude of uses. In fact, timber harvesting can improve forest campgrounds. For example, approximately 3,080 cords of pulpwood and 161,000 board feet of logs were harvested from the Northern Highland / American Legion State Forest's Firefly campground in the winter of 1992. The harvest promoted the growth of bigger trees in the campground area by reducing the number of trees competing for light, water and nutrients. In addition, removing some trees between campsites let in more sunlight. The sunlight encourages the growth of shrubs, which improves the screening between sites.

Wisconsin's state forests are popular tourist destinations, and the Northern Highland / American Legion State Forest is the most heavily visited. The DNR estimates that over two million people a year visit the forest. The area is so popular because of the variety and number of recreational opportunities that are available.

Those visitors contribute significantly to the local economy. As tourism increases, dollars flow into restaurants and service businesses. The state and some municipalities derive income through sales taxes. The growing popularity of snowmobiling and cross-country skiing has created a year-round economy in places that used to shut down during the winter.

Many private forest owners help meet the recreational demands of the public by allowing hunting on their land. Others create nature trails or routes for snowmobiles. The scenic beauty of the woods, whether public or private, lures many hikers, birders and wildlife enthusiasts.



Sustainable Forests in Cities and Communities

They may not know it, but most city dwellers live in the middle of a forest. It's the urban forest—the thousands of trees dispersed in parks, in residential yards, along parkways and around business and industrial buildings.

This forest enhances the quality of life for the people who live in its midst. The forest cleans the air, absorbs pollutants, and provides cooling shade in summer. It also offers windbreaks against winter gales, softens harsh lines of buildings, increases residential property values, minimizes erosion, and adds color to the landscape.

Sustainable forestry practices apply to urban forests, too. Similar to foresters in rural areas, urban foresters promote biodiversity, deal with disease and insect infestations, and manage the resource to meet the needs of both present and future generations.

As recently as 35 years ago, Milwaukee and many of its older suburbs had canopies of American elms shading their streets. The arrival of Dutch elm disease wiped out thousands of these great trees. Because the streets were planted with block after block of nothing but elms, the disease moved from tree to tree, with no natural barriers to stop it.

That hard lesson has taught today's urban foresters to plant more varieties of trees. A maple blight might take some maples, but won't affect neighboring honey locusts or lindens.

Dick Rideout, state urban forestry coordinator for the Department of Natural Resources' Bureau of Forestry, points out that urban forestry involves more than just planting a variety of street trees. The urban forest is not just the trees on public property.

"From a biological point of view, it's all mixed, all one ecosystem, interconnected," Rideout said. "There are interactions between all greenspace, air, water, soil and infrastructure regardless of political or property boundaries."

Cities and villages are in fact urban ecosystems that include humans, plants, and animals that live in the area.

"To maintain the health of the urban ecosystem, clear air and clean water, you have to integrate the natural systems and the human systems," Rideout said.

Trees and other plants are a major part of this.

"To practice sustainable urban forestry, not only do you have to increase biodiversity, but you have to increase and improve the environment for plants so they can thrive with minimal effort and cost," Rideout noted. This will provide the greatest long term benefits to the human and natural community, he added.

Maintaining a healthy, diverse tree population contributes to the ability of the urban ecosystem to sustain life. One program aimed at sustaining urban forests is sponsored by the National Arbor Day Foundation. Called Tree City USA, it encourages urban forest management by recognizing communities that have met a minimum set of standards. Wisconsin currently ranks fifth in the nation for the number of communities achieving Tree City USA status.

Further encouragement for strong urban forest management programs comes through the state's Urban Forest Assistance Grant program. In 2000, $500,000 was available to help local governments improve their capacity to manage their trees through the development of inventories, management plans and staff training. Projects that preserve, protect, expand or improve the forest also are eligible. These include planting, hazard tree removal, and pest control.

Today's urban foresters manage trees through planting, management, and removal of old or damaged trees. They make sure the community's tree inventory is maintained or increased to the benefit of future users.

TREE CITY USA®

Planning for the 7th Generation

So well have Wisconsin's Menominee Indians managed their tribal forests that the tribe's foresters are now recognized as international leaders in forest and ecosystem management.

Since the tribe began commercial logging and lumbering more than a century ago, the Menominee forest has, in effect, been cut over twice. Yet it has more trees now than when the reservation was established in 1854. Not only the quantity but the quality of the forest has improved.

The Menominees have done this by following their centuries-old reverence for the forest and their solid instincts about its preservation and enhancement. But that's not all! They developed annual cutting limits and pioneered regular surveys (akin to a tree "census"). Foresters began using modern management techniques on the reservation long before they came into use elsewhere.

The results speak for themselves:

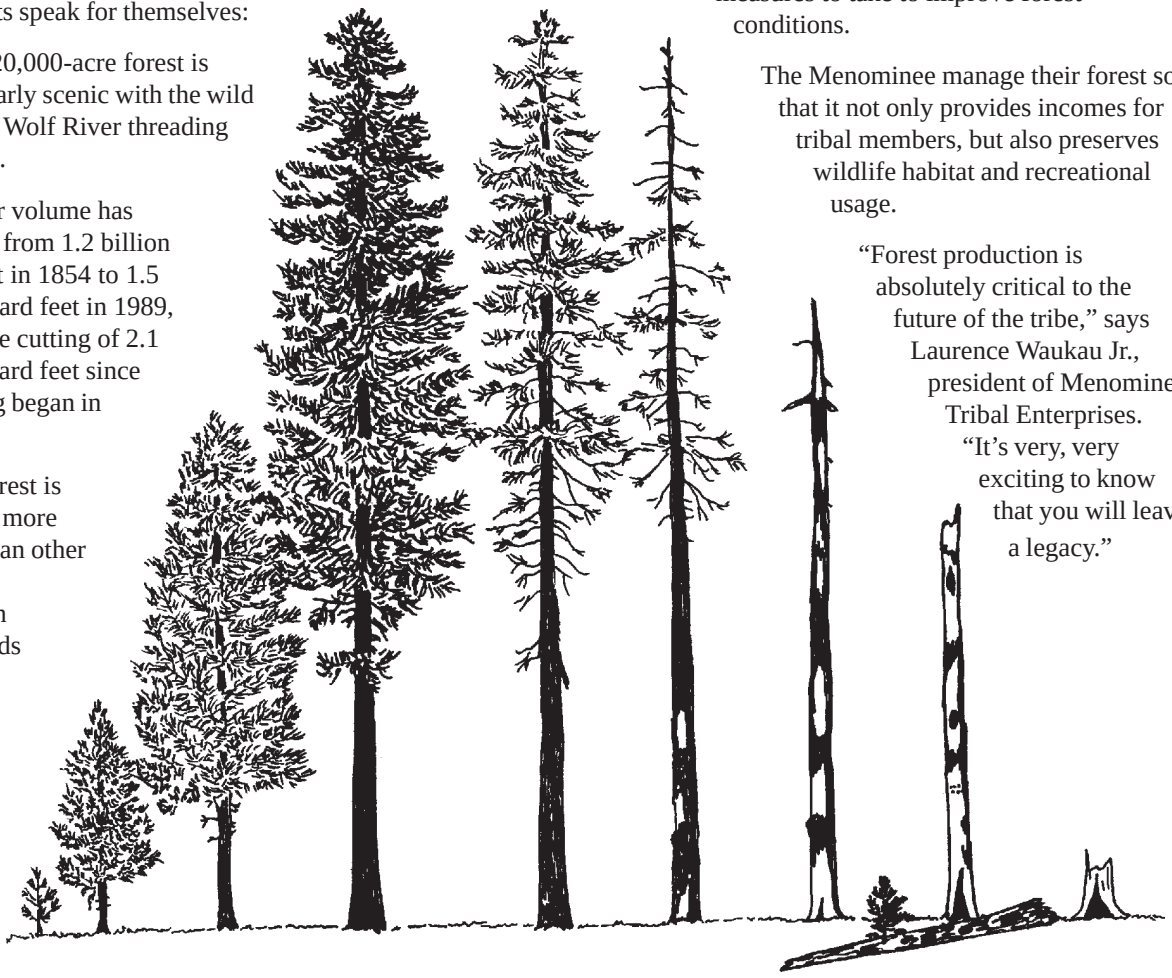
- The 220,000-acre forest is spectacularly scenic with the wild and clean Wolf River threading through it.
- Timber volume has increased from 1.2 billion board feet in 1854 to 1.5 billion board feet in 1989, despite the cutting of 2.1 billion board feet since lumbering began in 1865.
- The forest is older and more diverse than other northern Wisconsin timberlands which were heavily logged in the l9th Century. The reservation contains 11 of the 16 major types of forest habitat in the state and more than 25 species of trees.
- Hardwood timber has increased from about 70,000 acres in 1963 to 115,000 acres in 1988. This means the forest is maturing. Hardwoods typically exist as late successional forest cover types on good quality sites.

This has all come about through a strong cooperative relationship between the tribe, the Wisconsin Department of Natural Resources, the Department of the Interior's Bureau of Indian Affairs and its Forestry Department, with research assistance from experts at the University of Wisconsin.

The Menominee developed a Forest Management Plan that would inventory the timber by species, size and acreage; track the annual growth and cut by species; and specify harvesting plans each year. The inventory, conducted every 10 years, gives foresters the data needed to decide what, when and approximately where to cut, and what other measures to take to improve forest conditions.

The Menominee manage their forest so that it not only provides incomes for tribal members, but also preserves wildlife habitat and recreational usage.

"Forest production is absolutely critical to the future of the tribe," says Laurence Waukau Jr., president of Menominee Tribal Enterprises. "It's very, very exciting to know that you will leave a legacy."



These articles have been adapted from ***Sustainable Forestry: Commitment to the Future*** published by the Wisconsin Department of Natural Resources, Bureau of Forestry, Publication # FR 106-1995.

What's Happening in Wisconsin's Forests?

Wisconsin is home to many forest communities. Differences in soil and climate make each forest community unique, with its own challenges for sustainable forestry. The ***Wisconsin Forests Forever*** CD-ROM divides the state into three forest regions and gives brief descriptions of ten community types that can be found in Wisconsin.

Northern Forests
Pine Community
Aspen Community
Hemlock-Hardwood Community
Spruce-Fir Community

Central Forests
Aspen Community
Jack Pine Community
Scrub Oak Community

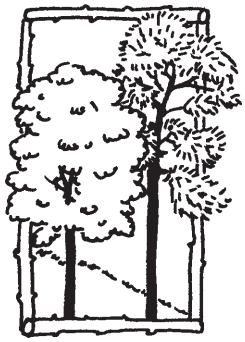
Southern Forests
Oak Savanna Community
Southern Hardwood Community
Urban Forest Community

We know that a forest is much more than just trees, but communities are usually named for their dominant plant species. And . . . trees are the dominant plants in a forest! Are you in an aspen community, a spruce-fir community, or a scrub oak community? When foresters inventory forest types based on the dominant trees, they recognize that those trees are part of a community of other plants and animals. That community is in that particular place because of a unique combination of moisture, temperature, soil type, and climate.

In this activity, you and your students will try to figure out what type of vegetation covered your community in the mid-1800's—before major logging. Then you will explore the forest communities that are present now and compare the results.

Getting Ready

1. Check to ensure the CD-ROM is installed and working properly.
2. Find several local forests that you can explore. If you have a school forest, start there! If not, try nearby city, county, or



Method

Students visit a local forest to discover how forest communities have changed in their neighborhood.

Key Concepts

Forest ecosystems contain many communities that support diverse populations of organisms.

Forest communities change over time through patterns of growth and succession.

The type of forest community present on a site depends on soil and climate, but is also influenced by natural events (e.g., fire, weather, disease) and past management practices.

Objectives

- recognize that Wisconsin is home to many forest communities
- identify neighborhood trees
- compare the current vegetation found in a nearby forest to presettlement vegetation

Subjects & WI Academic Standards

Science:
A.4, B.4, C.4, E.4, F.4
A.8, B.8, C.8, F.8

Social Studies:
A.4, A.8

English/ Language Arts:
A.4, B.4, C.4, D.4, E.4, F.4
A.8, B.8, C.8, D.8, E.8, F.8

Materials

- CD-ROM
- maps showing precipitation and temperature differences around the state
- map of presettlement vegetation of Wisconsin
- aerial photos of your area of the state
- ***Forest Trees of Wisconsin: How to Know Them***
- tree identification guides
- a forester!
- maps and/or photos of your location

Preparation Time

30 minutes

Activity Time

2 50-minute class periods and a field trip

Setting

classroom and outdoors

state parks; state or county forests; public recreation areas; and/or state natural areas. See **Finding Out More!** for information on how to find nearby forest resources.

3. Gather several tree identification books and/or field guides. See the **Appendix** on page 113.

Doing the Activity

1. Be sure that each student or small group of students has a chance to use the CD-ROM. They should go to the main menu and select the *Balance* section. They will be instructed to explore different regions of the state and discover how sustainable forestry works in each region.
2. Discuss the different forest communities around the state. Be sure students understand that different communities grow in different places based on local conditions. Look at Wisconsin maps that compare precipitation, summer and winter temperatures, and snowfall. Can you reach any conclusions?
3. Check out a map of the early vegetation in Wisconsin. See **Finding Out More!** for sources. What type of forest or community does the map suggest for your location? List the trees that would have been found in your area.
4. Invite a city, county, or state forester to visit your class and help with the project. Ask whether he/she can bring maps, species lists, or early survey records that will help you identify what the local forests looked like.
5. Using tree identification books, such as the ***Forest Trees of Wisconsin: How to Know Them*** included in this kit, find pictures and descriptions of the trees that once grew near your school.
6. Visit a forest to inventory the trees, plants, and animals living there. Invite the forester to accompany you on the trip. His/her knowledge of the area will be invaluable! Use resource books and field guides to identify the trees in the area. Remember to look for the trees on the list you made.
7. Back in the classroom, compare your results. What did you find? What didn't you find? How have the trees in your area changed? How have the changes affected the other plants and animals that live in the forest? How can you explain the similarities and differences?

8. Obtain aerial photographs of forests in your area. If possible, also obtain photos from the mid-1900's. Students can compare these photos and talk about how and why the forests have changed over time. See **Finding Out More!** for photo sources.

9. Look back at the information your students collected in the activity "Timber! The History of Forestry in Wisconsin." Review your local forest history. Was your area logged? Did fires burn here? Was the land ever farmed? Was it allowed to regenerate naturally or was it replanted?

10. Talk to your forester about how forests in your area are being managed. If the forest is radically different from presettlement times, is that OK? Can we or should we try to "re-create" the forests of the past? Is the forest you visited diverse?

    The CD-ROM pointed out unique challenges around the state. What are the issues that are inspiring or hampering sustainable forestry in your local community?

Assessing Student Understanding

Evaluate student participation in class discussion and field exploration. Assess their map reading and identification skills.

Instruct students to write short stories describing the changes that have occurred in the forest they visited. Encourage them to write the story from an interesting perspective. One view could be that of an older person who grew up here 75 years ago and is now returning for the first time. Another could be that of a turtle that has lived on the land for the last 50 years.

Extending Student Learning

Identify Your Local Trees

Identifying a tree is probably a new skill for your students. These activities will help you teach your students how to know trees:

- The ***NatureScope: Trees Are Terrific!*** activity "Keying Out Trees" uses a "people key" to help kids understand how an identification key works. "Twig Detectives" helps students recognize the parts of a twig. Grades 3 - 7.
- The ***Project Learning Tree*** activity "Name That Tree" introduces several identifying features of trees and reinforces the learning with a game. Grades 2 - 8.

- The ***Wisconsin's Millennium Tree*** activity "Local Tree Identification Guide" helps students sort and classify local tree leaves. Grade 4.

Discover Global Forest Types on the Web

Temperate Forest Foundation. This website includes information about forest ecosystems around the globe.
www.forestinfo.org
Follow these links: Discover→Cool Facts→Forest Zones

World Forest Institute. This website takes you to forests in many countries.
www.vpm.com/wfi/resources.htm

Create Leaf Art

Do you have leftover leaves from your field trip? The book ***Look What I Did With a Leaf*** by Morteza E. Sohi is filled with creative ideas for turning leaves into animals, nature scenes, and even monsters.

Finding Out More!

Looking for a Field Trip Site?

State Natural Areas. These parcels of land are great examples of natural communities. They are protected by the Department of Natural Resources and can be found all over the state. Visit the WDNR website to search for nearby state natural areas.
www.dnr.state.wi.us
Follow these links: Natural Resources→Endangered Resources→State Natural Areas→Listed by County

State Forests
www.dnr.state.wi.us/org/land/forestry/StateForests

County Forests
www.wisconsincountyforests.com

Industrial Forests
www.wipapercouncil.org

Recreational Opportunities on Federal Lands
www.recreation.gov

Wisconsin Wildlife Viewing Guide by Mary K. Judd. This guide covers many of the state parks, natural areas, sanctuaries, nature centers, and wildlife areas around the state.

Wisconsin Department of Natural Resource's Public Wildlife Recreation Land published by WDNR - Bureau of Wildlife Management. This booklet lists public lands that are open for people to hunt, fish, hike, canoe, and watch wildlife.

Understanding the Public Land Survey System

Wisconsin Department of Natural Resources
www.dnr.state.wi.us./org/land/forestry/Private/PLSSTut/plsstut1.htm

Locating Climate Maps

National Weather Service
View climatology reports for selected Wisconsin cities.
www.crh.noaa.gov/mkx/climate.htm

The Wisconsin Page
www.uwsp.edu/acaddept/geog/wisconsin

Wisconsin State Climatology Office
www.uwex.edu/sco/state.html

Locating Vegetation and Soil Maps

Wisconsin Department of Natural Resources
www.dnr.state.wi.us/org/at/et/geo/map_gal/landcov

Wisconsin Geological and Natural History Survey
www.uwex.edu/wgnhs

Wisconsin State Cartographer's Office
http://feature.geography.wisc.edu/sco

Locating Aerial Photos

County Land Use Planning Departments. Contact the Land Information Officer for your county. Check the county government section of your local phonebook.

Farm Service Agency. Purchase photos for your town, range, and section by calling the Farm Service Agency in your county. Look in the federal government section of your local phone book.

Regional Planning Commissions. Find out about the Regional Planning Commission for your county by visiting the State of Wisconsin Information Server website and searching for Regional Planning Commissions.
http://badger.state.wi.us/

Wisconsin's Statewide Aerial Photography Project.
Purchase photos from all over the state using an order form available from the Wisconsin Dept. of Natural Resources, Bureau of Forestry, P.O. Box 7921, Madison, WI 53707, (608) 264-8990.
www.dnr.state.wi.us/org/land/forestry/airphoto/index.htm

Obtaining Early Survey Notes

State Historical Society of Wisconsin. Surveyors' field notes are very interesting and reveal a lot about what your area looked like prior to European settlement. To obtain them, you must know the town, range, and section of the forest. Contact: SHSW, 816 State St., Madison, WI 53706, (608) 264-6400.
www.shsw.wisc.edu/localhistory/articles/surveyor.htm

Copies of the notes are also available through interlibrary loan. You can also try your county's Register of Deeds or County Surveyor to see if copies are available locally.

Finding Out About Wisconsin Forests Online

eNature, Inc. This site is filled with online field guides!
www.enature.com

TreeLink. This site has an online tree key.
www.treelink.org/whattree/

Wisconsin Department of Natural Resources. Find out the results of the latest inventory of Wisconsin's forests.
www.dnr.state.wi.us
Follow these links: Natural Resources→Forestry→A Look at Wisconsin's Forests

Wisconsin Department of Natural Resources. Try the tree key!
www.dnr.state.wi.us/org/land/forestry
Follow these links: A Look at Wisconsin Forests→Name that Tree

Wisconsin's Vascular Plants
www.wisc.edu/herbarium

Don't Stop Now!

Now that you and your students have learned about Wisconsin's forest resources and have been introduced to sustainable forestry, what are you going to do? You could scratch "teach about forests" off your "to do" list! Or you and your students could tackle a local forestry issue or problem in your community.

If you choose action, get ready for a great and challenging learning experience!

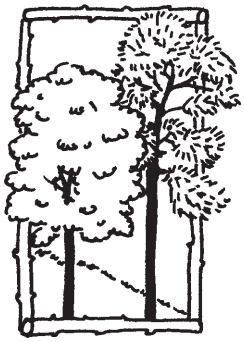
Getting Ready

1. You don't want to choose the action project your class will tackle, but you do want to be ready for it. Read ***Taking Action: An Educator's Guide to Involving Students in Environmental Action Projects***. See **Finding Out More!** for information.
2. Watch the local paper for forestry-related articles. Keep note of interesting issues that might inspire a class project.

Doing the Activity

Below is an outline of the steps needed to get a project off the ground. The size and nature of your project will determine the course it takes!

1. Discuss with your students the idea of doing an action project. Tell about some action projects that kids have already done. ***Taking Action*** gives summaries of "success stories" from around the country.
2. Together, brainstorm a list of some possible topics and related projects that the students find interesting.
3. Assign research on the most promising topics.
4. Pick a project.
5. Develop a plan.
6. Do it! Don't forget to keep a photographic and written record of your project.
7. Get recognized! Here's one way! Participate in the Department of Natural Resources' annual Earth Day Project. Projects that are registered with this program and meet the requirements will receive an Earth Day flag or classroom banner. Contact: Earth Day Project, c/o Project WILD/Project Learning Tree, Department of Natural Resources, CE/6, P.O. Box 7921, Madison, WI 53707-7921, (608) 267-2463.



Method

Students participate in a self-directed action project.

Key Concepts

Every person is responsible for the stewardship of forest resources.

Our children's children should be able to experience the beauty and productivity of diverse forest ecosystems.

Objectives

- identify ways they can make a difference
- complete a project that focuses on sustainable forestry

Subjects & WI Academic Standards

Science:
H.4, G.8, H.8

Social Studies:
D.4, D.8

English/Language Arts:
A.4, B.4, C.4, D.4, F.4
A.8, B.8, C.8, D.8, F.8

Environmental Education:
A.4, C.4, D.4, E.4
A.8, C.8, D.8, E.8

Materials
varies

Preparation Time
varies

Activity Time
varies

Setting
varies

Ideas for Action Projects Related to Sustainable Forestry

Improve the Quality of Your School Grounds, School Forest, or Local Park

Map your school's green space and consider how it could be improved. Your students will struggle with management decisions that consider the economic, ecological, and social goals of your site. Think about your school site. What *would* it look like in the future if nothing was done? How *could* it look if you follow a thoughtful plan? Find helpful information in the following resources:

- ***Wild School Sites: A Guide to Preparing for Habitat Improvement Projects on School Grounds*** published by Project WILD.
- "Design an Urban Schoolyard Forest" from ***Wisconsin's Millennium Tree***.
- "Improve Your Place" and "I'd Like to Visit a Place Where . . . " from ***Project Learning Tree***.
- ***Wildlife and Your Land: A Series About Managing Your Land for Wildlife*** from the DNR's Bureau of Wildlife Management. It offers many suggestions for improving wildlife habitat.
- ***DNR Service Centers*** and your local state park can provide you with construction plans for wild houses! Bluebirds, wood ducks, and bats will appreciate your efforts.
- The ***National Wildlife Federation's Backyard Wildlife Habitat*** program and ***Schoolyard Habitats*** program also offer good suggestions for enhancing wildlife habitat. www.nwf.org/habitats

Share Inspiration

Students are wonderful educators. Take advantage of their natural teaching ability by allowing them to write and/or read stories about the forest to younger children. Look at the ***Wisconsin's Millennium Tree*** activity "Forest Fact and Fiction." In this activity, students create a book that expresses their knowledge about Wisconsin forests.

Research Local Forest Issues

See the activity "Forest Issues Project" in ***Wisconsin's Millennium Tree*** for ideas on how to use local foresters as resources for environmental investigations and student research.

Think About the Rainforest

Unlike some parts of the world, Wisconsin has been gaining forest acreage, not losing. Many other parts of the world are not so fortunate! Ask your students to watch for news articles about deforestation in other countries. Look into ways that your class can raise awareness about the world's tropical rainforests. Here are two ideas to get you started:

- Investigate the advantages and disadvantages of preserving tropical forest land. Here are a couple of the groups doing this:
  International Children's Rainforest
  P.O. Box 936, Lewiston, ME 04240 (207)784-1069
  Save the Rainforest
  Dodgeville High School, 912 W. Chapel, Dodgeville, WI 53533
  www.lascruces.com/~saverfn/

- Find out about shade-grown coffee. Does it conserve tropical rainforest habitat while still allowing farmers to make a profit from their land? One source of information and coffee for resale is the Thanksgiving Coffee Company, Box 1918, Ft. Bragg, CA 95437, (800) 648-6491.
  www.thanksgivingcoffee.com

These action projects were mentioned earlier in the guide. They are repeated here in case you just became inspired!

Plant a Tree

What if you wanted to plant a tree outside your school? What kind of tree would you plant? What would you need to consider? See additional information in the **Extending the Learning** section of "Every Tree for Itself!" on page 12.

Be a Tourist in Your Own Town

Find out if you live in a Tree City USA. Visit the WDNR website (www.dnr.state.wi.us/org/land/forestry/uf/awareness) for a complete list of Wisconsin cities. If you do, how did your community qualify? If you don't, what are the qualifications? Is anyone in city government aware of the program or working toward the goal of becoming a Tree City? Take a walk through your community. Where are trees growing? Talk about what the community would be like without any trees. Invite your city forester or someone from the city maintenance department to talk to your group about how trees are planted, why they are planted where they are, and how people in the community can help care for trees. See the activity "Trees in Trouble" in ***Project Learning Tree***. It will help you identify some special problems that city trees face. Do something about it!

Investigate Endangered Species

Focus on Wisconsin's endangered and threatened species that live in the forest. Visit the Endangered Resources website (www.dnr.state.wi.us/org/land/er/rare.htm) for an up-to-date listing. The greatest problem that threatened and endangered animals face is habitat loss. Learn more about this need for space in these activities:

- The ***Project WILD*** activity "Too Close for Comfort" investigates the amounts of space different animals need.
- The ***Project Learning Tree*** activity "Life on the Edge" encourages students to become advocates for endangered species of plants or animals. After learning about habitat loss, students create "public relations campaigns" for these species.

Get Involved with Wildlife Research

Since animals depend on forest ecosystems, we can learn a lot about the forest by monitoring animal populations. Find out about these opportunities for students to be involved in gathering data:

- ***Christmas Bird Count***
  Wisconsin Audubon Society
  3118 N. Oneida Street, Appleton, WI 54911, (414) 735-9903
- ***Classroom FeederWatch***
  Cornell University
  http://birdsource.cornell.edu/cfw
- ***Fourth of July Butterfly Count***
  North American Butterfly Association
  www.naba.org
- ***Journey North***
  Journey North
  www.learner.org/jnorth
- ***Midwest Sandhill Crane Count***
  International Crane Foundation
  P.O. Box 447 Baraboo, WI 53913-9778, (608) 356-9462
  www.savingcranes.org
- ***Wisconsin Frog and Toad Survey***
  Wisconsin Department of Natural Resources
  Bureau of Endangered Resources
  P.O. Box 7921, Madison, WI 53707, (608) 267-0849

Volunteer Your Muscles!

Help maintain a recreation area, restore a habitat, or just clean up a place! Here are some possibilities for involvement:

- ***Adopt-A-Highway***
  Department of Transportation
  www.dot.state.wi.us
- ***Adopt-A-Trail***
  Contact your local WDNR state park, forest, or trail.
- ***Adopt-A-Lake***
  UW-Extension, University of Wisconsin - Stevens Point
  Stevens Point, WI 54881
  http://uwexlakes.uwsp.edu/Adopt-A-Lake
- ***DNR's Natural Areas Program***
  Wisconsin Department of Natural Resources
  P.O. Box 7921, Madison, WI 53707
  www.dnr.state.wi.us/org/land/er/snas.htm
- ***The Nature Conservancy***
  633 W. Main Street, Madison, WI 53708, (608) 251-8140
  www.tnc.org
- ***Water Action Volunteer (WAV) Program***
  Wisconsin Department of Natural Resources
  P.O. Box 7921, Madison, WI 53707, (608) 264-8948
  http://clean-water.uwex.edu/WAV

Remember . . . Be a Good Steward Every Day

Put into practice the things you believe will help the earth and its inhabitants. Set a good example for your students. Pick up litter, recycle, conserve energy, shop wisely, and always look for new ways to care for the earth. Think of creative ways to share the message with your community!

Finding Out More!

Taking Action: An Educator's Guide to Involving Students in Environmental Action Projects produced by Project WILD and the World Wildlife Fund. This resource was compiled to inspire and to provide models for conducting effective environmental projects. Contact the Wisconsin Project WILD office: WDNR, P.O. Box 7921, Madison WI 53707.

Taking Action! Ideas for Environmental Involvement in Wisconsin compiled by the Wisconsin Project WILD office. This list of projects, ideas, and contacts is available from the Wisconsin Project WILD office. See address above.

Grants!

***C.D. Besadny Conservation Grants*.** Fund your small-scale, grassroots conservation project! Grants of up to $1,000 are awarded to schools, organizations, individuals, and government agencies for projects involving education, restoration, research, and management of Wisconsin's natural resources. Contact the Natural Resources Foundation of Wisconsin (608) 266-1430. www.nrfwis.org

***Forest Stewardship Grants*.** Do you have a forest stewardship project you would like to undertake? Projects can include: training natural resource professionals, landowners, youth, or loggers; developing training materials, educational resources, or programs; providing technical assistance to landowners; and completing forestry demonstration projects. Contact Forest Stewardship Coordinator, WDNR, 101 S. Webster St., P.O. Box 7921, Madison, WI 53707-7921.

GreenWorks! GreenWorks is a Project Learning Tree environmental community action program. It encourages students to participate in community-based partnerships by developing and implementing environmental action projects, such as graffiti paint-overs, tree plantings, stream clean-ups, and recycling projects. Contact the National PLT office at (202) 463-2462. www.plt.org/html/plt_in_action/greenworks.html

***Urban Forestry Assistance Grants*.** These grants are administered through the WDNR's Urban Forestry Program. They fund projects that improve a community's capacity to manage its trees. The applicant may be a city, village, town, county, tribal government, or not-for-profit organization. Joint applications are encouraged. Grants range from $1,000 to $25,000. www.dnr.state.wi.us/org/land/forestry/uf/grants

***WEEB Grants*.** The Wisconsin Environmental Education Board (WEEB) awards grants for the development, dissemination, and implementation of environmental education programs. Awards are available for small grants requesting up to $5,000 and for large grants requesting $5,001-$20,000. http://weeb.uwsp.edu

Local Grants. Check with local service organizations and conservation clubs for special project funding. Several nationwide discount chains have grant programs for schools and community organizations. Ask your local store! For example, Target and the National Wildlife Federation sponsor Earthsaver clubs (www.nwf.org/earthsavers) around the country.

Appendix

Curriculum / Activity Guides

Lessons in a Land Ethic: Teacher's Guide with Student Activities for Indoor and Outdoor Use published by The Leopold Education Project, 1991. Contact Pheasants Forever for information about attending a workshop and receiving this curriculum guide. Find your local chapter by visiting the national Pheasants Forever website (www.pheasantsforever.org). Also check out the Leopold Education Project website (www.lep.org). Grades 6 - 12.

NatureScope:Trees Are Terrific produced by the National Wildlife Federation, 1985. This multidisciplinary guide features good background information, hands-on activities, and copycat pages. It is available through Acorn Naturalists, (800) 422-8886, (www.acornnaturalists.com). Preschool - grade 7.

One Bird - Two Habitats: A Middle School Environmental Education Curriculum on Migratory Birds produced by the Wisconsin Department of Natural Resources, 1994. This interdisciplinary curriculum unit focuses on the interconnectedness of birds, forests, and people in Nicaragua and Wisconsin. It is available only through workshops. Contact the State Coordinator at WDNR, Communications and Education, PO Box 7921, Madison, WI 53707, (608) 264-6282. Grades 6 - 8.

Paper Makes Wisconsin Great! produced by the Wisconsin Paper Council, 1998. This multimedia educational program explains the papermaking process, highlights the socio-economic contributions and history of the industry, and demonstrates the industry's commitment to environmental stewardship. Contact the Wisconsin Paper Council, P.O. Box 718, Neenah, WI 54957-0718, (920) 722-1500, (www.wipapercouncil.org). Grades 4 - 5.

ParkPacks produced by the Wisconsin Department of Natural Resources - Bureau of Parks and Recreation, 1999. ParkPacks were developed through a grant from the Wisconsin Environmental Education Board. They focus on sustainable forestry and include engaging activity cards, books, and other materials. Contact the Chief Naturalist, WDNR, P.O. Box 7921, Madison, WI 53707, (608) 267-9351 for information concerning availability. Grades 6 - 8.

Project Learning Tree published by the American Forest Foundation, 1994. The PLT guide is a set of action-oriented activities that uses the forest as a "window" into natural and built environments. The guides can be obtained by attending PLT workshops. For more information contact the National PLT office at (202) 463-2462, (www.plt.org) or the Wisconsin office at (608) 264-6280, (www.dnr.state.wi.us/org/caer/ce/pltwild). Grades K - 8.

Project WILD published by the Western Regional Environmental Education Council, 1992. Project WILD is an interdisciplinary, supplementary conservation and environmental education program emphazing wildlife. For more information contact the National WILD office (www.projectwild.org) or the Wisconsin office at (608) 264-6280, (www.dnr.state.wi.us/org/caer/ce/pltwild/).

Sustainable Forestry: Commitment to the Future produced by the Wisconsin Department of Natural Resources, 1996. This packet is no longer available, however you might be able to borrow one from your local forester. Grades 6 - 12.

Wisconsin's Millennium Tree: Sustainable Forestry Activities for Elementary School Students produced by Department of Public Instruction, Wisconsin Department of Natural Resources, USDA Forest Service, and several other agencies, 1999. The complete activity guide can be downloaded from WDNR's EEK! website (www.dnr.state.wi.us/org/caer/ce/eek). Grade 4.

Educators' References

It Takes a Tree produced by the Pacific Logging Congress. Each American uses the equivalent of one tree in wood and paper products each year. This video and booklet discuss how the tree is harvested and how logging companies are working to conserve natural resources. Contact the Pacific Logging Congress at P.O. Box 1281, Maple Valley, WA 98038 for information about availability and price.

Material World: A Global Family Portrait by Peter Menzel (Sierra Club Books, 1994). This resource book provides an intimate look into the everyday lives of typical families from around the world. It is also available as an interactive CD-ROM.

Naturewatch: Exploring Nature with Your Children by Adrienne Katz (Addison-Wesley Publishing Company, Inc., 1986). This book offers over 50 projects that encourage exploration and discovery in the out-of-doors.

Sand County Almanac by Aldo Leopold (Available from several publishers in different formats). This classic environmental book is as timely as when it was first written. A definite "read" for older students and all adults!

Taking Action: An Educator's Guide to Involving Students in Environmental Action Projects produced by Project WILD and the World Wildlife Fund, 1995. This resource was compiled to inspire and to provide models for conducting effective environmental projects. Contact the Wisconsin Project WILD office: WDNR, P.O. Box 7921, Madison, WI 53707, (608) 264-6280.

Wild School Sites: A Guide to Preparing for Habitat Improvement Projects on School Grounds published by Western Regional Environmental Education Council, 1993. This guide contains everything you need to start a wildlife habitat project. Contact the Wisconsin Project WILD office: WDNR, P.O. Box 7921, Madison, WI 53707, (608) 264-6280.

Wildlife and Your Land: A Series About Managing Your Land for Wildlife by Mary K. Judd, Diane Schwartz, and Todd L. Peterson, 1996 - 1998. This is a series of booklets about managing your land for wildlife. They are available from the WDNR, Bureau of Wildlife Management, P.O. Box 7921, Madison, WI 53707. They are also listed on the WDNR website under Wildlife Publications.

Wisconsin Department of Natural Resource's Public Wildlife Recreation Land published by the Wisconsin Department of Natural Resources, 1998. This booklet lists public lands that are open for people to hunt, fish, hike, canoe, and watch wildlife. It is available from WDNR Service Centers and the Bureau of Wildlife Management, P.O. Box 7921, Madison, WI 53707. Ask for publication number PUB-WM-001-98.

Wisconsin: Pathways to Prosperity by Shiela Reaves (Windsor Publications, 1988). This overview of Wisconsin history is filled with historical photographs, old signs, and interesting reprints.

Wisconsin Wildlife Viewing Guide by Mary K. Judd (Falcon Press Publishing Co., 1995). This guide covers many of the state parks, natural areas, sanctuaries, nature centers, and wildlife areas around the state.

Wisconsin's Champion Trees produced by the Wisconsin Department of Natural Resources, 1998. This resource contains information on how to measure a tree and how to compare it to the state records. It also includes a detailed listing of the largest trees in the state organized by species. You can get a copy by contacting your local WDNR Forester and asking for publication number PUB-FR-115 98. It is also available online at the WDNR website.

Wisconsin's Famous and Historic Trees by Bruce Allison and Elizabeth Durbin (Wisconsin Books, 1982). This resource lists historic trees, hanging trees, homeplace trees, Native American trees, and surveyors' trees. It also tells you where you can find trees made famous by legend, art, and individuals.

Websites

Many of the sites contain links to other forestry-related pages on the WWW.
* Indicates partners in the development of this CD-ROM packet.

Adopt-A-Highway
www.dot.state.wi.us

Adopt-A-Lake
http://uwexlakes.uwsp.edu/Adopt-A-Lake

American Forest Foundation
www.affoundation.org

American Forest and Paper Association
www.afandpa.org

American Forests
www.americanforests.org

American Museum of Papermaking
www.ipst.edu/amp/

Chequamegon - Nicolet National Forests
www.fs.fed.us/r9/cnnf

Classroom FeederWatch
http://birdsource.cornell.edu/cfw

College of Menominee Nation - Sustainable Development Institute
www.menominee.edu/sdi/forestry.htm

Earthsaver Clubs
www.nwf.org/earthsavers

EEK! Environmental Education for Kids!
www.dnr.state.wi.us/eek/

eNature, Inc.
www.enature.com

Forest History Society
www.lib.duke.edu/forest

Forest Products Laboratory
www.fpl.fs.fed.us

Forest Research Community
www.reeusda.gov/forest

Forest Service Video Library
www.r5.fs.fed.us/video

Forest Stewardship Council
www.fscus.org

F.R.E.E. Network - Forest Resource Environmental Education
www.freenetwork.org

Georgia Pacific
www.gp.com/educationalinnature

International Crane Foundation
www.savingcranes.org

International Wood Products Association
www.iwpawood.org

Journey North
www.learner.org/jnorth

Lake States Lumber Association *
www.lakestateslumber.com

Leave No Trace
www.lnt.org

Leopold Education Project
www.lep.org

Library of Congress
http://lcweb2.loc.gov/ammem/collections/finder.html

Lumberjack Resource Conservation and Development Council, Inc. *
www.wi.nrcs.usda.gov/RCD/lumberjack/lumber.html

Minnesota Department of Natural Resources
www.dnr.state.mn.us

Minnesota Power Electric
www.mpelectric.com/treebook/

Museum Products Company
www.museumproductsco.com

Nasco
www.nascofa.com/prod/Home

National Arbor Day Foundation
www.arborday.org

National Association of State Foresters
www.stateforesters.org

National Project Learning Tree
www.plt.org

National Weather Service
www.crh.noaa.gov/mkx/climate.htm

National Wildlife Federation's Schoolyard Habitats Site
www.nwf.org/habitats/schoolyard

Natural Resource Conservation Education
www.fs.fed.us/outdoors/nrce

Natural Resources Foundation of Wisconsin
www.nrfwis.org

The Nature Conservancy
www.tnc.org

North American Butterfly Association
www.naba.org

Northwest Center for Sustainable Resources
www.ncsr.org

Recreational Opportunities on Federal Lands
www.recreation.gov

School Nature Area Project
www.stolaf.edu/other/snap

Smokey Bear
www.smokeybear.com/

Society of American Foresters
www.safnet.org

Soil and Plant Analysis Lab
http://uwlab.soils.wisc.edu

State Historical Society of Wisconsin
www.shsw.wisc.edu/oss

State of Wisconsin Information Server
http://badger.state.wi.us/

Sustainable Forestry Partnerships
http://sfp.cas.psu.edu

Technical Association of the Pulp and Paper Industry
www.tappi.org/paperu/

Temperate Forest Foundation
www.forestinfo.org

Tree Musketeers
www.treemusketeers.org

TreeLink
www.treelink.org

University of Florida
www.agen.ufl.edu/~foodsaf/dh104.html

University of Wisconsin - Extension
www.uwex.edu

Water Action Volunteer Progam
http://clean-water.uwex.edu/WAV

Wisconsin Center for Environmental Education *
www.uwsp.edu/acad/wcee

Wisconsin's County Forests Association
www.wisconsincountyforests.com

Wisconsin Department of Natural Resources *
www.dnr.state.wi.us

Wisconsin Department of Public Instruction
www.dpi.state.wi.us

Wisconsin Department of Tourism
www.travelwisconsin.com

Wisconsin Environmental Education Board
http://weeb.uwsp.edu

Wisconsin Forest Resources Education Alliance *
www.wfrea.org

Wisconsin Geological and Natural History Survey
www.uwex.edu/wgnhs

The Wisconsin Page
www.uwsp.edu/acaddept/geog/wisconsin

Wisconsin Paper Council
www.wipapercouncil.org

Wisconsin State Cartographer's Office
http://feature.geography.wisc.edu/sco

Wisconsin State Climatology Office
www.uwex.edu/sco

Wisconsin Woodland Owners Association
www.geocities.com/RainForest/1704/

Wisconsin's Vascular Plants
www.wisc.edu/herbarium

World Forest Institute
www.vpm.com/wfi

WWW Virtual Library: Forestry
www.metla.fi/info/vlib/Forestry

Children's Nonfiction

Apple Tree by Peter Parnall (Macmillan Publishing Co., 1987). This book describes the many ways an old apple tree interacts with insects, birds, and other animals through the four seasons.

Arbor Day by Diane Burns and Kathy Rogers (Carolrhoda Books, 1989). This book for elementary children encourages appreciation of trees and discusses what has happened to them since the pioneers settled America.

Biodiversity by Dorothy Patent Hinshaw (Clarion, 1996). This book provides a global perspective on environmental issues while showing the interdependence between Earth and all living things.

The Blossom on the Bough, A Book of Trees by Ann Dowden (Crowell, 1975). Beautiful drawings and text explore the importance of forests, the parts and cycles of trees, the functions of flowers and fruits, the distinctive features of conifers, and the forest regions in the United States.

Crinkleroot's Guide to Knowing the Trees by Jim Arnosky (Bradbury Press, 1992). A funny forest fellow introduces trees and woodlands with information on how to identify the bark and the leaves, the many ways that animals use trees, and how to read the individual history that shapes every tree.

A Day in the Life of a Forest Ranger by David Paige (Troll Associates, 1980). The forest ranger in this story works in the Nicolet National Forest.

Discovering Trees by Douglas Florian (Charles Scribner's Sons, 1986). This book introduces trees and their growth, reproduction, and usefulness.

Eyewitness Books - Tree by David Burnie (Alfred A. Knopf, 1988). Photographs and text explore the anatomy and life cycle of trees; examine the different kinds of bark, seeds, and leaves; explain the commercial processing of trees to make lumber; and describe the creatures that live in trees.

Eyewitness Explorers - Trees by Linda Gamlin (Dorling Kindersley, Inc., 1993). This is a junior version of the Eyewitness Book described above.

The Forest by David Bellamy (Clarkson N. Potter, Inc., 1988). This book describes the coexistence of a variety of plants and animals in their natural forest environment and their struggle to survive a human-made catastrophe.

Forest Fires by Patrick Merrick (The Child's World, Inc., 1998). Questions and answers provide information about forest fires and how they occur.

Forest Life by Barbara Taylor (Dorling Kindersley, 1993). Vivid photographs reveal the variety of animal and plant life found in the forest.

Forest Resources by Jane B. Whipple (Franklin Watts, 1985). This book examines America's forests and their use, describing the history of forest use and protection, the national forests, fire and other major threats, and the resources provided by forests.

The Hidden Life of the Forest by Dwight Kuhn (Crown Publishers, 1988). Colorful pictures tell the story of the animals and plants of the forest.

How the Forest Grew by William Jaspersohn (Greenwillow, 1989). This book describes the gradual transformation of a cleared farm field into a dense forest. It is a primer on forest succession.

How Trees Help Me by Bobbie Kalman & Janine Schaub (Crabtree Publishing Company, 1992). Part of the Primary Ecology Series, it introduces trees and tree parts, discusses tree life cycles and current problems facing trees, and includes some simple activities for getting to know trees.

I Can Be a Forest Ranger by Carol Greene (Children's Press, 1989). This career guide describes the duties and training of a forest ranger.

Oak & Company by Richard Mabey (Greenwillow Books, 1983). Text and drawings follow an oak tree and its company of plants and animals from its beginning as an acorn to its death 282 years later. This book was written in England, so the drawings and some of the names are not familiar or native animals.

One Small Square: Woods by Donald Silver (Scientific American Books for Young Readers, 1995). This book invites kids to investigate the plant and animal life found in a small section of the woods.

Outside and Inside Trees by Sandra Markle (Bradbury Press, 1993). This book discusses various parts of trees and their functions, including the bark, sapwood tubes, roots, and leaves. The text is accompanied by many photographs and microscopic images of trees.

Paper by Kids by Arnold Grummer (Dillon Press, 1990). Follow step-by-step instructions to make decorative paper using materials found around the house and simple equipment that can be bought or constructed.

Resources Today - WOOD by Kathryn Whyman (Glouchester Press, 1987). This book shows how wood is harvested and turned into useful products.

Temperate Forests by Lynn Stone (Rourke Enterprises, 1989). This EcoZones book examines the forest community as an ecological niche and describes the trees, plants, and animals supported there.

TIMBER! From Trees to Wood Products by William Jaspersohn (Little, Brown & Company, 1996). This book explains how people and machines turn trees into a variety of wood products.

Trees by Joy Richardson (Watts, 1993). This introduction to the world of trees covers how they grow, why they lose their leaves, and more.

Trees Alive by Sarah Reidman (Lothrop, Lee, and Shepard, 1974). This book describes the life processes of trees, how they support animal and plant life, and what they contribute to our environment, comfort, and enjoyment.

Trees and Leaves by Althea (Troll Associates, 1990). This book from the Nature Club Series describes the characteristics of various trees and how they provide food and shelter for animals. It includes great illustrations of trees from around the world that show the diversity and adaptability of trees.

Trees Are Forever by Eleanor B. Heady (Parents' Magazine Press, 1978). This book includes information on tree growth, diseases, insects, fire, forestry, and the importance of trees to people and animals.

Trees of North America by Alan Mitchell (Thunder Bay Press, 1994). This book describes broad-leaved trees, ornamental trees, evergreens, and conifers. It also includes many tree-related activities.

Woods, Ponds, & Fields by Ellen Doris (Thames & Hudson, 1994). This Real Kids/Real Science Book is filled with ideas and suggestions for observing and collecting animals and plants in woods, fields, and ponds.

Children's Fiction

The Big Tree by Bruce Hiscock (Macmillan Children's Book, 1991). Beautiful illustrations help to tell the story of a maple tree over 200 years old.

Birth of a Forest by Millicent Selsam (Harper & Row, 1964). This book tells the story of a pond slowly becoming a forest.

Cherry Tree by Ruskin Bond (Boyds Mill Press, 1991). A young girl plants a cherry seed in the Himalayan foothills. On her tenth birthday, the tree finally blooms.

A Clearing in the Forest by Carol and Donald Carrick (The Dial Press, 1970). The spirits of the forest try to drive away a boy and his father, but soon they see that the people want to live in harmony with the land.

Flute's Journey by Lynne Cherry (Harcourt Brace & Co., 1997). A young wood thrush makes his first migration from his nesting ground in a Maryland forest to his winter home in Costa Rica and back again.

Giants in the Land by Diana Appelbaum (Houghton Mifflin, 1993). Giant pine trees in New England were cut down during the colonial days to make massive wooden ships for the King's Navy.

The Gift of the Tree by Alvin Tressalt (Lothrop, 1992). A dying tree gives the gift of life to other plants and animals in the forest.

The Giving Tree by Shel Silverstein (Harper, 1964). This classic story tells of a boy's use of a tree from the time he is young until he is old.

The Grandpa Tree by Mike Donahue (Rinehart, 1988). Read this tale of the life cycle of an evergreen tree—from birth to death to rebirth.

Just a Dream by Chris Van Allsburg (Houghton, 1990). Walter is not interested in the environment; he is interested in the robots and amazing inventions of the future. But one night, his dreams take him to a very different future that changes his attitude about the use of natural resources.

The Light in the Forest by Conrad Richter (Bantam Books, 1953). An infant is kidnapped by the Lenni Lenape on the frontier. When he is returned to his parents as a teenager, he finds the white man's ways disturbing.

Little House in the Big Woods by Laura Ingalls Wilder (HarperCollins, 1994). Follow a year in the lives of two young girls growing up on the Wisconsin frontier.

Lumberjack by William Kurelek (Houghton Mifflin Company, 1974). The author's paintings of Canadian lumbercamps accompany his first-hand observations of the life of a lumberjack.

Marven of the Great North Woods by Kathryn Lasky (Harcourt Brace & Company, 1997). When his Jewish parents send him to a Minnesota logging camp to escape the influenza epidemic of 1918, ten-year-old Marven finds a special friend.

The Miracle Tree by Christobel Mattingley (Gulliver Books, 1985). Separated by the explosion of the atomic bomb, a husband, wife, and mother carry on with their lives in the ruins of Nagasaki and are eventually reunited one Christmas by a very special tree. This story is more about people than trees, but it shows how trees impact people's lives.

My Father Doesn't Know About the Woods and Me by Dennis Haseley (Atheneum, 1988). As a child walks in the woods with his father, he seems to become other animals enjoying the freedom of nature.

An Oak Tree Dies and a Journey Begins by Louanne Norris and Howard Smith (Crown Publishers, 1979). A big, old oak tree on a river bank falls into the water and floats out to sea.

Once There Was a Tree by Natalia Romanova (Dial Books, 1985). This story from Russia tells about a tree stump and the animals that call it home. It beautifully states that the tree belongs to all, because it grows from the earth that is home for all.

Once There Was a Tree (Great Plains National Instructional Television, 1994). This Reading Rainbow videorecording is based on the book by Gennadii Spirin. The story weaves together the relationships among all living things and our dependence on trees for food, shelter, and clean air. LeVar then explores the life cycle of trees in a forest. (30 minutes)

Pearl Moscowitz's Last Stand by Arthur Levine (Tambourine Books, 1993). A "grandmother" has seen enough changes. She saves the last tree on the street.

The Singing Fir Tree: a Swiss Folktale retold by Marti Stone (G.P. Putnam's Sons, 1992). In his quest to find the perfect wood for his masterpiece, a woodcarver tries to cut down the town's beloved singing fir tree.

Someday a Tree by Eve Bunting (Clarion, 1993). This powerful story tells how chemicals can affect trees and the people who love them.

Song of the Trees by Mildred Taylor (Bantam, 1984). A family tries to save their woods from lumbermen during the Depression.

Sky Tree: Seeing Science Through Art by Thomas Locker (Harper Collins Publishers, 1995). This beautifully illustrated book shows one tree through the seasons. Text and paintings tell the story of changes in and around the tree.

The Time Tree by Enid Richemont (Little Brown and Company, 1989). The summer after their last year of elementary school brings changes in the friendship of Rachel and Joanna. Past and present worlds seem to merge, and a mysterious girl dressed in old-fashioned clothing appears and disappears at their secret place in an old tree.

A Tree in the Trail by Holling Clancy Holling (Houghton Mifflin Co., 1970). A cottonwood tree, sprouted in 1610 on the Great Plains, sees much history before it is felled in a storm in 1834. While fiction, the tree's story is historically based. The first fourteen chapters move quickly and are easy to read aloud.

A Tree's Tale by Lark Carrier (Dial Books for Young Readers, 1996). The huge 400-year-old oak tree sees many people come and go during the course of its life as a path-tree to the inland forest.

Trees by Harry Behn (Holt, 1992). "Trees are the kindest things I know/They do no harm, they simply grow." This line sets the stage for this wonderful poem about trees.

The Voice of the Wood by Claude Clement (Dial Books, 1988). An incomparable magical cello is made from a Venetian instrument maker's beloved tree. It is played during the Grand Carnival only after a famous young musician lets down his public facade and faces the instrument with honesty and heartfelt desire.

Forestry References

The Forest by Roger Caras (Holt, Rinehart, and Winston, 1979).

The Forest by Peter Farb (Time-Life books, 1969).

Forest by Jack Page (Time-Life Books, 1983).

Forests: A Naturalist's Guide to Trees and Forest Ecology by Laurence Walker (John Wiley and Sons, 1990).

The Green America Book by American Forest Institute (American Forest Institute, 1980).

Introduction to Forest Science by Raymond Young (John Wiley and Sons, 1982).

The Life of the Forest by Jack McCormick (McGraw-Hill, 1966).

North American Trees: National Audubon Society Collection Nature Series by Barbara Burn (Gramercy Books, 1984).

The Secret Life of the Forest by Richard Ketchum (American Heritage Press, 1970).

Woodland Life by G. Mandahl-Barth (Blandford Press, 1966).

Field Guides

The Audubon Society Field Guide to North American Trees by Elbert Little (Alfred A. Knopf, 1987). Photographs.

Eyewitness Handbook of Trees by Allen J. Coombes (Dorling Kindersley, Inc., 1992). Photographs.

A Field Guide to Trees and Shrubs by George A. Petrides (Houghton Mifflin Company, 1972). The Peterson Field Guide Series. Drawings.

Forest Trees of Wisconsin: How to Know Them by Bureau of Forestry (Wisconsin Department of Natural Resources, 1990). Drawings. *****

Trees by George A. Petrides (Houghton Mifflin Company, 1993). A Peterson First Guides book. This field guide is smaller than the typical field guide and contains the trees that you are most likely to see. *****

Trees by Herbert S. Zim and Alexander Martin (Golden Press, 1956). A Little Golden Guide. Drawings. *****

Trees of North America by Frank C. Brockman (Golden Press, 1968). Drawings.

***** Recommended for use by children.

CD-ROM Pre/Post Test

1. One acre of trees, which is an area about the size of a football field, can provide enough oxygen daily for:
   a) You and 17 friends
   b) You and 100 friends
   c) Just you
   d) I don't know

2. What do trees do for us?
   a) Give off oxygen and take in carbon dioxide
   b) Cool the surrounding area by as much as 10 degrees
   c) Provide products such as clothing, football helmets, and cardboard boxes
   d) All of the above

3. How much of Wisconsin is covered with trees?
   a) Almost one-quarter
   b) Nearly half
   c) Over two-thirds
   d) I don't know

4. Wisconsin's forests provide homes for which of the following wildlife?
   a) Barred owl
   b) White-tailed deer
   c) Fox snake
   d) All of these

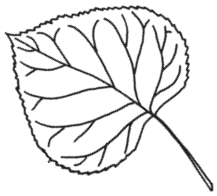
5. How many different products are made from trees?
   a) 50
   b) Hundreds
   c) Thousands
   d) I don't know

6. Which of the following fun things could people do in a forest?
   a) Hunting and fishing
   b) Camping and hiking
   c) Skiing and snowmobiling
   d) All of these

7. What is the most important job for Wisconsin's professional foresters?
   a) Build trails and campgrounds
   b) Manage forests sustainably to meet human needs and keep the environment healthy
   c) Control wildlife populations
   d) I don't know

8. What factors determine the types of forests found in Wisconsin?
   a) Soils and climate
   b) Species of animals
   c) Diseases and pests
   d) I don't know

9. Sustainable forestry provides which of the following benefits?
   a) Environmental
   b) Economic
   c) Social
   d) All of these



10. The cutting of trees provides many benefits.
    a) Agree
    b) Undecided
    c) Disagree
    d) I need to learn more

CD-ROM Pre/Post Answers

Correct answers are indicated with ***bold italic***.

1. One acre of trees, which is an area about the size of a football field, can provide enough oxygen daily for:
   a) ***You and 17 friends***
   b) You and 100 friends
   c) Just you
   d) I don't know

2. What do trees do for us?
   a) Give off oxygen and take in carbon dioxide
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   c) Provide products such as clothing, football helmets, and cardboard boxes
   d) ***All of the above***

3. How much of Wisconsin is covered with trees?
   a) Almost one-quarter
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4. Wisconsin's forests provide homes for which of the following wildlife?
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   a) 50
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   a) Build trails and campgrounds
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   d) I don't know

8. What factors determine the types of forests found in Wisconsin?
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9. Sustainable forestry provides which of the following benefits?
   a) Environmental
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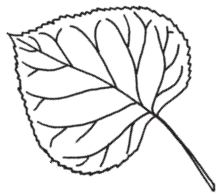
   c) Social
   d) ***All of these***



10. The cutting of trees provides many benefits.
    a) ***Agree***
    b) ***Undecided***
    c) ***Disagree***
    d) ***I need to learn more***

Note concerning question 10: There is no right answer to this question. Use it to spark class discussion or note possible changes in students' perspectives.

Welcome to the forest!

Thanks for choosing this CD-ROM Teachers' Packet. We hope that you and your students enjoy learning about Wisconsin's forest resources. Here's what you should find in the pack:

Wisconsin Forests Forever CD-ROM

Teachers' Guide

Forest Trees of Wisconsin: How to Know Them*
tree key (PUBL-FR-053 90REV)

Forest Trees of Wisconsin*
poster (PUBL-FR-101-95)

Sustainable Forestry
poster (PUBL-FR-105-95)

Questions & Answers About Wisconsin's Forests*
brochure from Wisconsin Governor's Forestry Council

A Look at Wisconsin's Forests*
brochure (PUB-FR-122)

The Forest Where We Live*
Wisconsin Natural Resources magazine insert (PUBL-FR-108-96)

***** Multiple copies of these publications may be available from the Wisconsin Department of Natural Resources.