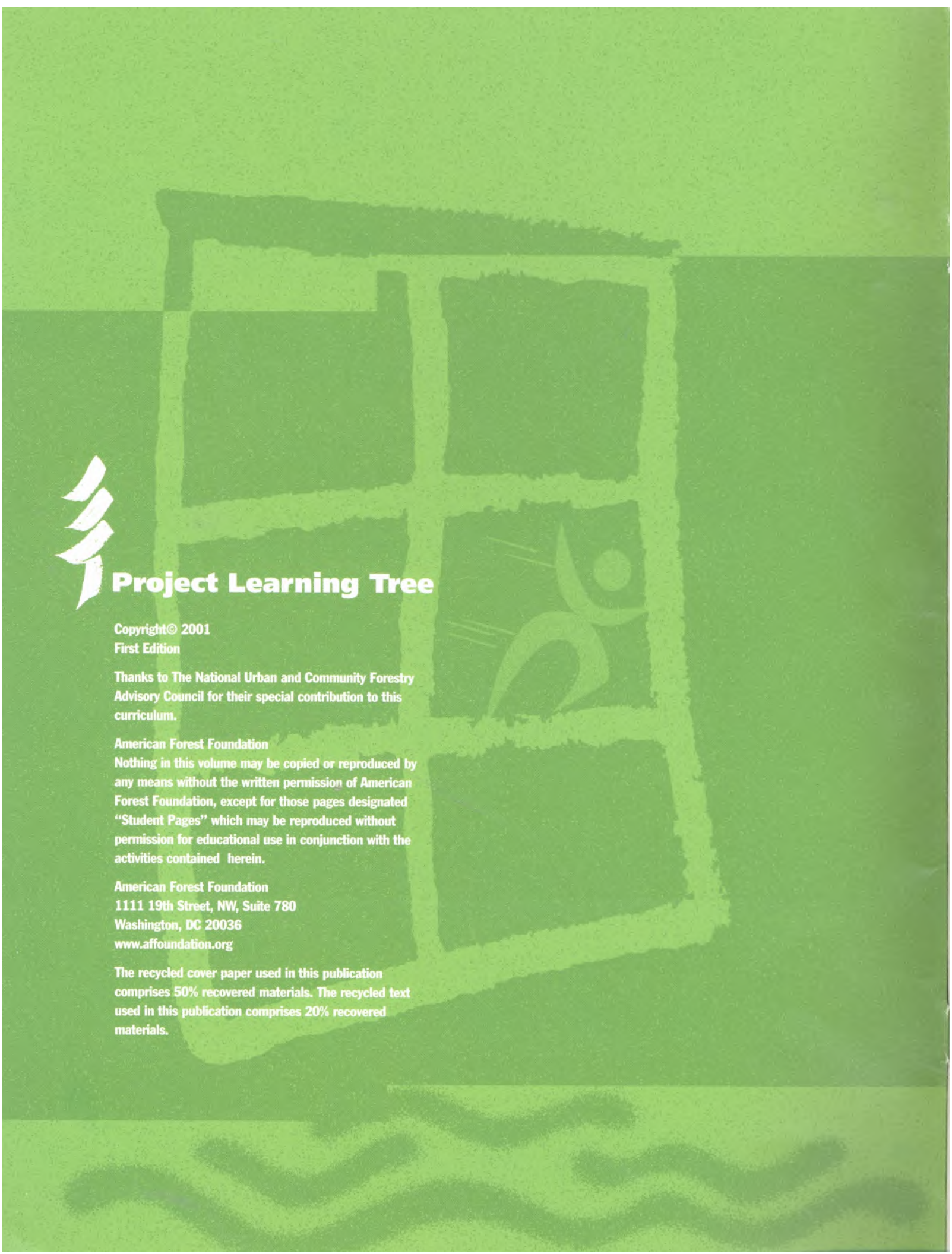
Project Learning Tree

GreenWorks!

Connecting Community Action and Service-Learning



Project Learning Tree

First Edition

Thanks to The National Urban and Community Forestry Advisory Council for their special contribution to this curriculum.

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The recycled cover paper used in this publication comprises 50% recovered materials. The recycled text used in this publication comprises 20% recovered materials.

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Acknowledgments

GreenWorks! is an environmental education and community action component of Project Learning Tree, a program of the American Forest Foundation. GreenWorks! has received significant financial support from Phillips Petroleum Company, the National Fish and Wildlife Foundation, the National Urban and Community Forestry Advisory Council and program development support from the United States Junior Chamber of Commerce. This support has made it possible for hundreds of PLT educators and their students to make a real difference in the communities in which they live and work.

We'd like to thank everyone who has contributed to building GreenWorks! partnerships over the years. These dedicated PLT teachers, students, businesses, and organizations have volunteered time, energy, and resources to improving their communities by taking action. Their contributions and combined efforts have made a difference, and as a result, we all share in the rewards of an improved environment.

We would also like to thank the many PLT Coordinators and educators who reviewed this guide and provided feedback and guidance throughout its production. A special thanks to Susan Duncan, Service-Learning Manager, Community Impact!, and Beverly J. O'Bryant, Ph.D., Director of Community Service/Service-Learning Programs, District of Columbia Public Schools.

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What is Project Learning Tree?

Project Learning Tree (PLT), sponsored by the American Forest Foundation, is an award-winning environmental education program designed for educators of students in grades PreK through 12. Founded in 1973, PLT provides supplementary environmental education curriculum materials and educator training designed around hands-on activities. PLT is implemented through a volunteer network in all 50 states, the District of Columbia, Guam, American Samoa, Canada, Chile, Mexico, Brazil, Japan, Finland, Mariana Islands, Sweden, Phillipines, Jordon, China, Slovakia. More than 200,000 educators have been trained to use its thematic, interdisciplinary curriculum.

Goals of PLT:

- Provide students with the awareness, appreciation, understanding, skills, and commitment to address environmental issues.
- Enable students to apply scientific processes and higher order thinking skills to resolve environmental problems.
- Help students acquire an appreciation and tolerance of diverse viewpoints on environmental issues and develop attitudes and actions based on analysis and evaluation of the available information.
- Encourage creativity, originality, and flexibility to resolve environmental problems and issues.
- Inspire and empower students to become responsible, productive, and participatory members of society.

PLT uses the natural environment as a "window on the world" to increase students' understanding of our complex environment; to stimulate critical and creative thinking; to develop students' ability to make informed, responsible decisions on environmental issues; and to instill in students the confidence and commitment to take responsible action on behalf of the environment. This is accomplished by teaching students to learn *how* to think, not *what* to think about complex environmental issues.

PLT's *PreK-8 Environmental Education Activity Guide* and secondary environmental education modules provide activities that help teach environmental literacy. Each activity guides the learner through the process of awareness, understanding, challenge, motivation, and responsible action using active involvement and hands-on experiences.

The activities are based largely on the constructivist learning theory and whole language teaching strategies.

- **Constructivism:** The constructivist theory of learning recognizes that students construct new understandings by combining previous understandings with new discoveries. Learning specialists have found that students' preconceptions about the way the world works have a profound effect on their ability to integrate new scientific explanations of natural phenomena.

  With this in mind, PLT provides opportunities for teachers to guide their students toward new discovery and scientific understanding and, simultaneously, help to develop critical thinking and creative problem solving skills.

- **Whole Language:** In the whole language approach, what is taught is integrated across the curriculum rather than presented in isolated "bits" and "pieces." This is done by focusing on connecting themes, conceptual understandings, and critical thinking skills rather than on the simple transfer of bits of information. With this approach, students frequently engage in writing and oral language activities related to experiential learning.

The PLT program employs highly effective and well-tested teaching strategies. These include cooperative learning and problem solving:

- **Cooperative Learning**. This approach is more than a simple "grouping" technique. Rather, students are organized into small teams that work together to accomplish academic and non-academic tasks while, at the same time, develop important social skills. Specific roles are often assigned to group members, for example, recorder, reporter, and facilitator.

- **Problem Solving**. Emphasizing a problem solving approach to learning promotes the development of such skills as identifying problems, determining desired outcomes, selecting possible solutions, choosing strategies, testing solutions, evaluating outcomes, revising and repeating steps, and predicting new problems.

What is GreenWorks!?

GreenWorks! is the community action service learning component of PLT, built around action projects that partner educators, students, and the community in an effort to understand, respect, and improve the world around us. To support community action, GreenWorks! blends service activities with the academic curriculum and addresses real community needs as students learn through active engagement.

The key to a healthy environment lies in informed action. GreenWorks! offers PLT educators and their students the opportunity to positively impact the communities in which they live and work. By combining the environmental knowledge and resources of PLT with community action initiatives, GreenWorks! action projects have a true impact on the future of America. GreenWorks! action projects make a difference in how young people think, in their sense of responsibility toward their communities, and in their understanding of their relationship to the environment.

GreenWorks! offers opportunities for people of all ages to work together to enhance their surroundings. By linking PLT educators and their students with local community groups, GreenWorks! action projects help educate communities about environmental issues and engage people in working together to find solutions to environmental problems within their communities. Community participation is the cornerstone of a GreenWorks! action project—people working together to improve the environment. For example, a GreenWorks! action project might involve students partnering with a local nursery to provide more greenspace for observing and exploring the many cycles of life. A GreenWorks! action project may involve many groups working together to enhance our city streets by cleaning-up graffiti and planting trees. Or a GreenWorks! action project may involve a group of high school students working with a forestry agency and a local forest resources company in an effort to understand the complexities of fire in a forest ecosystem.

Green Works! provides students with experiences that extend learning beyond the classroom into real world contexts. By linking community action with classroom activities, students gain an understanding of environmental issues while enhancing basic math, science, English, and communication skills; strengthening problem solving and decision making skills, and developing civic skills, abilities, and competencies. GreenWorks! addresses community issues and integrates academic learning with community action projects to connect young people with their communities.

PLT and GreenWorks! *Working Together to Maximize the Learning Experience*

A GreenWorks! action project partners educators, students, and communities in order to fulfill a most important mission, *taking responsible action on behalf of the environment.* In this way, GreenWorks! encompasses the goals of PLT, and supports the mission of PLT by providing opportunities for educators, students, and the community to work together through understanding environmental issues and involvement in environmental projects.

Thoughtful action is one of the most important components of the PLT education program. When students work together on an action project, they develop self-esteem and a sense of belonging and learn that they can make a difference and, in fact, contribute towards positive change. Initiating and carrying out a GreenWorks! action project is the next natural step in the PLT learning experience. A GreenWorks! action project helps students to learn by doing. It is experiential learning at its best. GreenWorks! action projects create opportunities for students to become active participants in understanding the complexities of our natural and built environments.

PLT's *PreK- 8 Environmental Education Activity Guide* and secondary environmental education modules serve as the curriculum "backbone" to initiating a GreenWorks! action project. (See PLT Resources & Activities Cross Reference List, Appendix, p. 30.) PLT curriculum materials provide classroom resources to support the GreenWorks! learning experience—providing the needed academic background and skills development as well as the opportunity for students to reflect, talk, and write about what they did and saw during the actual community action experience.

PLT and GreenWorks! Making the Connection between Service and Learning:
Schools, school districts, and states are increasingly integrating service-learning and community service requirements into the curriculum. GreenWorks! action projects can help support and fulfill those requirements.

GreenWorks! links classroom learning to the real world by integrating community action with curriculum- and standards-based activities in the classroom. GreenWorks!, like

any service-learning experience, involves schools, students, community-based organizations, local government officials, and the public and promotes cooperation and collaboration among these institutions.

GreenWorks! can also serve as a springboard for students in those school districts or states where there are mandates for community service hours. PLT, GreenWorks!, and an understanding of important environmental issues in the community can inspire students to choose to participate in activities with an environmental emphasis as they complete their hours of community service.

Both service-learning and community service provide opportunities for students to address important issues and the needs of the community while expanding their own academic and personal growth and developing an understanding of civic responsibility. This is a natural extension of the interdisciplinary nature of PLT, GreenWorks!, and environmental education.

PLT and GreenWorks! A Natural Fit

- **GreenWorks!** is a community action program that has its roots in *constructivist learning* theory. Students construct new understandings by combining previous understandings with new discoveries.
- **GreenWorks!** provides a *whole language experience* in which students learn by doing.
- **GreenWorks!** is service-learning—integrating community service and the academic curriculum.
- **GreenWorks!** supports students who choose environmental activities to fulfill community service requirements.
- **GreenWorks! Projects** require cooperation and problem solving.

The *GreenWorks! Connecting Community Action and Service-Learning* Guide "At a Glance"

The *GreenWorks! Connecting Community Action and Service Learning* guide is for PLT teachers (PreK-12) who are interested in carrying out an environmental action project with a class or club. It is also intended to be used by individuals in community-based groups or businesses that are interested in working with PLT trained educators and their students to carry out an environmental action project. The *GreenWorks! Connecting Community Action and Service Learning* guide also supports teachers in school districts that require student participation in service-learning activities, as the guidelines presented in the following pages are often closely matched with those of the district's service-learning program.

The guide also provides useful information to anyone interested in conducting an action project, in general, and outlines the suggested process for implementing a GreenWorks! action project, in particular, through case studies and examples of successful projects. The GreenWorks! guide is a useful and informative tool that will assist you in all stages of your project, from assessing the needs of your community to evaluating the results of your community action project.

The GreenWorks! Community Action and Service-Learning Guide is organized into five sections.

PART 1. **Starting with Good Intentions (pages 6-7)** provides an overview of the components of community action projects and ideas for community action projects.

PART 2. **Connecting Service and Learning (page 8)** makes the connection between the growing integration of service-learning into the school curriculum and environmental action projects.

PART 3. **Doing a GreenWorks! Action Project (pages 9-14)** describes the development, planning, and implementation of a GreenWorks! action project.

PART 4. **GreenWorks! Projects in Action (pages 15-17)** provides examples of actual GreenWorks! action projects.

PART 5. **Appendices (pages 18-59)** provide supporting materials, resources, and samples of GreenWorks! action project documents.

Starting with Good Intentions

What Is an Environmental Action Project?

An environmental action project is an activity that gets students involved in tackling an environmental issue or problem with the goal of improving their community. A GreenWorks! action project is all of this and more. A GreenWorks! action project is about *partnering* and *sharing* the accomplishment of an activity among community, state, or national sponsors and PLT trained educators and their students. The activities connect service with learning—integrating students' community action with the academic curriculum. GreenWorks! action projects offer opportunities for people to become engaged citizens—working together to enhance their surroundings while sharing in the rewards of an improved environment.

Environmental action projects range in scope and complexity. An action project can result in the enhancement of outdoor habitats or the development of natural sites within the community. It can also lead to improved dialog with a company about how it conducts its operations. For example, a GreenWorks! action project may involve a citizen's association working with a local school in an effort to reduce noise pollution and commercial traffic in residential/school areas.

The goals of an effective action project are to educate people about complex environmental issues and help them make responsible choices. GreenWorks! environmental action projects partner students, educators, and communities in an effort to understand, to respect, and to improve the world around us.

Why Is an Environmental Action Project a Good Idea?

An environmental action project often improves the environment and can have a long-lasting effect on the conservation and management of our natural resources. An environmental action project educates people about environmental issues and challenges them to make responsible choices regarding environmental issues (such as plant, wildlife, and fish habitat; quality of life in our communities; pollution prevention) now and in the future.

An environmental action project provides experiential learning opportunities for students and other participants in a project. Education becomes more meaningful when put in "real world" context. An action project can help students develop a strong environmental ethic and an increased sense of personal worth and competence. Beyond that, students gain a better understanding of their own perspective by examining their positions on a range of issues—from their relationship to the community to their empathy for others. Taking part in an action project that involves more than one group of individuals working together teaches everyone the importance of acting responsibly in our shared environment.

Benefits of a GreenWorks! Action Project

- *Increased cooperation.* GreenWorks! is a partnership among public and private sector educators and natural resource professionals in the PLT network, students and their families, public and private school systems, the diverse membership of community businesses and organizations, and other local participants. Through cooperative project selection and implementation, GreenWorks! not only matches people and resources with specific and immediate community objectives, but also fosters mutual understanding among partners.

- *A model for sustained community environmental action.* GreenWorks! is designed to accommodate different community goals and compositions. Effective partnerships and processes are likely to continue beyond the initial activity.

- *Enhanced understanding of the environment.* GreenWorks! fosters informed action. Students investigate environmental issues and make informed, responsible decisions. The lessons learned about resource conservation often have a profound effect on a student's sense of stewardship for the environment.

- *Improved community environments through effective, innovative actions.* The first step in planning a GreenWorks! action project is to determine the needs of the community. This critical step ensures that the participants carefully consider their proposal before taking action. This approach promotes critical thinking and decision making skills among the participants, helps ensure that a broad range of projects are considered, and sees that the selected activity fulfills the needs of the community.

- *A more effective learning experience.* Students learn by doing in an action project. The experiential learning process involved in carrying out a GreenWorks! action project is adaptable to urban, suburban and rural settings. The learning experience is shared by all participants and often yields the following three very important results: 1) Students gain a deeper conceptual understanding through active learning, 2) the community takes a shared responsibility in the education of its youth, and 3) the environment is improved. GreenWorks! action projects benefit students, the community, and the environment. GreenWorks! is the realization of the notion that we all are active participants in the education of our children.

- *Connects service and learning.* Students learn and develop through active participation in thoughtfully organized service that is integrated into and enhances the curriculum of the students, fosters civic responsibility, and provides time for students to reflect on the service. GreenWorks! supports service-learning by providing opportunities for educators to link community action and academic curriculum requirements. In addition, it can inspire students in those school districts that have instituted community service requirements to complete their required hours by participating in environmentally based activities.

- *Recognizes and encourages diversity.* GreenWorks! action projects are intended to be unique to the communities in which they occur. That community may be an inner-city neighborhood, a suburb, or a rural area. Likewise, participants in the classroom contribute varying cultural perspectives, languages, and special needs. An action project is an effective means of encouraging group participation, providing opportunities for students students to examine how life choices can be made to help create a more caring, connected, and respectful way of living. Everyone can *participate* and *contribute* to an action project, and enhance its final outcome.

The Need to Organize

Getting started on your action project can be a daunting task. From the conception of an idea to the realization of your goal, being organized is the key to success. People, time, money, and resources need to be identified, and good planning and goal setting from the initial stages of your project increase the chances that your GreenWorks! action project will be successful.

Getting students involved from the ground up, with your guidance, will enhance the meaning of the project. Students will learn skills in organization, time management, cooperation, and many other skills that prove to be valuable assets throughout adulthood.

Connecting Service and Learning

To encourage participation in community service and service-learning, some school districts and states have instituted service requirements in public schools. Education leaders have recognized the academic benefits of integrating community service activities into the academic curriculum and national and state standards of learning. Defined as service-learning, this methodology helps students make real world connections to what they learn in the classroom. Districts across the country have also found that requiring students to conduct a defined amount of hours of independent community service provides benefits to both the student and the community. Community service strengthens a student's connection to his/her community by fostering a sense of responsibility, an understanding of good stewardship, and knowledge of citizenship.

Goals and Key Elements of Service-Learning

The National and Community Service Trust Act of 1993 identifies the following five elements of service-learning:

- Students learn and develop through active participation in thoughtfully organized service that is conducted in and meets the needs of a community.
- The service is done in connection with an elementary school, a middle school, a secondary school, institutions of higher education, or community service programs and with the community.
- The service helps foster civic responsibility.
- The service is integrated into and enhances the curriculum of the students.
- Time is set aside for students to reflect on the service.

Service-Learning and the Environment

According to the United States Environmental Protection Agency (EPA), "The goal of environmental education is to increase public awareness and knowledge about environmental issues, and to provide the public with the skills needed to make informed decisions and to take responsible actions. Environmental education enhances critical thinking, problem solving, and effective decision making skills. It also teaches individuals to weigh various sides of an environmental issue to make informed and responsible decisions. Environmental education does not advocate a particular viewpoint or course of action."

This definition of environmental education along with an understanding of service-learning make it clear that the two have much in common. GreenWorks! and Project Learning Tree strongly support the service-learning education reform. GreenWorks! and PLT are based largely on constructivist learning theory and whole language teaching, and use cooperative learning and problem solving strategies—all necessary for high quality service-learning. And like service-learning, GreenWorks! and PLT facilitate learning through problem solving and the exploration of issues—teaching students how to think, not what to think. GreenWorks! action projects help students gain an awareness and understanding of their environment while encouraging responsible decision-making and action. Projects also provide an excellent way to help students connect with their communities and develop citizenship skills.

To learn more about service-learning and community service, visit the web site of the United States Department of Education's National Center for Education Statistics <http:/nces.ed.gov>. The 1999 survey, Service-Learning and Community Service in K-12 Public Schools, can be downloaded from the NCES web site by going to <http://nces.ed.gov/pubsearch>, and searching on the title of the publication.

There are seven steps to completing a GreenWorks! Action Project:

1. Assess the Need in Your Community
2. Connect Service and Learning
3. Get Organized
4. Form Partnerships
5. Implement the Project
6. Get the Word Out—Advertise
7. Follow-up and Evaluate

Step One: Assess The Need In Your Community

A community needs assessment is the first step in a GreenWorks! action project. Together, you and your students can identify the needs in your community and determine which projects should, and can, be done. By assessing the community's needs your students will gain a better understanding of their own perspectives as they evaluate their attitudes toward environmental issues and propose solutions to environmental problems. They will also begin to appreciate that taking action can lead to improving their environment.

Doing a Community Needs Assessment. Using the GreenWorks! community needs assessment materials (*see* Appendix, pp. 19-20) is one way to determine the unique environmental needs of your community, neighborhood, or school site. Areas of environmental concern are organized into eight categories: waste management/household hazardous waste; waterways/water quality; air quality; trees; schoolyards; gardens; greenspaces/parks; highways/roadways; and natural disasters. By using this environmental classification system, problem identification and student discussion is more directed. Based on your group's interests and the results of the assessment questionnaire, your class should be ready to develop a list of potential GreenWorks! action projects.

You could also identify possible action projects by focusing on a subject you are investigating in the classroom. A PLT activity can generate ideas for doing an environmental action project in your school, neighborhood, or community. For example, the Fire Ecology activities in PLT's *The Changing Forest: Forest Ecology* module may lead to a GreenWorks! action project in which students work with a community developer to produce an evacuation plan for their community in the event that a wildfire encroaches on homes along their urban/rural border. (See PLT Resources & Activities Cross Reference List, Appendix, p. 31)

Choosing a Priority. Your group may have many ideas for doing an action project. Deciding which project you'll choose is a matter of evaluating or assessing your priorities. Items to consider include

- value to the community
- educational benefits
- level of interest
- feasibility (cost, sponsorship, technical capabilities, resources)

To select a priority project, ask your class to consider questions such as

1. Which idea might be the most feasible?
2. Which idea do we like the best on a scale of one (low) to five (high)?
3. Which idea has the potential to improve the environment the most?
   - What will those benefits be?
   - What types of resources do we need?
   - Can we afford it?
4. Which idea might help us learn the most?

Once these questions have been discussed, have students reach a consensus for selecting the project that meets your priorities and resources.

Suggestions for Getting Students' Ideas on Paper

Grades K-6: The teacher can record ideas from group brainstorming sessions on the blackboard or on overhead. Together, students and the teacher can propose solutions to the identified problem area.

Grades 7-12: Students can work together in small groups to formalize specific ideas from a classroom brainstorming session. Using the Interest and Awareness Chart on p. 19, students can identify problems, rate their level of interest in the subject, analyze what is being done to address the problem area, and propose solutions to the problem.

Step Two: Connect Service and Learning

Many of the activities in the Project Learning Tree secondary modules may be used as the basis of GreenWorks! action projects and provide connections between the classroom and community action. For example, in the *Introductory Handbook for the Secondary Modules*, "Watch on Wetlands" helps students learn about wetlands, land-use decisions, and legislation. It also provides guidance on conducting a wetland assessment and adopting a wetland. In that same module, "Waste Watchers" focuses on energy, providing suggestions for working with local utility companies and conducting audits for your home, school, and neighborhood. In *The Changing Forest: Forest Ecology* module, activities provide guidance on adopting a forest, assessing forestlands, and working with foresters, botanical gardens, zoos, nurseries, greenhouses, and natural resource departments. The *Exploring Environmental Issues: Municipal Solid Waste* module provides background and activity ideas for a school waste audit, compost pile, and source reduction plan. And the *Exploring Environmental Issues: Focus on Risk* module encourages students to explore risks within the community and makes suggestions for taking action to reduce those risks.

You may choose to implement your community action project as part of your classroom activities, integrating community action and service-learning. For example, to support the required academic curriculum and meet required standards, your science class might develop a schoolyard habitat for local wildlife or a recycling program for the school or community. Your chemistry class might perform water testing for the local environmental health department. Or your art class could design posters and fliers as part of a public education campaign. One benefit to this approach is that students immediately see real uses for what they learn in the classroom. As an alternative or enhancement to participating during class when school is in session, your students may apply their understanding outside of class, with you providing classroom learning in support of the activity. An example of this might be a home energy audit as a practical application for a physics lesson on thermodynamics.

In some districts, students are required to complete a specified number of community service hours independently and outside of class time. Integrating environmental education in the classroom through PLT, GreenWorks!, and other programs can help students recognize possibilities for working on behalf of the environment as they complete these community service hours. In many cases, community service also provides students with valuable career insights.

Step Three: Get Organized

Now that you and your class have selected what your environmental action project is going to be, it's time to get organized and develop an action plan. It is essential to involve your students in the planning process. They will need to work together to set goals and decide who's going to do what. As a result, from the start of the project to its conclusion, your students will have a sense of shared responsibility and ownership in accomplishing their GreenWorks! environmental action project.

In developing an action plan, you and your students should discuss and record plans for carrying out the project. The use of a planning worksheet (see Action Planning Worksheet, Appendix pp. 22) will help you and your students to be organized and stay focused on your goals and objectives while formalizing a thorough plan of action. Your action plan should

- **Set Goals**
- **Establish Timelines**
- **Delegate Tasks**
- **Get Upper-Level Support**
- **Develop a List of Possible Sponsors**
- **Advertise—Promote the Project**
- **Develop a Budget**
- **Raise Funds**

Set Goals. Help your students get started by asking, "What do you hope you'll accomplish by doing this project?" After students share their answers, guide them to come up with goals and specific, concrete objectives they will need to accomplish along the way.

Establish Timelines and Delegate Tasks. Have your students list the tasks that need to be accomplished to meet each objective. Next, work with them to identify a tentative completion date for each task and decide who is going to do what.

Get Upper-Level Support. This step may be best done by you, the teacher or leader of the project. You'll need to inform the appropriate people (principal, director, supervisor, etc.) of your plans. Try not to surprise anyone. Share your ideas, ask for feedback, and gain their support. You want as many people on your side, enthusiastically supporting you and your group's effort in carrying out your environmental action plan.

Develop a List of Possible Sponsors. With your students, write down the names of people and organizations that may be able to provide useful information, technical assistance, or resources as you carry out your action plan. Don't forget to in-

clude local government officials, as they serve the public, and will want to lend their support as well. (See List of Possible Partners, page 12.)

Advertise—Promote the Project. You and your group should think of ways to share and promote your GreenWorks! action project. People in your community will be interested in learning about your project and may want to help you in your efforts. Television, radio, and newspaper reporters love to cover stories of young people taking action in the community, and a GreenWorks! action project has all the elements of attracting interest, because *those* young people are enhancing and improving their surroundings. Here are some ideas for expanding your reach. (See also, Get the Word Out--Advertise, p. 13; and Media Coverage Samples, Appendices, pp. 27-29)

- *Public Service Announcements (PSAs)*
- *News releases in local newspapers*
- *Donated or sponsored advertising space in local newspapers and magazines*
- *Media coverage by newspapers, radio, and television stations*
- *Media sponsorship by a radio station, television, or cable station*
- *Posters and/or flyers distributed around town to local businesses*
- *Mayor's Proclamation*

Develop a Budget. Your group needs to consider the financial resources that will be needed to carry out their action project. Be realistic in your assessment of what it will take to make your project a success. Keep in mind that as your project takes shape, and you establish partnerships, you will most likely need to revise your budget. A proposed budget often looks very different from the actual expenditure of costs when the project is completed. In revising the budget, keep precise records of the anticipated and actual costs of your project. Detailed records can provide a history to help in planning future projects. (See Sample Budget Worksheet, Appendices, pp. 22)

Raise Funds. A GreenWorks! action project can require hours of hard, physical work toward reaching the project's goal. In some cases, your action project may require funds to buy materials or resources in order to meet your goal. Partnerships are an important element of GreenWorks! action projects, and establishing a partnership may be the solution to your financial and resource needs. (See Step Four: Forming Partnerships, page 11)

Also, be sure to consider other alternatives for financial assistance.

- Contact national PLT and submit a PLT GreenWorks! grant proposal.
- Plan a fund-raising drive and/or seek grant opportunities.
- Talk to your PLT state coordinator and ask about state funding possibilities.
- Go to your local library or college library and consult the Environmental Grantmaking Foundations' Directory for a listing of organizations that have an interest in funding environmental projects. There are many groups and individuals who are interested in supporting environmental action projects, and we suggest you research your options at both the national and local level.

GreenWorks! In Action—A Fishing Derby!

Seventh grade students at Summit Hill School in Frankfort, Illinois decided immediate attention was needed to keep an on-going conservation program alive in their community. State officials estimate that Illinois has lost more than 90 percent of its wetlands to commercial and residential development. In an effort to preserve and enhance a wetlands area near their school, which serves as a study site, students joined forces with local groups to take action. They decided to hold a fishing derby to raise funds to meet their conservation goal. This one-day catch and release event was an enormous success. The money they raised went towards equipment to support the school's hands-on projects at the Island Prairie Park (for example, monitoring water quality, restoring and preserving wetland plants and the fish population). This GreenWorks! action project was a combined effort of the Summit Hill Wetlands Team, the Frankfort area Jaycees, the Frankfort Square Park District, national PLT, and Ed Shirley Sports in Frankfort.

Step Four: Form Partnerships

One requirement of every GreenWorks! action project is to forge a link or partnership between the students and the community in an effort to educate communities about environmental issues and involve them in environmentally focused projects. A GreenWorks! action project is a community effort.

Why Partner? There are many rewards in developing successful partnerships. Students will benefit from sharing the load of implementing an action project, and engaging partners in the project often contributes to improving the end results. Partners may lend technical support, expertise, resources, and/or financial assistance to help meet the project's goal. Students have a chance to be active community members and learn citizenship skills. Most of all, a community's reward in a successful community-school partnership is the end result—an improved environment. GreenWorks! partnerships benefit all who work together to solve problems by participating in successful environmental action projects.

List of Possible Partners. The list of potential partnerships is endless. Use your creativity, ingenuity, and resourcefulness to identify potential partners in your community and state—even at the national level. Here is a list of possible partners

- Philanthropic organizations
- Non-profit organizations and foundations
- Businesses (big and small)
- Chamber of Commerce and Jaycees
- Governments (local, state, national)
- State departments of forestry, natural resources, conservation, etc.
- Law enforcement groups
- Departments of Public Works
- Service clubs: Lions Club, Elks, AmeriCorp, etc.
- Neighborhood and other civic associations
- Youth groups: Boy Scouts, Girl Scouts, 4H, etc.
- Senior citizen organizations
- Trade and professional associations
- Educational organizations and associations
- Universities, trade schools, community colleges
- Labor unions
- Environmental organizations
- Television networks and radio stations

Considerations in Choosing a Partner. The partners you choose to support your community action project will depend on the nature of your project and its particular needs. For example, if you and your class are interested in coordinating a recycling program, you'll want to consider contacting a local sanitation contracting company, or a recycling plant. If your action project is focused on beautifying an inner-city park, you may want to contact your local department of parks and recreation, a landscaping company, a horticultural society, or a philanthropic organization that has an interest in providing more greenspaces in urban areas.

You'll also want to consider the type of resources partners can contribute to your project. For example, you may need a partner who will give technical guidance on the project, or perhaps your needs are purely financial. Or you may look for a partner who can give you needed in-kind services or goods. For example, a local printing company may donate their services to print brochures or educational materials.

Finally, don't overlook organizations or groups that already support your school or have a link to the school. A GreenWorks! action project may find support by partnering with area schools, service clubs, or youth groups. For example, a high school industrialization class could build and donate bird feeders to an elementary school's GreenWorks! action project of building an outdoor classroom. A Girl Scout troop could work with a class on a project to organize a community tree inventory. Be creative. There are lots of potential partners who can help make your project a success.

GreenWorks! In Action—Creative and Innovative Partnerships!

In Jackson, Mississippi four area schools joined forces with the Mississippi Department of Forestry, Mississippi PLT, the federal Bureau of Land Management, Jackson Jaycees, the PTA/PTO, the Jackson Garden Club, the Plant-A-Tree Foundation, and a Jackson area hardware store to provide more greenspaces and recondition playgrounds at school sites.

In Santa Fe, New Mexico local schools, the City of Santa Fe, the New Mexico Forestry and Resources Conservation Division, New Mexico PLT, and the Governor joined forces to sponsor a GreenWorks! 5k run and **1** mile walk. The "Governor's Run For Trees" was a one-day event to call attention to New Mexico's Arbor Day and the importance of trees.

How to Approach a Potential Partner. It' s important to provide a potential partner with a clear idea of what your project is, what your goals are, and what your purpose is in gaining their support. You'll need to be clear and precise in expressing your needs. You also need to be persistent in your efforts and flexible about the outcome of your request. We also suggest you include your students in the process as much as possible. We suggest the following steps when approaching a potential partner.

1. Write a letter, attaching a copy of your action plan
2. Schedule a meeting
3. Meet with the organization
4. Follow-up by telephone, and send a letter of thanks

Suggestions

1. Who to contact. When you write a letter to a small organization or business, direct your correspondence to the CEO, president, or senior officer. For a large organization or business, direct your letter to the director of public or community affairs. Your local chamber of commerce will be able to assist you in identifying the appropriate individual for local businesses in your area.

2. **What to include in your letter.** State the goal(s) of your project, your needs, and what type of assistance/support you are seeking. Also state that you will follow-up by telephone in order to schedule a meeting. Attach a copy of your action plan with timelines, and budget.

3. **Telephone follow-up.** Shortly after you've sent the letter, contact the organization by phone. Ask to speak with the person you wrote to or with that person's secretary, or administrative assistant. Ask to schedule a meeting (30 minutes should be sufficient) to discuss your action project.

4. **Who goes to the meeting?** You should attend the meeting, and we suggest you bring one or two of your students as well. The meeting will provide an interesting educational experience for the students and the partner alike. It will be much more meaningful for the potential partner to meet the kids who will be using the resources the company is being asked to provide.

5. **What happens after the meeting?** After you've met with the potential partner, you should have an indication if they are interested in supporting your action project, or not. If they are, great! Write a letter of thanks and confirm what they have committed to by specifying how they will be involved in the project. If after your meeting you are uncertain if they are interested in supporting your project, write a letter of thanks and tell them that you will call them to discuss their interest in the project. If you are quite certain that the partnership is not going to take place, write a letter thanking them for the time they took to meet with you.

6. **Being persistent and flexible are valuable aspects in the process of securing a partnership.** Many times, people are busy and have other pressing commitments. They just may not have the time or resources to deal with your request at the time you approach them. Don't be discouraged. Be patient and try again later. And be flexible in your request for their assistance. Remember, your partner organization has its own goals and objectives for establishing a relationship with you. Many GreenWorks! action projects have multiple partners and sponsors, and each relationship is unique. To be successful, you'll need to figure out what works best in each situation.

Step Five: Implement the Project

A GreenWorks! action project takes careful planning, organization, dedication, and hard work along each step of the way. Now that you've formed partnerships, it's a good time to take a look at your action plan again, and make any needed revisions. Perhaps nothing needs to be altered. That is fine. Chances are, though, some changes may be needed to accommodate the addition of partners to your project. You may need to re-delegate tasks, alter timelines, and revise your budget. It's also important to determine if you need to advertise and get the word out about your project before its implementation. By revising and reexamining your action plan periodically, you can stay on-track and maintain an accurate and precise record of your progress.

Once you begin to work and implement your plans to improve the environment, keep an accurate account of your progress and record any difficulties you encounter as well as your successes along the way. Keep a journal, take pictures, and record students' reactions. It's important to catalog your project, as your records will provide valuable information when planning your next environmental action project.

You can read about other GreenWorks! action projects in Part Four of this guide and learn how others made a difference in their communities.

Step Six: Get the Word Out—Advertise

Communicating with others about your GreenWorks! action project is important in all steps in the process. In addition to communicating with partners and others directly involved in the project, you'll want to promote your activities and share your excitement with the broader community. This may happen at various stages in the process, depending on your project. For example, if your project is a one-day event designed to engage the whole community, you'll need to promote your event prior to its implementation. And you'll want to publicize your project—including the good work of your students and partners and the benefits to the community—once it is completed.

Your action plan is a good starting point for writing a press release, and therefore getting coverage for your GreenWorks! action project. (See Media Coverage, Appendices, pp.27-28)

How to get press coverage for GreenWorks! action projects.

- Include the news media and local public officials such as the mayor, the police chief, and city council members in your GreenWorks! action projects.
- Invite state conservation and/or environmental officials to meet and speak with your group, including your partners, and get their endorsement of your project.

- Arrange speaking engagements for the state program manager and/or the state PLT coordinator to promote your GreenWorks! action project.

If you choose a project that is a one-day event (e.g., a stream or roadside clean-up day), and you would like to encourage community-wide participation, you may find that PSAs, news releases, posters, flyers, and media coverage are your most effective methods of promotion. (See Media Coverage, Appendices, pp. 27-29)

On the other hand, if your group chose an on-going project such as a tree inventory, which could include presenting the results of the inventory to the town council as well as tree plantings and regular tree maintenance, you may find it more advantageous to keep the media informed of your long-range plans, but include them only in special events associated with your project. Invite them to attend the kick-off of your tree inventory, to cover your city council report, to participate in your tree planting activities, and to come with you as you perform long-term maintenance.

Regardless of your project, it's important to analyze the particular promotional needs of each GreenWorks! action project and customize your media plan to meet those needs.

Step Seven: Follow up and Evaluate

Is your action plan working? Have you met your goals? How have your efforts improved the environment? How have your students' experiences enhanced their understanding of the environment? How have classroom activities enhanced your students' learning experience—connecting academic learning to their community experience? Take the time to evaluate effectiveness of your GreenWorks! action project and thank all the people who have worked to make your action project a success. As with all of the other steps in the process, it's important to get the students involved in these final tasks.

Learning Students to Learn from Their Work Ask your students to look at their action plan again and assess the project's success. Give them time to reflect on their experience and discuss how their project has impacted the community, their awareness of the environment, and their overall educational experience. It's also important for students to consider their feelings about the project. Was this an enjoyable experience or not? Which aspects of the action project motivated them and which did not?

Sample Questions to Assess Your Project:

1. *What was the goal of your project? What were its objectives?*
2. *Did you accomplish your goals and objectives? Explain. (Be sure to describe the project's accomplishments, even if they weren't part of the original objectives.)*
3. *What was the most successful part of your project? What was the least successful part?*
4. *Who was influenced or motivated by your actions? Who might those people, in turn, now influence?*
5. *If you repeated the project, what, if anything, would you do differently?*
6. *How do you feel about your involvement in the project?*
7. *Have your feelings and opinions about the issue you worked on changed since you began the project?*
8. *What did you learn during this project that you'll be able to apply to other situations?*
9. *Would you get involved in another environmental action project? Why or why not?*
10. *What advice would you give to other students who are planning an action project?*
11. *Do you think it's important for citizens to volunteer for community service? Why or why not?*

(Adapted from Project WILD, Taking Action)

Thank Your Sponsors, Supporters and Partners Be sure to send letters of thanks to all of your sponsors, supporters, and partners. It took many hands to make your GreenWorks! action project a success, and you'll want to thank everyone who donated time, resources, money, manpower or moral encouragement.

You may want to consider awarding a "Certificate of Thanks" to your supporters and presenting the awards at a benefit/reception honoring those individuals and partners. We recommend that you use student artwork, comments, or pictures and customize your certificate to reflect your project, as this always means so much more to those who have given support.

Reporting to National PLT Let national PLT know how your project turned out. PLT wants to hear about how your efforts have paid off, what students have learned, and which PLT activities were useful in making your GreenWorks! action project a rewarding educational experience. Sharing what worked and didn't work helps others who are interested in doing an action project. (See GreenWorks! Project Report Forms, Appendices pp. 25-26)

National PLT can serve as a vehicle for getting information to others. PLT may do a story about your action project in its twice yearly newsletter, *The Branch*, or may ask you to present your project at a conference. Information about your GreenWorks! action project can be shared with others through PLT's web page. Remember to report back to national PLT, and let others share in the celebration of your hard-earned success.

The GreenWorks! action projects included in this section are samples from a list of hundreds of the many outstanding GreenWorks! action projects completed. The results of each action project exemplify strong and lasting contributions to improving the environment. The first example gives a detailed look at a model GreenWorks! action project that used schoolyard beautification as its goal. The other model project examples illustrate different types of project ideas that you might want to consider, but remember there are endless possibilities.

Ball's Bluff Elementary School Outdoor Classroom

PLT-trained teacher and facilitator, and special education teacher Karen Blodgett wanted to develop the courtyards at Balls Bluff Elementary School in Loudoun County, Virginia into outdoor classrooms and nature gardens. Included in the gardens would be a butterfly garden area, bird feeders, a birdbath, and a variety of plants, shrubs, and flowers. Ms. Blodgett's kindergarten through 5th grade students took action and got to work. They dug holes, planted a variety of plants, and developed various habitats for study and enjoyment.

Ms. Blodgett submitted a grant proposal and was awarded a GreenWorks! grant from national PLT to carry out their GreenWorks! action project. This GreenWorks! action project partnered local businesses, a local vocational technical school, the Parent Teacher Organization, and volunteers from the community. Overbrook Nursery in Round Hill, Virginia provided technical assistance and materials. The county Vocational Technical Center made the picnic tables and benches. Teachers, students and volunteers worked hard to enhance and beautify their school community, and all who participated in the project found it a rewarding and fun experience.

CNN covered Ball's Bluff GreenWorks! action project on the news and on the CNN Web Site during Earth Day. This media coverage placed Loudoun County Schools on the international

Top and center: courtyard at Balls Bluff, before and after. Above: Karen Blodgett's students.

scene. It also contributed to expanding the pool of volunteers that participated in the project.

Sample GreenWorks! Action Projects

Outdoor Classroom

- Students at Union Elementary School in Zionsville, Indiana built an outdoor nature laboratory. The outdoor shelter was also enhanced by a butterfly garden, vegetable garden, and nesting and feeding stations for birds. **Project Partners: Union Dad's Club, Union Elementary PTO, Beaver Materials, ABC Roofing, Woods Edge Greenhouse, and Altum Gardens.**

- Dennis Mitchell's eighth grade science class at Evergreen Middle School in Cottonwood, California converted a retired school bus into a greenhouse. The students are using the greenhouse as a learning laboratory and also to raise plants for landscaping the school campus. **Project Partners: Moss Lumber, Local Paint Stores, Art Academy, Sierra Pacific Industries, and Ameri-Corp.**

Horticulture

- Fifth graders from The Gordon Georgia Youth Science & Technology Center, along with a local high school horticulture class in Barnesville, Georgia, planted a garden at a local history museum. The students researched many types of shrubbery in order to find plants that had historical ties to the area and the entire state of Georgia. **Project Partners: The Museum and The Science Center.**

- Third graders at Soldotna Elementary School in Soldotna, Alaska developed an ongoing project to improve their school grounds. Students grew wildflower and perennial gardens for beautification purposes. They also created a vegetable garden, which was the culmination project for studying the history of Soldotna and the early pioneers. **Project Partners: Trustworthy Hardware.**

- Art students at Columbus Junior High School in Columbus, Texas created the Cardinal Art Garden on their school grounds. The art garden included birdfeeders and a birdbath, a painting of flowers, a bench, and plants and additional shrubbery. **Project Partners: Jones Seed Co., CJHS Council, Audubon Park Co., EON Industries Inc., HEB, Vivian Ellis, Charlie Janak, and Colorado Valley Bank.**

- Students at Blackshear Elementary School decided to create a neighborhood garden on the vacant lot located directly across from their school grounds. They identified the owner of the lot, convinced him to donate the lot to the school, and began working with undergraduate agriculture students at Texas A&M to develop a beautiful vegetable and small scrub garden. The students, their parents, and the community maintain the garden as well as harvest the produce from the garden. **Project Partners: Blackshear PTO, Texas A&M, Nature Heritage Society, Bank of Houston, and City of Houston Planning.**

Construction

- The Liberty Union-Thurston Middle School eighth grade science classes in Baltimore, Ohio constructed a 90-foot observation deck across the wetlands at the school's 60-acre land lab facility. The observation deck allows students to take water samples, observe animal life, and conduct other experiments with more ease. **Project Partners: The Basil Garden Club, The Lions Club, and Take Pride in Ohio.**

Recycling

- Students at the John F. Kennedy Learning Center in Dallas, Texas began a paper and plastic bag-recycling program. In one year alone, the school recycled 14.5 tons of paper, saving 54,000 pounds of lumber, 345,000 gallons of water, and 44.37 cubic yards of landfill space. **Project Partners: Students and Faculty.**

Earth Day Project

- Morrow County second graders in Mt. Gilead, Ohio participated in an Earth Day activity entitled "Earth Day at the Park." The students planted a dogwood tree, attended four learning sessions, explored fifteen different learning stations, and took part in a hike/litter pick-up. The activities were planned in accordance with the second grade science curriculum. **Project Partners: The Ohio Bird Sanctuary, Morrow Environmental Educators Committee (SWCD,**

Appendices

Community Needs Assessment Worksheet

Interest and Awareness

	Environmental Concern	Level of Group Interest 1(low) to 5(high)	Awareness of Existing Community Efforts	What Can We Do?
Waste Management/ Household Hazardous Waste				
Waterways/ Water Quality				
Air Quality				
Trees				
Schoolyards				
Greenspaces/Parks				
Highways/Roadways				
Natural Disasters				

Community Needs Assessment Questionnaire

Waste Management/ Household Hazardous Waste

- Does your community have a recycling program? Who manages it? What type of recycling is done there (plastics, tin, aluminum, paper, glass, motor oil, batteries, grass clippings, Christmas trees, etc.)?
- Does your community have a composting program?
- Does your community know where to find information about proper disposal of household hazardous waste products (e.g., cleaning solvents and solutions, batteries, paint, turpentine, fingernail polish and remover, bleach, pesticides, fertilizer, motor oil, etc.)?
- Does your community have collection centers for household hazardous waste?
- Does your community have a public education program to teach residents about household chemicals and hazardous waste (public service announcements, workshops, flyers, advertisements, etc.)?

Waterways/Water Quality

- Has your community experienced either a long- or short-term water quality or quantity problem?
- Has your community experienced use restrictions based on water quality or quantity?
- Has your community conducted water quality tests recently?
- Do you know the source of your community drinking water?

Air Quality

- Who is in charge of air quality in your community?
- Does your community have air/ozone alert days?
- Do you know what the emissions standard is for your community?
- Where can members of your community go to have the air quality tested in homes, office buildings, and schools?
- Is there a radon-testing program in your community?
- Is firewood, leaf, and trash burning regulated in your community?

Trees

- Is there an on-going tree planting program in your community?
- Is there an overall community plan for the care and maintenance of your city's trees?
- Who is responsible for caring for the trees in your community?
- Are there areas in your community that would benefit from a tree planting?
- Are there areas in your community where existing trees are in need of care and maintenance?
- Is there a volunteer tree advisory board in your community?

Schoolyards

- Are your community schoolyards landscaped?
- Do your schools have outdoor classrooms or schoolyard habitats?
- Who is responsible for schoolyard maintenance during the school year? During the summer?
- Does your community have a schoolyard vandalism problem?
- Is your community permitted to use the schoolyard for public activities?
- Does your school use the grounds for hands-on outdoor education activities?
- Does your school have an environmental club for students?
- Does your school have plants, trees, bird feeders, etc., on the grounds?
- Does your school subscribe to environmental and science magazines and periodicals for the student library?

Greenspaces/Parks

- Do you have greenspaces, parks, or town forests in your community?
- Who is responsible for caring for the greenspaces and parks in your community?
- Does your community have a long-range plan for selecting locations for greenspaces and parks?
- Does your community encourage the use of greenspaces and parks by all civic groups of all ages?
- Does your community have programs where gardening plots are made available for community use?
- What might prevent people from using a community park?

Highways

- Do you know who is responsible for trash removal and landscaping of your highways and roadsides?
- Do people in your community use side roads and secondary roads as dumpsites?
- Does your community plant trees, shrubs, and wildflowers for sound barriers, snow or wind breaks, or to replace high maintenance mowing on roadsides?
- How does your community control erosion on highways and roadsides?
- Does your community or state sponsor an "Adopt-A-Highway" program?
- What might prevent people from using a community park?

Natural Disasters

- Has your community suffered consequences of a natural disaster?
- Are there ways in which you might establish community relief programs or assist with on-going relief efforts?
- Are there groups in your community that might require extra relief or restoration efforts (e.g., senior citizen homes, community shelters, etc.)?

Potential Action Projects

Based upon the group's interests and the results of the assessment questionnaire, your group should now be ready to develop a list of potential GreenWorks! action projects that would benefit the environment of your community. Use the space below to formulate your list of ideas.

1. _____

2. _____

3. _____

4. _____

5. _____

Project Notes:

Action Planning Worksheet

1. What environmental problem will your project focus on?

2. What is the goal of your project and your strategy to accomplish this goal?

3. What are the specific objectives that will help you reach your overall goal?

Objectives

1.

2.

3.

4. How will you connect your community service project to classroom activities (service-learning)?

5. What are the approximate starting and ending dates of your project?

6. List the tasks that need to be accomplished to meet each objective. Include a tentative completion date for each task, the names of people responsible, the supplies and equipment needed, any funding needed, and ideas about where you might get materials and funding.

Tasks	Person Responsible	Supplies/Equipment	Funding	Completion Date
1.				
2.				
3.				

7. Write the names of people and organizations that may be able to provide you with useful information, specific skills, expertise, or other help.

8. List ideas for how to publicize and generate support for your project.

9. Describe how you will measure your success.

Sample Budget for Bird & Butterfly Garden (1/4 Acre)

Items	Grant Funds Needed	Match/In-Kind Funds
Top Soil		PTO ($500)
Plants & Grasses	$200	
Trees		Local Nursery ($250)
Shrubs	$300	
Design/Research		Students & Volunteers
Landscape Consultant		Local Firm
Bird Bath		Local Bank ($150)
Rototiller		Loan from Student's Family
Mulch		Local Nursery ($250)
Birdhouse		Built & Donated by G.S. Troop ($30)
Bench		Designed & Built by School Art Club ($300)
Site Preparation & Maintenance		Students, Parents, Volunteers ($1,500)
TOTALS	$500	$2,980

Sample Letter Seeking a Sponsor/Partner

(DATE)

Ms. Alice Adams, President
Rock Creek Lumber Center
Anywhere, ST 12345

Dear Ms. Adams:

I am writing to invite the Rock Creek Lumber Center to become a sponsor of our GreenWorks! community gardening project.* The project is designed to build community partnerships that will work toward extending educational experiences for students and their partners by involving them in environmentally focused projects. We believe that a community working together to improve the environment provides a powerful experience for all.

This GreenWorks! community garden project will bring together the children from Austen School and the residents and members of Shelley Senior Center to create a year-round flower and vegetable garden in the vacant lot between their two buildings. The children and the senior citizens will plan, plant, maintain, and harvest the vegetables and flowers grown there. The project will introduce the students to horticulture and community involvement, while providing seniors with the opportunity to garden and enjoy the company of young children.

We have received a contribution of flower and vegetable seeds from the Alban Garden Center, and we have been offered gardening equipment from Hay's Hardware. We hope that Rock Creek Lumber will be able to donate some lumber for the boundaries and dividers of the various plots. I expect we will need no more than 500 board feet of 4x4 timbers.

I will call your office next week to arrange an appointment to meet with you. If you would like to speak with me before then, I can be reached at my office; my telephone number is (xxx) xxx-xxxx.

Thank you for your time and consideration.

Sincerely,

(NAME)
(TITLE)

*GreenWorks! is an environmental action and service-learning program of the American Forest Foundation's Project Learning Tree (PLT).

Guidelines for Completing the GreenWorks! Project Report

Following is a list of guidelines pertinent to completing your GreenWorks! *Project Report.* Please adhere to all the points when submitting your report. Failure to submit a report may void the contract and your entire grant must be refunded to the PLT national office within 30 days.

Note: These funds must be used for educational projects. The funds can not be used to lobby or urge support for or against legislation, whether local, state or national.

1) Completed reports (including all sections and appendices) should be submitted to the PLT program manager at the PLT national office **postmarked one year from date on your grant award letter.**

2) Please submit your report in original, **hardcopy** format **only**. **No** e-mail or faxes will be accepted.

3) The narrative portions of the report should be complete and as detailed as possible.

4) The financial report must include itemized expenses by category and include all in-kind contributions provided to the project.

5) Please document and provide back-up (news clipping, photos, slides, action press releases) for any publicity you receive as a result of this grant and your project. One GreenWorks! action project was featured on CNN's Earth Day 1997 coverage. We use a variety of publicity venues, including our PLT Web site, to showcase community GreenWorks! action projects throughout the country.

6) If you have any difficulty fulfilling any portion of your GreenWorks! Project Report please contact the GreenWorks! program manager at 202/463-2462.

GreenWorks! Project Report

Return to:
GreenWorks! Program Manager
Project Learning Tree
1111 19th St., NW #780
Washington, DC 20036

Name of Project: _____

Date of Grant Awarded: Month_____ Year_____

Name of School/Organization: _____

Contact Person: _____ Phone: ( ) _____

Address:_____Zip: _____

I. PROJECT ACCOMPLISHMENTS: Please provide a detailed narrative of project activities funded by the GreenWorks! grant, project accomplishments, and the value to your organization and to the community. In responding, please pay special attention to the following questions:

- What parts of the project have been successful?
- What parts of the project are proving particularly difficult?
- In what ways is the project turning out to be different from the proposed project?

II. FINANCIAL REPORT: What were you able to do with the GreenWorks! grant funds that you would not otherwise have been able to do?

- Please enclose a record of itemized expenses for the funded project.
- Have you completed the project? If no, what is likely to be the source of future support.

III. GUIDANCE TO OTHERS: If another school or community wanted to undertake a similar project, what advice would you give them? What skills, resources, community conditions, or project ingredients are needed to make this project work best?

IV. PUBLIC ANNOUNCEMENT: Please attach copies of any public announcements of your project (e.g. newspaper articles, newsletter, photos, etc.).

Sample News Release

To send a news release to newspapers, type the information on plain, white 8-1/2 x 11 inch paper, double-spaced, using upper and lower case lettering. Include who, what, when, where, how and why. Provide them with as much information as possible because they may edit your text. Provide them with contact information so they can check your information or refer inquiries to you.

FOR IMMEDIATE RELEASE (or specify release date)
CONTACT(name)
(telephone)

(Partner's Name) TEAMS UP WITH (Your School/Organization) TO SPONSOR
(Name of Your Project)

(City) Students of (name) Middle School and the (name) Senior Center will work together to develop an urban gardening program. This project is part of GreenWorks!, an environmental education and community action program of the American Forest Foundation's Project Learning Tree (PLT®). PLT educators and their students survey the environmental needs of their area and design action projects. GreenWorks! action projects offer opportunities for people of all ages to work together to enhance their surroundings and share in the rewards of an improved environment.

GreenWorks! encourages community environmental action by developing partnerships and coalitions among various local groups. This urban gardening project pairs teenagers with senior citizens to design, plant, maintain, and harvest a vegetable and flower garden.

GreenWorks! has received financial support from Phillips Petroleum Company and the National Fish and Wildlife Foundation. This urban garden is being sponsored by the (name) Seed and Garden Center, with additional support from the (name) Lumber Yard.

Project Learning Tree is an award-winning international environmental education program that focuses on teaching children how—not what—to think about complex environmental issues.

Sample Public Service Announcement

Typically, PSAs intended for broadcast on radio or television should be not longer than 10 or 15 seconds. Some stations prefer the PSAs to be neatly typed on plain, white 8-1/2 x 11 inch paper; some prefer them to be typed on 3 x 5 index cards. Be sure to check with your stations to find out which format they prefer. Be sure to include chapter name, PLT affiliation, project description, date, time, location, and contact name and telephone number. Send four to six weeks prior to the project's implementation.

Sample Public Service Announcement (PSA)

GreenWorks!

Join the teachers and students from Project Learning Tree in (project name/brief description) on (date) at (place) from (time) to (time). **GreenWorks!** —young people and adults working to improve our community's environment.

GreenWorks!

The (partnering group), along with youth organizations from Project Learning Tree, will be (doing what) to help improve the environment of (community name). Join them at (location) on (date) from (time) to (time). **GreenWorks!** —you can help make it happen.

Sample Proclamation

A proclamation from the mayor or other local official can generate a lot of interest in the overall GreenWorks! program. Good publicity about GreenWorks!, your school/organization and PLT can generate opportunities for new sponsors and new alliances on future projects.

To secure the support of the mayor, you need to meet with her/him and introduce them to GreenWorks! It might be a good idea to discuss potential projects with the mayor and seek advice on which to select and the timing. The mayor also might be able to put you in contact with other organizations that might provide human and financial resources for the project.

Once you have the mayor's support for GreenWorks!, ask her/him to issue a proclamation declaring a GreenWorks! day or week. If the mayor is agreeable, have the proclamation professionally designed. For best results, print the proclamation on high-quality paper, suitable for framing.

When you arrange the appointment with your mayor to present your proclamation, ask permission to invite the media. Also, let the mayor know you will be bringing members of your partnering organization(s) and PLT to take part in the project. Once you have an appointment with the mayor, contact all the newspapers, radio stations, and television stations in your area. Send each a letter and press release at least two weeks in advance and follow up all correspondence with telephone calls. Use the phone conversation to verify that the right person received the letter, then remind the person of the time, date, and location of the presentation of the proclamation, and ask if they need additional information or assistance. Invite reporters to bring along a photographer.

Be sure to keep members (partners, national PLT) of your project well informed. They can help with plans to gain as much media coverage as possible with this important GreenWorks! action project.

Proclamation

WHEREAS the key to a healthy environment lies in informed action, and

WHEREAS joint concern and action is a proven method of resolving a community's problems, and

WHEREAS GreenWorks! offers young people and adults an opportunity to work together, providing a constructive means of addressing community needs, and

WHEREAS the (school/organization) and Project Learning Tree have come together to form this unique partnership to educate and involve communities in environmental issues and projects,

THEREFORE, I hereby proclaim (date) as **"GreenWorks! Day"**

in the city of Anytown, Anystate

and I call upon the citizens of our city to join with millions of Americans in helping to conserve the environment for generations to come.

Date this (date) day of (month), (year)

(Signed) _____

Project Learning Tree is an award-winning environmental education program designed for teachers and other educators working with students in pre-K through grade 12. PLT is a comprehensive environmental education curriculum. PLT is not just about trees. It's about the total environment: land, air, water, and wildlife. It is local, national and global in scope.

PLT can be applied in many different contexts. PLT can be used in formal education settings, with youth organizations, or by parents with their children. It appeals to the broadest range of young people—children of all ages, learning styles, and ethnic and racial backgrounds.

The activities selected below are just a sampling of the many hands-on, interdisciplinary PLT activities that lend themselves to generating ideas for GreenWorks! action projects.

PLT Environmental Education PreK – 8 Activity Guide

Activity # and Title

21. Adopt a Tree
31. Plant a Tree
32. A Forest of Many Uses
34. Who Works in This Forest?
36. Pollution Search
47. Are Vacant Lots Vacant?
55. Planning the Idea Community
57. Democracy in Action
58. There Ought to Be a Law
68. Name That Tree
71. Watch on Wetlands
83. Reduce, Reuse, Recycle
96. Improve Your Place

PLT Secondary Environmental Education Program

Exploring Environmental Issues: Focus on Forests

This module uses the forest as a "window" into the natural environment, while it helps students gain an awareness and knowledge of the world around them and of their place within it.

Activity # and Title

1. What's a Forest to You?
3. Tough Choices
5. Balancing America's Forests
8. Take Action!

The Changing Forest: Forest Ecology

The activities in this module are designed to encourage students to explore and learn about forest ecosystems through hands-on discovery and experimentation. Their investigations will help them appreciate the diversity of life in forests, understand the interdependencies of such forest life, and develop an awareness of the importance of forests in our daily lives.

Activity # and Title

1. Adopt-a-Forest
2. Cast of Thousands
7. Understanding Fire
8. Fire Management

Exploring Environmental Issues: Municipal Solid Waste

This module helps youth explore the important and current topic of managing our municipal solid waste (MSW). Both the challenges and solutions of this rather complex subject are addressed, thereby providing students with a fuller understanding of the factors that affect the management of our waste.

Activity # and Title

1. Introduction to Municipal Solid Waste: The Waste Stream
2. Source Reduction
3. Recycling and Economics
4. Composting
8. Take Action: Success Stories and Personal Choices

Exploring Environmental Issues: Focus on Risk

This module provides formal and nonformal educators with a series of activities to help students learn the rationale for and the mechanics of risk assessment, risk management, and risk communication. The module's activities provide students with a framework through which they can apply scientific processes and higher order thinking skills to environmental issues. By learning the basics of risk, students will be able to apply their knowledge and skills to environmental issues, public policy issues, and personal decisions.

Activity # and Title

2. Things Aren't Always What They Seem
5. Communicating Risk
7. Decision Making: Ecological Risks, Wildfires, and Natural Hazards

Special Topic: Electromagnetic Fields
Special Topic: Chlorine—Looking at Tradeoffs
Special Topic: Plastics, Risk/Benefit Analysis, and Environmental Legislation

8. Taking Action: Reducing Risk in Your School or Community

Business Partners

- Coordinate a community collection program for motor oil or batteries.
- Work with local electric and gas utilities to hold a low-flow showerhead drive or a "brick in the tank" drive.
- Coordinate a recycling program.
- Start a community composting program and hold composting workshops.
- Coordinate a "Bike/Walk/Bus to Work and School" day.

Youth Group Partners

- Adopt a stream/lakeshore/wetland for clean up and maintenance.
- Stencil the words "No Dumping" on storm drain openings and pass out pamphlets about the proper disposal of motor oil and household hazardous waste.
- Initiate neighborhood roadway planting projects.
- Participate in your local "Adopt-A-Highway" program or hold a "Roadside Clean Up" day.
- Clean up illegal dumpsites.
- Plant flowers/shrubs/trees on vacant lots to reclaim them for greenspaces/parks.
- Coordinate a tree planting and maintenance program.
- Organize a community tree inventory (species, location, condition).
- Organize a program to monitor the water quality of local streams and waterways.

Senior Citizen Partners

- Start a community gardening program, especially with young people and senior citizens.
- Work with local mechanics and garages to sponsor a "Car Tune-Up Day" for senior citizens and others with limited incomes.
- Sponsor radon testing in senior citizen centers and other community centers.

School/Student Partners

- Coordinate Earth Day and Arbor Day programs at your schools and in your community.
- Sponsor an environmental essay/photography/art/poster contest in your community.
- Hold "Paint and Clean Up" days in your parks and at your schools.
- Organize an "Adopt a School" program to landscape the grounds, create outdoor classrooms, build greenhouses or indoor grow labs.
- Work with industrial education classes to build bird feeders and birdhouses for schools, senior centers, parks, day care centers, etc.
- Sponsor an "Adopt a Tree" program.

Tree Planting: PLT Activities (with background information)

These lessons were extracted from the Project Learning Tree PreK - 8 Environmental Education Activity Guide. *The student pages are included here in both English and Spanish.*

Overview
It is easy to see that items made of wood come from trees. However, many tree products are not obvious. In this activity your students will discover the diversity and multitude of products that are in some way derived from trees.

Background

Products are derived from all parts of a tree. Wood is the most obvious. It provides things such as lumber for houses, furniture, doors, picture frames, clocks, paintbrush handles, counters, cabinets, floors, spools for thread, etc. ***Cellulose*** is the major component of wood (and most other plant fiber). Paper is made from cellulose, and paper products include books, wrappers, cereal boxes, magazines, newspapers, food labels, etc. Besides being used to make paper, cellulose is an ingredient in many other products. (See student readings on pages 41-42.)

Getting Ready

1. Before doing this activity, collect as many of the following items as you can:

- Newspaper
- Toothpicks
- Candy bar with almonds
- Piece of lumber or plywood
- Tissue paper
- Sponge (synthetic, not natural)
- Article of rayon clothing or a piece of rayon cloth
- Baseball
- Wooden chopsticks or a wooden mixing or salad spoon
- Bottle of vanilla (flavoring)
- Book or magazine
- Cardboard box
- Can of paint thinner, turpentine, or mineral spirits
- Pack of chewing gum
- Can of paint
- Bottle cork
- Rubber gloves
- Apple or other piece of fruit that comes from trees
- Plastic comb or brush
- Piece of cellophane
- Wooden chair or other piece of furniture

Most of these items should be readily available around the house. Others may be available from your school's buildings and grounds department, shop, or art department. Scraps of plywood and lumber may also be available from a home improvement store.

2. You will be dividing your students into groups of four, so make enough copies of student pages 41-42 for each group of four students.

Doing the Activity

1. Place the items you collected around the room, and label each one with a number.

2. Divide the group into teams of four, and tell them that team members will work together to determine which of the products around the room are made from trees. All team members must agree with the team's decision about each product and must be able to explain why each product is on their team's list.

3. Have the students in each team number themselves from one to four. Tell all the "1's" that it's their responsibility to record the information that everyone on their team agrees on and that they'll have to report their group's findings to the rest of the class. Tell all the "2's" that they must make sure that everyone in the group has an opportunity to speak as the

LEVELS
Grades 4-6

SUBJECTS
Social Studies, Science, Language Arts

CONCEPTS

- Successful technologies are those that are appropriate to the efficient and sustainable use of resources, and to the preservation and enhancement of environmental quality. (2.3)
- Natural beauty, as experienced in forests and other habitats, enhances the quality of human life by providing artistic and spiritual inspiration, as well as recreational and intellectual opportunities. (3.4)

SKILLS
Analyzing, Classifying and Categorizing, Interpreting

OBJECTIVES
Students will ① examine various products and determine which ones are made from trees, ② describe ways that trees are used to make products and ways that these products can be conserved, and ③ explore methods for recycling and reusing products.

MATERIALS
Various forest products (see Getting Ready Step 1) and copies of pages 41–42

TIME CONSIDERATIONS
Preparation: 30 minutes
Activity: Two 50-minute periods

team tries to reach decisions. The "3's" must make sure the group stays on track and gets everything accomplished in the time allowed. And the "4's" are the only people who may leave the group to ask you questions.

4. Have the teams move around the room and examine the products. *(WARNING: Do not let them open any of the product containers.)* After they have decided if one item comes from trees in some way, they should record it on a list and move on to the next one.

5. Once teams have established their lists, give each team a set of the readings on pages 41-42. Each student should read the article that corresponds to his or her number. (Student pages can be cut in half).

6. After reading their articles, students should explain the contents to their team members. Each person is responsible for making sure everyone else in the group understands what his or her article says.

7. The teams should then re-evaluate the list of products they came up with in Step 4. Are there any products they want to add to or delete from their list? Once again, remind them that everyone on their team must agree with the changes and should be able to explain why each item is on their list.

8. Have the teams share their lists with the rest of the group. Discuss the diversity of products we get from trees. Check the students' understanding of the articles by asking them to explain why they included certain products.
If they didn't realize it during the activity, they should realize by the end of the discussion that all the products you spread around the room came from trees in some way.

9. How will this new awareness of forest products affect student's lifestyles? Will they make any changes? Talk about conservation practices where their families use a forest product but could also ○○ recycle the product, ○ reuse the product, or ○ reduce its use.

Enrichment

Have the students work in their groups to brainstorm a list of the ways they use paper. Then have them write down possible substitutes for the three or four items on the list that they think are the most important. Afterward have them compare the environmental and economic factors associated with these products and their possible substitutes by answering the following questions. (They will need to do research to answer some of the questions. Encourage them to divide the research among their group members.)

1. Would the substitute serve the same purpose as efficiently and cheaply as the tree product?

2. Is the substitute made from a renewable or nonrenewable resource?

3. Does the production of the substitute require more or less energy than the production of the original product? (They will need to research this.)

4. Is the substitute reusable or recyclable? Was the original forest product reusable?

5. What, if any, are the long-term implications for continuing to use the paper product or its substitutes?

END NOTES...

ASSESSMENT OPPORTUNITY

Wood furniture is an obvious tree product. But many common products such as toothpaste, which contains cellulose or wood fiber, are not. A scavenger hunt for tree products is a fun way to assess students' understanding of the concepts and information presented in this activity. The scavenger hunt can be done in school, outdoors, or in a supermarket or drug store.

1. Organize students into groups of three.

2. Provide each group with a list of items such as these to find :

- two products derived from the gum of trees (rubber products, chewing gum)
- two objects made directly from wood (furniture, toothpicks, spools)
- two products made from tree resin (violin rosin, soap, varnish)
- two products derived from fruits and nuts of trees (cider, dyes, spices)
- two products extracted from the leaves or bark of trees (astringent lotion, cork, honey)

3. Challenge your students to find items that are not obvious tree products.

4. After a fixed amount of time, have the students share their discoveries and explain which part each product is from.

RELATED ACTIVITIES

Tree Treasures, A Few Of My Favorite Things, Three Cheers for Trees, Resource–Go–Round, Renewable or Not?

REFERENCE

Wright, Helena. *300 Years of American Papermaking.* Washington, DC: Smithsonian Institution, 1991.

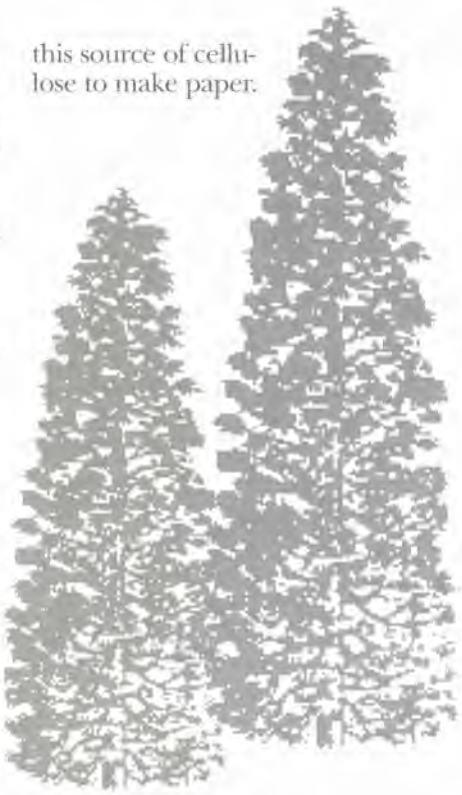
TREE READINGS

1 Look around you and chances are you'll see a lot of things made out of wood. People use wood to build houses and other buildings; to construct doors, floors, fences, and furniture; and to make many other products including bowls, boats, paddles, crates, baskets, and baseball bats.

To make wood products, you must first harvest trees and process them into lumber. In sustaining a renewable supply of timber, forest managers practice silviculture—the management and cultivation of forests. Young trees are usually re-planted or naturally re-seeded on the land where they were harvested. Openings created by harvests often improve the habitat for certain wildlife species.

After the trees have been cut down, the branches are removed, and they are cut into logs. Then, the logs are loaded onto trucks and transported to a sawmill. The first machine at the sawmill strips off the bark. The logs are then measured and then cut into lumber. Depending on how the wood will be used (whether for buildings, furniture, baseball bats, etc.), the trees will be cut in different ways. What products a tree is used for depends on the type of tree it is. For example, hardwood trees such as oak and maple are often used for flooring and high-quality furniture, while softwood (coniferous) trees are usually used for papermaking, lower-quality furniture, houses, and crates.

Plants contain a compound called cellulose to give them rigidity and support. Cellulose is the main component in wood and, in most cases, people use this source of cellulose to make paper.



2 Paper was made by hand for nearly 17 centuries following its invention in China about 100 A.D. In the Orient, plant fibers were beaten into a pulp, suspended in water, and formed into sheets by draining the fibers through a screen. As knowledge of papermaking moved westward, papermakers began to use rags rather than plant fibers to furnish pulp.

Papermaking spread to Europe through the Middle East, reaching Spain from North Africa by about 1200. From Spain, the craft eventually was brought to the New World. The Spanish established a European-style paper mill in Mexico in about 1580, but little is known of that endeavor, and it did not mark the beginning of continuous production.

Paper mills use cellulose from three sources: recycled paper, wood chips and sawdust leftover from making lumber, and raw logs. When raw logs arrive at the mill, machines strip the bark off and chop the trees into chips. Then the chips (and other sources of cellulose) are "cooked" with chemicals until the mixture becomes a thick pulp.

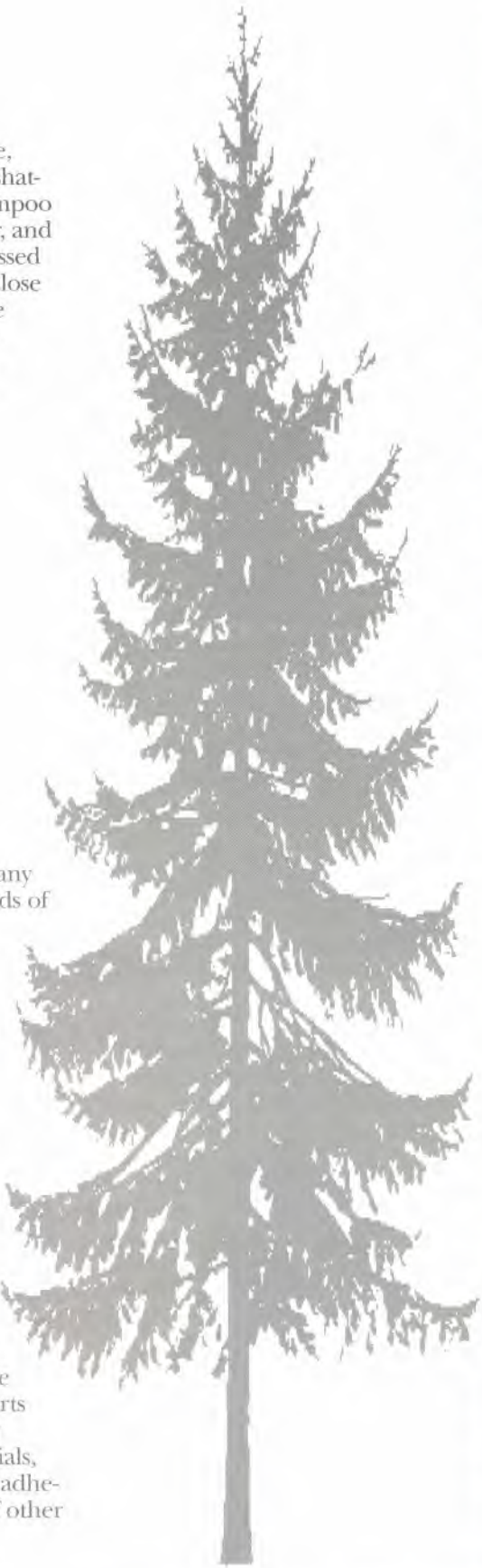
Next, the pulp is "washed." During the washing stage, dirt and other impurities are filtered out, producing clean pulp and, leftover waste and solids called sludge water. The sludge is separated from the water and either landfilled, burned, or applied to the land as fertilizer. The wash water goes into a waste water treatment system. The clean pulp then goes through a series of machines where the fibers get mashed apart so that the pulp will form smooth sheets when dried.

Eventually, the pulp is run onto screens where the water drains off, and the result is newly formed paper. The paper is compressed and dried. Depending on the chemical process used to refine the pulp and the amount of cleaning and flattening involved, people create different kinds of paper such as coffee filter paper, heavy writing paper, wrapping paper, and so on. They can also create cardboard, boxboard, paperboard, and other

STUDENT PAGE©

TREE READINGS

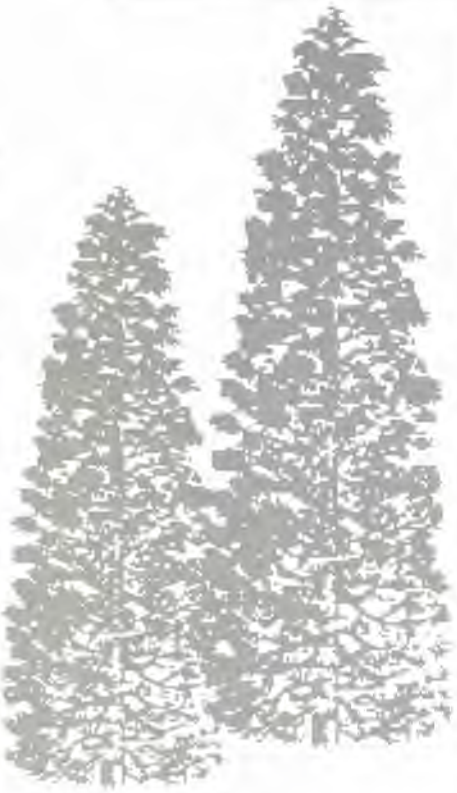
3 strong products. All land plants contain a compound called cellulose, which provides them with rigidity and support—it's the number-one component in wood. People use cellulose from wood to make a variety of products besides paper. For example, cellulose can be mixed with certain chemicals and squeezed into fibers that are used to make carpets, wigs, and fabrics such as rayon for clothes and furniture. Cellulose is also used as a key ingredient in cellophane, sausage casings, explosives, shatterproof glass, sponges, shampoo thickeners, imitation leather, and many other products. Processed with certain chemicals, cellulose may also be used to produce molded plastics for eyeglass frames, hairbrush handles, steering wheels, and so on.



4 It would be hard—if not impossible—to find a part of a tree that people do not use in some way. The bark of many trees, for example, is used for many different products. Most bottle corks are made from the bark of cork oak trees, which grow in Europe and Africa near the Mediterranean Sea. The spongy bark of these trees is made into bulletin boards, the inner cores of baseballs, and many other products. Quinine, the drug used to cure and prevent malaria, comes from Peruvian bark and had been used by Native Americans long before the Europeans arrived. Some tree bark has an abundance of a chemical called tannin. People use tannin to process leather.

Some trees produce saps called gums and resins that are used to make paint thinner, chewing gum, medicines, and many other products. For hundreds of years, South American Indians have extracted the sap or latex from the rubber tree to make products such as rubber-soled shoes and containers. They processed it by heating the rubber and mixing it with sulfur to improve its strength. Maple trees produce a sap that people turn into maple syrup. Trees provide people with fruits and nuts such as apples, coconut, pecans, lemons, and olives, and spices such as allspice and nutmeg. Tree leaves, trunks, and other parts also provide ingredients for paints, road building materials, medicines, artificial vanilla, adhesives, inks, and hundreds of other products.

LECTURA - ARBOLES



1 Mira hacia tu alrededor y probablemente verás muchas cosas hechas de madera. Las personas usan la madera para construir casas y otros edificios; y para elaborar muchos otros productos que incluyen cuencos, barcos, canaletas, cajones, cestos y bates de pelota.

Para manufacturar los productos madereros, primero se deben talar los árboles para convertirlos en madera. Los administradores forestales practican la selvicultura—la administración y el cultivo de bosques—para sostener un surtido renovable de madera. Los árboles jóvenes normalmente se siembran de nuevo o se replantan por proceso natural en el terreno donde fueron cosechados. Los claros en el bosque creados por las cosechas suelen mejorar el hábitat para ciertas especies de fauna silvestre.

Después que lo árboles han sido talados, se les quitan las ramas y se cortan en troncos. Luego, los troncos se cargan en camiones y se trasladan a un aserradero. En el aserradero, la primera máquina le saca la corteza al tronco. Entonces se miden los troncos y se cortan en madera. Los árboles tendrán que cortarse de distintas formas dependiendo de cómo se van a utilizar (si se utilizarán para construcción, muebles, bates de pelota, etc). Por ejemplo, los árboles de madera dura como el roble y el arce suelen usarse para pisos y muebles de alta calidad, mientras que los árboles de madera blanda (coníferos) normalmente se utilizan para fabricar papel, muebles de más baja calidad, casas y cajones.

2 Tras el descubrimiento del papel en la China alrededor de año 100 a.C., se fabricó a mano durante casi 17 si-glos. En el Oriente, las fibras de las plantas se batían hasta reducirlas a pulpa, se pasaban por agua, y se formaban en hojas tras ser coladas las fibras por una criba. A medida que el conocimiento de la elaboración de papel se extendió hacia el occidente, los fabricantes de papel comenzaron a utilizar trapos en vez de fibras de planta para abastecerse de pulpa. La fabricación de papel se extendió a Europa y al Medio Oriente, llegando a España y África del Norte alrededor de 1200.

Desde España el arte finalmente se trasladó al Nuevo Mundo. Los españoles establecieron una fábrica de papel al estilo europeo en México alrededor de 1580, pero se conoce poco sobre este empeño, y no marcó el inicio de la producción continua.

Las fábricas de papel usan la celulosa de tres fuentes: del papel reciclado, de las astillas de madera y del serrín, producto sobrante de la producción maderera, y de troncos en bruto. Cuando los troncos en bruto llegan a la fábrica de papel las máquinas le quitan la corteza a los troncos y los reducen a astillas. Entonces, las astillas (y otras fuentes de celulosa) se "cocinan" con sustancias químicas hasta que la mezcla se convierte en una espesa pulpa o pasta.

Luego, la pulpa se "lava". Durante la etapa del lavado, la suciedad y otras impurezas pasan por un proceso de filtración lo cual produce una pulpa limpia, y el desperdicio sobrante que se llama aguas residuales industriales. Los residuos se separan del agua y se trasladan a un basurero, se queman o se aplican como fertilizante. El agua entonces pasa por un sistema para el tratamiento de aguas resi-duales industriales. La pulpa pasa por una serie de máquinas donde las fibras se baten para que la pulpa se pueda formar en hojas lisas cuando se seque.

Finalmente, la pulpa se pasa por filtros donde el agua se escurre, y el resultado es el nuevo papel. El papel se comprime y se seca. Dependiendo del proceso químico utilizado para refinar la pulpa y la cantidad de limpieza y aplanamiento, se pueden fabricar diferentes clases de papel tales como el papel para los filtros de cafeteras, papel grueso para escribir, papel de envolver regalos, etc. También se puede producir cartón, cartón rígido para cajas, cartelones rígidos, u otros productos resistentes.

3 Todas las plantas de tierra contienen un compuesto llamado celulosa que les proporciona rigidez y soporte—es el ingrediente fundamental en la madera. La gente usa la celulosa de la madera para fabricar papel y para elaborar una variedad de productos, además del papel. Por ejemplo, la celulosa se puede mezclar con otras sustancias químicas y exprimirse para formar fibras que se utilizan para alfombras, pelucas, y telas como el rayón para ropa y muebles. La celulosa también es el ingrediente clave en el celofán, fundas de embutidos, explosivos, cristal inastillable, esponjas, espesadores de champú, semilicuero y muchos otros productos. Al ser procesada con ciertas otras sustancias químicas, la celulosa también se puede utilizar para producir plástico moldeado para armaduras de lentes, mangos para los cepillos para el cabello, volantes, etcétera.

4 Sería difícil—si no imposible—encontrar una parte de un árbol que la gente no utilice de una manera u otra. Por ejemplo, la corteza de muchos árboles se utilizan para diversos productos. La mayoría de los corchos de botellas se fabrican de los árboles alcornoques que crecen en Europa y Africa cerca del Mar Mediterráneo. De la corteza esponjosa de estos árboles se fabrican tablones de anuncios, los núcleos de las pelotas de béisbol y muchos otros productos. La quinina, el fármaco que se utiliza para curar y evitar la malaria, proviene de una corteza peruana y era usada por los indígenas norteamericanos mucho antes de la llegada de los europeos. La corteza de algunos árboles tiene una abundancia de una sustancia química llamada tanino. La gente utiliza el tanino en el tratamiento del cuero.

Algunos árboles producen savias llamadas gomas y resinas que se usan para fabricar diluyente de pintura, goma de mascar, medicamentos y muchos otros productos. Por centenares de años los indígenas de Sur América han extraído la savia o látex para elaborar productos tales como zapatos de suela de goma y reci-pientes. El caucho era procesado al ser calentado y mezclado con azufre para mejorar su resistencia. Los arces producen una savia que la gente convierte en jarabe de arce. Los árboles proveen frutas y nueces tal como manzanas, cocos, pacanas, limones, y aceitunas, y especias tal como pimienta de Jamaica, y nuez moscada. Las hojas y los troncos de los árboles y otras partes también proveen ingredientes para pinturas, materiales para la construcción de carreteras, medicamentos, vainilla artificial, pegamentos, tintas, y cientos de otros productos.

Overview
Never underestimate the power of a tree! Besides giving us an amazing array of paper and wood products, trees provide a host of other benefits—from shading our backyards to assisting in the maintenance of the global climate. Students can express their appreciation of trees by planning and carrying out their own tree-planting program.

Background

Industrialized societies depend on carbon-based fuels such as gasoline, oil, coal, and natural gas to heat homes and to power factories, vehicles, appliances, and other machinery. Burning those fuels releases enormous amounts of carbon into the atmosphere. On the average, every person in the United States is responsible for 2.3 tons (2.1 metric tons) of atmospheric carbon each year. Some scientists believe that these emissions can cause climatic changes that, in turn, could lead to severe storms, droughts, floods, and times of famine. (See Background for "Waste Watchers" and "Air to Drive" on pages 274 and 325.)

Tree planting is an important strategy for reducing this potential threat. An average young tree stores about 25 pounds (11.3 kg) of atmospheric carbon a year. At present, 1.5 billion trees flourish in American cities and towns.

According to Dr. Rowan Rowntree of the U.S. Forest Service's Urban Forest Ecology Research, a 12-year-old child needs to plant and maintain 65 trees in order to offset the amount of carbon that child will put in the atmosphere during the rest of his or her lifetime. Planting 65 trees is lot of work, so the time to start is right away! As an alternative, students can care for trees that have already been planted, since those trees often die from damage or neglect.

Below is a list of some other benefits trees provide, particularly those planted in urban or residential areas:

- Help settle out, trap, and hold small particles (dust, ash, smoke) that can damage lungs
- Absorb sulfur dioxide and other pollutants
- Replenish the atmosphere with oxygen
- Hold soil with roots, preventing erosion
- Provide homes and food for birds and other animals
- Serve as a windbreak, keeping buildings warmer
- Provide shade, keeping buildings cooler
- Lower energy bills by providing shade and serving as a windbreak
- Muffle traffic noise
- Provide beauty and enjoyment

Getting Ready

Find out which agencies or organizations are responsible for tree planting and maintenance in your community. Parks departments, urban forestry departments, and independent garden clubs are possibilities. Students can write to those agencies or organizations for tree-planting information.

Doing the Activity

1. Ask students to name some areas in the community (such as along city streets and in other public areas, including the school grounds) where trees have been planted. Then have them work in small groups to list the benefits trees provide to people and wildlife in those areas.

2. Use the groups' lists to develop a class list, and add any other benefits you can think of (see Background). Have everyone make a copy of the list.

3. Tell the students that planting trees is a great way to do something good for the community—and for planet Earth! Then have them work in small groups over the next week or so to identify areas in the community (or on the school grounds) that would be improved by the presence of one or more trees. Remind students to refer to their lists of tree benefits as they consider different planting sites. If you're

LEVELS
Grades 1-8

SUBJECTS
Science, Social Studies

CONCEPTS
- Organisms are interdependent: they all depend on nonliving components of the Earth. (4.1)
- Altering the environment affects all life forms—including humans—and the interrelationships that link them. (4.2)
- Resource management technologies interact and influence environmental quality; the acquisition, extraction and transportation of natural resources; and all life forms. (5.1)

SKILLS
Researching, Defining Problems, Formulating Questions, Making Decisions, Evaluating

OBJECTIVES
Students will ① identify ways that urban trees enrich our lives, ② determine how people care for urban trees, ③ identify areas in the community that would benefit from having more trees, and ④ organize and execute a class tree-planting project in a local area.

MATERIALS
Paper and pencils, copies of "Planting Recommendations" on student page 97

TIME CONSIDERATIONS
Preparation: 60 minutes
Activity: Two to five 50 minute periods

working with **younger students,** take them on a walk around the school to locate an area or areas that would be improved by adding a tree.

4. After the students have identified possible sites, have a group discussion about the feasibility of each site. Have students decide which site (or sites) should be the focus for their tree-planting campaign. With proper supervision, teams can work on different sites.

5. If you're working with older students, ask them whom they think they should contact to get permission to plant in the area(s) they've chosen. Then help them compose a letter to the appropriate people, agencies, or organizations. You might also suggest that the letter include several general questions about tree planting in the community, such as the following:

- How much money is spent annually on tree care in the community? How many trees are planted, and where?
- Which species are most often chosen for planting?
- Do any criteria exist for selecting the species that will be planted? If so, what are they? Whether or not such criteria exist, you may want to suggest to students that they consider many different factors before deciding on which trees to plant. For example, depending on where they'll be planting, they may want to consider species that are resistant to air pollution, drought, and so forth.
- What are some hardships that urban trees face? What is the average life span of a city tree?
- How can citizens become involved in planting and maintaining trees on public property?

6. After the students have received a reply, have them detail plans for their tree-planting campaign. For instance, they may decide to raise money to buy trees from a local nursery, or they might ask people to donate trees.

7. Have students plant trees and take care of them. See the planting recommendations on student page 97, and get directions from the nursery on how to plant and care for the particular species of tree.

Enrichment

1. Students could arrange for a special tree-planting ceremony, possibly in conjunction with a special occasion such as Earth Day or Arbor Day. Students should plan the event and send out news releases to publicize it.

2. As discussed in the background, students need to plant and maintain about 65 trees each to absorb all the carbon they put in the atmosphere during their lifetime. Ask students to list all the opportunities they have for tree planting throughout the year. What is the total number of trees they could plant in a year if they took advantage of all those opportunities? Is the total close to 65? If not, what other action could they take to keep carbon out of the air? (They could cut back on fuel consumption.)

END NOTES...

ASSESSMENT OPPORTUNITY

Your group could put together an information booklet that other groups could use to plan, execute, and publicize a com-munity tree-planting project. Teams of students can work on different sections of the booklet. It should include sections on learning the benefits of tree planting, selecting a site in your community, getting permission and advice for planting on a site, finding volunteer help and funding, determining what species to plant, learning how to plant and care for the trees, and arranging for publicity. Students can include photos, diagrams, drawings, and videos.

RELATED ACTIVITIES

Air to Drive, Waste Watchers, Three Cheers for Trees, We All Need Trees, How Plants Grow

REFERENCES

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Pirone, Pascal Pompey. *Tree Maintenance.* New York: Oxford University Press, 1988.

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STUDENT PAGE©

PLANT A TREE

CHOOSE YOUR SITE CAREFULLY.

Look up, around, and down. The tree you plant today could eventually reach 40 to 100 feet (12 to 30 meters) in height (depending on the tree type). Give your tree plenty of room—its roots will grow wide and deep.

Plant it well away from buildings and powerlines, so that it won't do any damage,

or need disfiguring or harmful pruning later in its life. Plant the tree where its roots will not grow into sewers and pipelines, or under driveways and sidewalks.

Look at the tree. Make sure it's suited to the environment you are planting it in, so that it has the best chance of surviving.

TAKE CARE BEFORE AND DURING PLANTING.

Keep the tree cool and shaded, and keep its roots moist until

planting.

During planting, try not to handle the tree's roots. Tamp the dirt firmly, but don't pack it too tightly or the roots won't be able to either reach out for water and nutrients, or anchor the tree. Soak the soil around the tree with water to encourage deep rooting.

If you're planting a sapling—
Dig a hole twice as wide and as deep as the rootball. Build a mound of soil, and place the sapling on top of the mound so that it is two inches (five cm) above the hole's bottom. If the roots are wrapped, remove the burlap. Fill the hole with dirt, tamping it down with your foot and wetting it with water as you fill the hole.

If you're planing a seedling—
Dig a hole a little deeper than the roots' length. Fill the hole around the seedling with dirt. Then gently pull the trunk of the seedling up slightly to straighten out the roots.

GIVE SPECIAL CARE DURING THE EARLY, DEVELOPMENTAL YEARS.

A tree is most vulnerable during the first years of its life. Protect it from pests and animals. Water it frequently. *Then sit back and enjoy!* If cared for properly, each tree you plant will grow and flourish, providing you and all of us with benefits and beauty for generations.

SIEMBRA UN ARBOL

ESCOGE EL LUGAR CON CUIDADO.

Mira hacia arriba, alrededor, y hacia abajo. El árbol que siembras hoy puede que crezca de 40 a 100 pies (12 a 30 metros) de alto. Dale bastante espacio a tu árbol—sus raíces serán anchas y profundas. Planta el árbol lejos de edificios y cables de alta tensión para no dañarlo, ni desfigurarlo y para que luego no haya que podarlo de una manera dañina. Planta el árbol donde las raíces no crezcan dentro de alcantarillas y conductos o debajo de las aceras.

Mira el árbol.
Asegúrate de que el ambiente donde lo estés plantando sea el apropiado para que tenga la mejor oportunidad de sobre vivir.

TEN CUIDADO ANTES DE PLANTAR Y MIENTRAS QUE ESTES PLANTANDO.

Mantén el árbol fresco y bajo sombra, y mantén sus raíces húmedas hasta que lo vayas a plantar. Cuando lo estés plantando no toques las raíces. Apisona la tierra, pero no muy fuerte porque sino las raíces no podrán alcanzar agua y nutrientes ni podrán sujetar el árbol. Remoja la tierra alrededor del árbol con agua para arraigar las raíces.

Si estás plantando un árbol joven—
Cava un hueco el doble del ancho y tan profundo como el sistema radicular. Pon el árbol sobre un montón de tierra para que quede dos pulgadas (cinco cm) sobre el fondo del hueco. Si las raíces están envueltas, quítale la arpillera. Rellena el hueco con tierra, apisonándolo con los pies e irrigando con agua a medida que rellenas el hueco.

Si estás sembrando—un plantón—Cava un hueco un poco más profundo que el largo de las raíces. Rellena el hueco alrededor del árbol con tierra. Entonces, cuidadosamente levanta el tronco del plantón para enderezar las raíces.

PROPORCIONALE CUIDADO ESPECIAL AL ÁRBOL CUANDO ES JOVEN Y EN SUS AÑOS DE DESARROLLO.

El árbol es más vulnerable durante sus primeros años de vida. Protégelo de los insectos y animales. Riégalo con frecuencia. Entonces, gózalo. Si le prestas el cuidado necesario, cada árbol que siembras crecerá y prosperará, brindándote a ti y a todos nosotros beneficios y belleza por generaciones.

Overview
By acting out the parts of a tree, your students will see how a tree works like a factory. Afterward, they can create their own "tree factories."

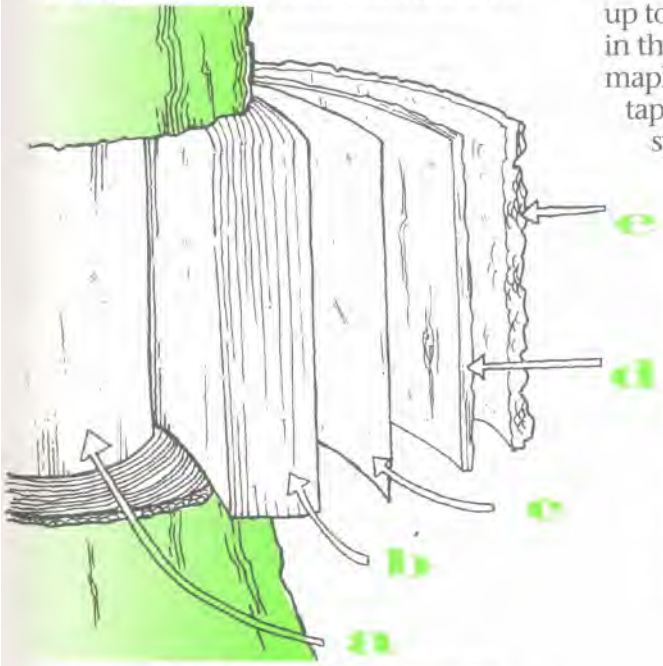
Background

From a tree's tiny ***root*** hairs buried in the ground to the highest leaves in its ***crown,*** each part of a tree plays a role in helping it to function. Here's a rundown of the various parts of a tree and what each one does:

Leaves
Leaves are the food factories of a tree. Using energy from the sun, which they capture with a pigment called *"chlorophyll,"* leaves convert carbon dioxide and water into oxygen and sugar (food!) through the process of ***photosynthesis.*** The gases needed for and generated by photosynthesis enter and exit through tiny holes called *"stomata,"* on the under surface of the leaves. Water vapor also exits through the stomata in the process of transpiration.

Trunk and Branches
The trunk provides support for branches, which in turn support the tree's leaves. The trunk and branches contain the tree's "pipes"—the tubes that transport water and nutrients to the leaves, and sugar from the leaves to the rest of the tree. They also contain the growing layer of the tree that makes the trunk, branches, and roots of the tree thicker each year. Here's a look at a tree trunk from the inside to the outside and a description of what each layer does: (see diagram below)

- ***Heartwood*** forms the central core of the tree, is made up of dense dead wood, and provides strength for the tree.
- ***Sapwood,*** also called the xylem (ZEYE-luhm), brings water and nutrients up from the roots to the leaves; older xylem cells become part of the heartwood.
- ***Cambium*** (KAM-bee-uhm), a very thin layer of growing tissue, makes cells that become new xylem, phloem, or cambium.
- ***Phloem*** (FLOW-uhm), also called the inner bark, carries sap (sugar and nutrients dissolved in water) from the leaves to the rest of the tree; at certain times of the year, phloem may also transport stored sugars from the roots up to the rest of the tree (for example, in the springtime, the sap of sugar maples rises from the roots and is tapped by people to make maple syrup).
- ***Bark*** protects the tree from injury caused by insects and other animals, by other plants, by disease, and by fire; bark characteristics vary from species to species (for example, it may be thin, thick, spongy, rough, smooth, covered with spines, and so on, depending on the type of tree).



American Forest Foundation/Project Learning Tree

Roots
A tree's roots help anchor the tree in the ground. They also

LEVELS
Activity: Grades 3-6
Variation: Grades PreK-2

SUBJECTS
Science, Physical Education, Performing Arts

CONCEPTS
- Populations of organisms exhibit variations in size and structure as a result of their adaptation to their habitats. (10.1)
- The structure and scale of an ecosystem are influenced by factors such as soil type, climate, availability of water, and human activities. (10.2)

SKILLS
Ordering and Arranging, Representing, Identifying Attributes and Components, Comprehending

OBJECTIVES
Students will ① describe the general structure of a tree and ② explain how different parts of a tree help the tree function.

MATERIALS
Slips of paper, paper sack, tape (optional), yarn or string, art supplies (see "Assessment Opportunity"), copies of student page 227

TIME CONSIDERATIONS
Preparation: 20 minutes
Activity: 50 minutes

absorb water and nutrients from the soil. Trees have ***lateral roots*** that spread out from the tree and cover a broad area. Many trees also have a ***taproot*** that grows straight into the ground. As a tree's taproot and lateral roots grow away from the tree, they branch into finer and finer roots called ***rootlets.*** The rootlets themselves are, in turn, covered by even finer ***root hairs.*** These root hairs absorb approximately 95 percent of the water and nutrients absorbed by the tree.

Getting Ready

Activity—Write the following parts of a tree on separate slips of paper and put them in a sack. (We've included enough parts for a group of 30 students. However, you may need to adjust the numbers depending on the size of your group.)

Heartwood		(1)
Sapwood		(3)
Taproot		(1)
Lateral roots		(2)
Cambium		(5)
Phloem		(6)
Bark		(8)
Leaves		(4)
Total	=	30 slips of paper

Afterward, make four branches for your tree by cutting yarn or string into four 6-foot (1.8-m) lengths. Then find a large, open area where the students can build the tree. Also make copies of student page 227.

Variation—Find an outside area that has a tree and enough space to allow the students in your group to spread out and sit on the ground.

Doing the Activity

1. Ask the class to think about trees and what they need to survive. (food, water, air, and so on) List the ideas on the chalkboard. When students have completed the list, ask them how the tree gets these things, especially since trees can't move around the way most animals can. For example, ask students how a tree gets the water it needs.

- Where does the water come from?
- How does it get into the tree?
- How does it get around to all parts of the tree?
- How do trees get the food they need?
- How do they keep from blowing over in the wind?

Don't worry about answering all these questions completely at this stage. During the rest of the activity, students will learn the answers to these questions.

2. Use the Background information to answer the questions raised in Step 1.

3. Tell students that they're going to create a tree by acting out the tree parts they just discussed. Have each student pick one slip of paper from the sack (prepared earlier) to find out what role to play in the tree. Take students to an area with lots of space to build the tree.

4. Ask students what makes up the center of the tree and gives the tree strength? (heartwood) The students portraying heartwood should stand in the center of an open area, tighten their muscles, and chant, "I support; I support."

5. Ask students what tree part transports water to all parts of the tree. (sapwood) Have the sapwood students join hands to form a small circle around the heartwood. Have these students chant, "Gurgle, slurp. Gurgle, slurp. Transport water," as they raise their joined hands up and down.

6. Ask students where the water in the sapwood comes from (it's absorbed by the roots). Then have the taproot sit down with his or her back against the sapwood, and have the lateral roots lie down on the ground with their feet toward the sapwood and their arms and fingers spread out to represent root hairs. Have the roots make sucking noises.

NOTE- Be sure to warn other students not to step on the roots!

7. Ask students where the water in the sapwood travels (to the leaves). Then have the heartwood hold the ends of the four pieces of yam or string that you cut earlier. Give the other end of each piece to a different student who represents leaves. Ask the leaves what they do all day (make food through photosynthesis). Have the leaves flutter their hands and chant, "We make food; we make food."

8. Ask the leaves what happens to all the food they make using sunlight, air, and water. (It gets transported to the rest of the tree.) Ask everyone what part of the tree transports the food from the leaves to the rest of the tree. (phloem) Have the phloem students join hands and form a large circle around the tree. Then have them simulate the role of the phloem by reaching above their heads and grabbing (for food), and then squatting and opening their hands (releasing the food) while chanting, "Food to the tree!"

9. Ask students if they've left out an important part of the tree. What layer produces new sapwood and phloem to keep the tree growing and healthy. (cambium) Have the cambium students form a circle between the phloem and the sapwood. Tell them to sway from side to side and chant, "New phloem, sapwood, and cambium. New phloem, sapwood, and cambium."

10. Ask students what final component of their tree is missing—it's something that protects the tree. (bark) Have the bark students lock arms and form a circle that faces out from the center of the tree. Ask them to look tough. Have them march in place chanting, "We are bark. Please keep out."

11. When the tree is completely assembled, have all students act out and chant their parts simultaneously. If you want, you can end the session by telling the students their tree is old and falls over. Let everyone carefully fall down.

VARIATION FOR YOUNGER STUDENTS

1. Ask students to name things that living things need to survive (sun, air, water, food, space, and so on). List their ideas on a chalkboard. They will now go outside and find out how members of one group of living things (trees) get the things they need to survive.

2. Take students outside and have them sit down around a tree. Ask how trees get the water they need.

- Where does the water come from? (rain, snowmelt, groundwater)
- How does it get into the tree? (It's absorbed by the roots.)
- How does it get around to all parts of the tree? (Tiny "pipes" in the sapwood carry water to the trunk, branches, and leaves.)

As the students discuss each question, have them act out the answers. For example, they can simulate rain falling by patting their hands on their legs or the ground, they can simulate roots by lying on their backs with their arms and legs spread out as they make slurping sounds, and they can simulate sapwood chanting, "Gurgle, gurgle, gurgle. Water to the tree."

3. Next, ask students where trees get the food they need to survive. Do they chase after animals? Grab things with their branches? (No! They make their own food in their leaves by using energy from the sun.) Then have the students imitate how the leaves make food. Have them hold their arms up and alternately curl and straighten their fingers ("leaves") while chanting, "Making food, making food." After-ward, explain that the leaves also "breathe" by taking in gases from the air and releasing other gases through tiny holes in their under-sides (sto-mata). You might pass around some leaves and magnifying glasses so students can look for these holes.

4. Have students stand up and wrap their arms around the trunk of the tree.

What does the trunk do for the tree? (It provides strength, supports the branches and leaves, and contains all the "pipes" that transport water and food around the tree.) Then have the students act out the trunk of the tree by standing straight and tall and by looking strong.

5. Have students feel the bark of a tree and describe what it feels and looks like. Then ask them how bark might be useful to a tree. (protects it from pests and disease) Have students act out the role of bark by holding hands and forming a circle with all students facing out from the center. While they still hold hands, have them chant, "We're the bark. Insects, keep out!"

6. Have students look for seeds, fruits, nuts, or cones on the tree. Ask them what these parts of the trees do. (produce new trees) Then have them act out a seed growing into a tree by scrunching down into a ball (the seed) and then slowly straightening up until their arms are raised over their heads.

7. Ask students what keeps the tree from blowing over. (roots) Then divide the group into two parts. Have all students lie down with their arms and legs spread out, and have one group make slurping sounds (to simulate the roots absorbing water) while the other group chants: "Stay in place. Stay in place" (to express how roots anchor the tree).

8. Finally, call students together to build a model tree. Divide the students into three groups. One group, the roots, should stand close together with their arms entwined and chant, "Gurgle, gurgle, gurgle. Water to the tree." The next group, the bark, should make a circle around the roots, join hands, and chant, "We're the bark! Insects, keep out." Members of the last group, the leaves, should stand at various distances around the bark and chant, "Making food, making food" while flexing their fingers.

Enrichment

1. Have the students take a look at cross sections of a tree (tree cookie) and identify the heartwood, sapwood, phloem, and bark. You may also want to do the activity "Tree Cookies" on page 289.

2. Ask students how a tree is similar to a factory. (It takes sunlight, air, and water; and manufactures leaves, fruits, nuts, and flowers.) What different de partments are in a "tree factory," and what jobs are done by each? (In the "roots department" the tree gets anchored to the ground and water is absorbed from the soil, and so on.) Have students draw a cut-away diagram of a tree factory in which you can see the jobs that get done by each department .

3. After exploring how a tree works, have your students consider how they benefit from trees. Give each student a blank piece of paper; have each draw a small tree in the center. Have students draw eight lines radiating from the tree like the spokes of a wheel. On each line, have them write the name of something the tree gives to them (beauty, shade, protection from wind, furniture, pencils, paper, apples, something to play on).

END NOTES...

ASSESSMENT OPPORTUNITY

1. Pass out art supplies, such as drawing paper, scissors, construction paper, toilet paper rolls, straws, aluminum foil, scissors, and tissue paper. Tell students to create a model of a tree. Explain that they should include and label all tree parts they've learned about and be able to explain what each part does. They may explain orally, or create labels that give these explanations. Encourage them to be as creative as possible while still being accurate.

2. For younger students, pass out copies of "Living Labels" student page 227 to pairs of students. Explain that the sheet is like a talking book, but without electronics. Instead, each student will do the talking when one of the buttons on the bottom is pressed. Depending on the level of your group, you may want to go over each of the words on the buttons below the drawing. Explain that each partner should take turns pressing the buttons on the bottom. Each time a student presses a button, the partner must point to the corresponding part of the tree and explain how it helps the tree survive.

RELATED ACTIVITIES

The Closer You Look, Bursting Buds, Looking at Leaves, How Plants Grow, Soil Stories, Trees in Trouble, To Be a Tree

REFERENCES

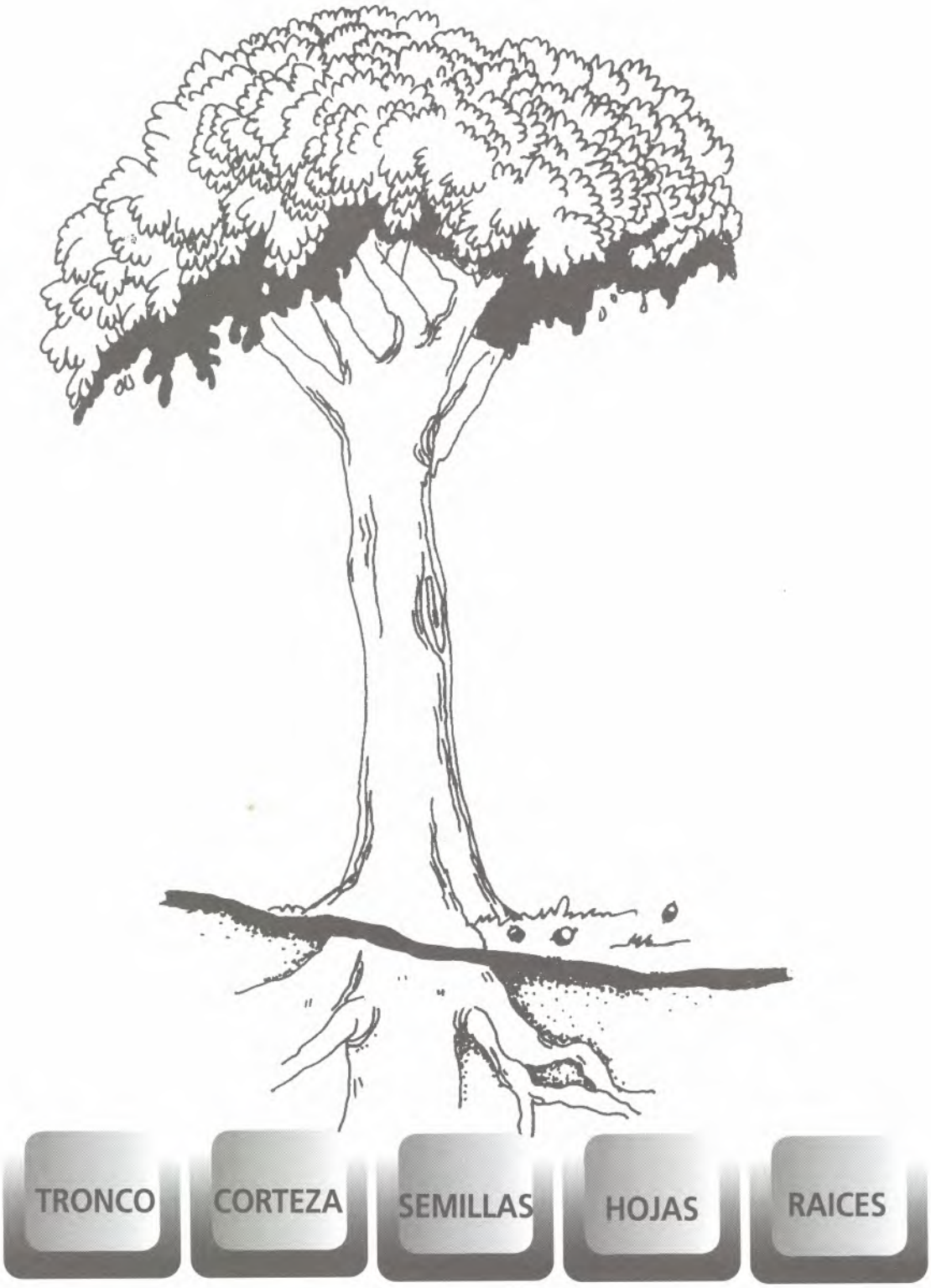
Adapted in part from: Cornell, Joseph. *Sharing The Joy of Nature*. Nevada City, CA: Dawn Publications.

STUDENT PAGE©

LIVING LABELS

TRUNK BARK SEEDS LEAVES ROOTS

ETIQUETAS VIVIENTES



Overview
Like humans, trees can become weak and unhealthy, suffer injury, and die. People have learned to read the symptoms of unhealthy trees to help them. In this activity, students will examine trees for signs of damage or poor health.

Background
Trees require some of the same things people and other animals need to grow and thrive. For example, they need plenty of water, food, and room to grow. If these requirements are not met, a tree may grow slowly or die. The growth rings on a cross section of a tree reveal whether the tree's requirements have been met over the years, and they provide a record of a tree's health over its lifetime. (See Back-ground for "Tree Factory," "Tree Cookies," and "Every Tree for Itself.")

Getting Ready
Plan a trip on the school grounds, in a park, in the woods, or along a tree-lined street. Make copies of student pages 296-298. For younger students, play "This Bark on Me" by Billy B, and discuss the meaning of the song (see References).

PART A

NEIGHBORHOOD CHECKUP

Doing the Activity
1. As a group, discuss what causes a person to get sick or become unhealthy. Responses might include poor nutrition; unclean water; a lack of food or water; toxic substances like smoke or drugs, disease, and physical injury. Students should also think of ways to prevent or combat these things, like proper diet, regular exercise, and safe behavior. With older students, ask them to name several human diseases or illnesses and their causes, symptoms, and cures.

2. Compare elements that keep humans healthy with those that keep trees healthy.

3. Tell students that they will become "tree-tectives" (tree detectives) and search their neighborhood for healthy and unhealthy trees.

4. Students should use the "Tree-tective Trouble Guide" and "Reading Leaf Symptoms" student pages to identify symptoms of unhealthy trees. They should take additional notes and make sketches of their findings such as broken branches; unusual leaf colors or shapes; holes; trunks damaged from scratches, carvings, or graffiti; or uprooted, fallen trees that still appear to be alive. Take measuring tapes or rulers to record the size of wounds and diameters of trees that have been affected. As an option, students can use a camera to photograph damaged trees.

5. Have students hypothesize about what caused the damage. Note that some problems may be more common in certain regions than in others. Older students can read and discuss the article "Trees May Tell Each Other of Attacks," on page 298. This article describes research that seems to indicate that trees can send alarm signals to each other about certain unhealthy factors in the environment.

6. After your field trip, combine all the information the class collected and make a "Tree Damage Report." Then find the people or agency in your area that cares for unhealthy trees (many city, county, or state forestry and park agencies have urban foresters). Send a copy of your report to the agency (or person) in charge of trees in your area. Follow up a couple of weeks later to find out if the agency is going to take action. Ask if you can be informed of any planned tree work so that your class can be at the location to observe. You can also visit a garden center, nursery, or tree-trimming company in your area to find out what they do to keep trees healthy.

LEVELS
Part A: Grades 1-8
Part B: Grades 4-8

SUBJECTS
Science, Math, Social Studies, Language Arts, Performing Arts

CONCEPTS
- Organisms change throughout their lifetimes. Species of organisms change over long periods of time. (13.1)
- While every organism goes through a lifecycle of growth, maturity, decline, and death, its role in the ecosystem also changes. (13.3)
- 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. (13.4)

SKILLS
Observing, Analyzing, Researching, Comparing and Contrasting, Solving Problems

OBJECTIVES
Students will ① cite factors that can cause trees to become unhealthy, ② describe symptoms of unhealthy trees, ③ compare environmental conditions that affect both human health and plant health, and ④ identify people or agencies that care for trees and forests.

MATERIALS
Part A: copies of student pages 296-298, measuring tape or rulers, optional camera
Part B: half-gallon milk cartons, rigid paper plates, potting soil, white vinegar, pH test strips or litmus paper, fertilizer (liquid or granular), radish seeds, rulers or measuring tapes, graph paper, knife, paper bags, bleach, lemon juice, ammonia. Optional: cross section of a tree; Billy B Sings About Trees (see References) and cassette player

TIME CONSIDERATIONS
Preparation: Part A: 15 minutes
Part B: 45 minutes

Activity: Part A: One to two 50-minute periods

Part B: Two 50-minute periods over several weeks and 10 minutes daily to record observations

PART B

PLANTS UNDER STRESS

Doing the Activity

Divide students into investigation teams and tell them they will conduct a series of experiments to determine conditions that cause plants to become unhealthy.

NOTE—To plan your time allotment for this activity, check the estimated sprouting time for the seeds you are using.

Experiments

Explore the effects of the following on plant growth: Crowding, Acidic Precipitation, Fertilizer.

Crowding

Trees need space to grow so they can spread their branches to collect sunlight and their roots to collect water. Discover what happens when plants are grown too close together.

1. Have students form a hypothesis about what will happen to plants that grow under crowded conditions. The hypothesis can be stated in an "if-then" form: "If plants are grown too close together, then

2. Each team should cut milk cartons in half to make planting pots.

3. Punch a few holes in the bottom of each pot and set it on a rigid or coated paper plate that will catch water as it drains.

4. Fill the pot with potting soil.

5. Half of the teams should plant only one or two radish seeds in their pots. The other teams should plant a dozen or so seeds in a single hole. All the pots should have the same light and water conditions. The only variable is the amount of seeds per pot.

6. See how long it takes for the seeds to sprout. Measure the height of the plants above the soil level and record at daily intervals for several weeks. After a specified time, students can dig up the plants and observe differences in the size of the radish bulbs. Cut the radishes in half; measure and record the diameters. Discuss the findings. Which radishes appear to be healthier?

Acidic Precipitation

Many scientists believe that acid precipitation, or acid rain, causes negative health effects on vegetation. To test this, set up a series of plants similar to those in the previous demonstration. You will use white vinegar in water to simulate acid rain.

1. Have students form a hypothesis about what will happen to plants that grow under the influence of acidic water conditions. This hypothesis can be stated in an "if-then" form: "If plants receive more acidic water, then

2. Before proceeding with the experiment, discuss the phenomenon of acid rain with your students. Ask them to research acid rain in a library or media center. Discuss the differences between acidic and basic solutions. Use litmus paper and test for acid or base color reactions for substances such as tap water, lemon juice, vinegar, household bleach, and household ammonia. (Be sure to take proper precautions when handling these substances.)

Only small amounts are needed for litmus testing. For more advanced students, the concept of pH can be demonstrated using pH indicator strips, which give more precise readings of the pH value of substances.

3. Prepare solutions of varying acidic strengths. Sample solutions could include ranges from tap water to quarter, half, and three-quarter strength water-vinegar solutions to full strength vinegar.

4. Determine what happens when plants are "watered" with water-vinegar solutions of varying concentrations. Keep the light conditions and the watering schedule the same for all plants, varying only the strength of the water-vinegar solutions.

5. Keep a daily log of observations and discuss changes in the health and growth of the plants.

Fertilizer

Like people, plants need vitamins, minerals, and other nutrients in their diet to maintain good health. Most of these are supplied by the soil and water in which the plants grow.

1. With a set-up similar to past experiments, hypothesize about the effects of fertilizer, or "plant food," on the growth of plants.

2. Keep all variables constant, except the amount of fertilizer (i.e., Miracle-Gro) added to the soil on a periodic basis. Follow directions on the package or bottle of fertilizer. Make certain that one group of plants receives no fertilizer at all.

3. Check and record observations and discuss results.

4. As in all the experiments, you can show observations and results by plotting the data on a graph.

(Additional tests for light, water, and soil conditions can be found in "How Plants Grow" on page 135.)

Enrichment 1
Adopt a Sick Tree

Perhaps on your field trip you found a "tree in trouble" that could use some help. Maybe it had been damaged; or, maybe it appeared to be healthy and you want to help it stay that way. Have the class adopt the tree. If you choose a tree close to the school, you can report on the progress of its health. Contact the appropriate municipal agencies (see Step 6 in Part A, Doing the Activity) to find out ways to help a sick tree.

Enrichment 2
Dead Tree of Life

Trees, like humans, eventually become sick and die. If you found a dead or partially dead tree on your field trip, you may want to return to see what activity is taking place. Is there evidence of insects at work to decompose the tree and return its remains to nature? Are there signs of woodpeckers living in the dead tree? Are any animals living in holes in the tree? Are fungi growing on the tree? Did the city remove or trim the tree for safety reasons?

Enrichment 3
Useful to Be Useless

Consider the following story attributed to the ancient Chinese philosopher, Chuang Tzu:

A sage, in rambling about the Heights of Shang, saw a large and extraordinary tree. The teams of a thousand chariots might be sheltered under it, and its shade would cover them all! He said, "What a tree this is! It must contain an extraordinary amount of timber!" When he looked up, however, at its smaller branches, they were so twisted and crooked that they could not be made into rafters and beams; when he looked down to its root, its stem was divided into so many rounded portions that neither coffin nor shell could be made from them. He licked one of its leaves, and his mouth felt torn and wounded. The smell of it would make a person frantic, as if intoxicated, for more than three whole days together. "This indeed," said he, "is a tree good for nothing, and it is thus that it has reached so great an age." ... The cinnamon tree can be eaten, and therefore it is cut down. The varnish tree is useful, and therefore incisions are made in it. Everyone knows the advantage of being useful, but no one knows the advantage of being useless.

Have each student write his or her own story about the many values of trees, both healthy and unhealthy.

Enrichment 4
Look Inside a Tree

If a cross section of a tree or a stump is available, "read" the annual rings—they can tell some interesting stories about the health, life, and history of the tree. Tightly spaced annual rings may mean that the tree underwent a period of stress, such as a drought, and did not grow very much in that period. Look for evidence of drought and damage from lightning, fire, or insects. (See "Tree Cookies" on page 135.)

ASSESSMENT OPPORTUNITY

Ask the students to draw a healthy tree and then an unhealthy one. After the drawings are collected and displayed, review them with the students. Have them list the qualities of healthy trees and the causes for other trees being unhealthy, as shown in the drawings.

RELATED ACTIVITIES

How Plants Grow, Every Tree for Itself, Adopt-a-Tree, Tree Cookies, Plant a Tree, Tree Lifecycle

REFERENCES

Billy B Sings About Trees cassette

STUDENT PAGE©

TREE-TECTIVE TROUBLE GUIDE

BROKEN
BRANCHES ATTACHED

BROKEN
BRANCHES HANGING

BROKEN BRANCHES
ON GROUND

TRUNK DAMAGED
HIT BY CAR OR LAWN MOWER

BRANCH STUBS
SHOULD BE TRIMMED
SO TREE CAN HEAL

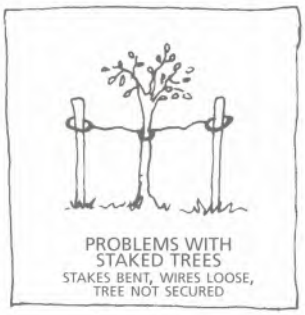
CRACKED TRUNK
FROM LIGHTNING OR FROST

SPLIT TRUNK

TREE LEANING

VANDALIZED
CARVED INTO OR
BRANCHES TWISTED

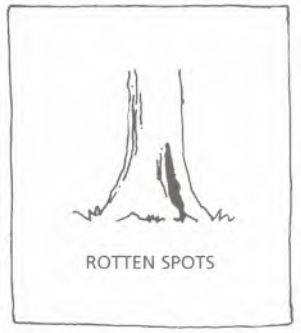
BROKEN OFF TREES



PROBLEMS WITH
STAKED TREES
STAKES BENT, WIRES LOOSE,
TREE NOT SECURED

INSECT FEEDING
MANY LEAVES MISSING
OR FULL OF HOLES

LEAF DEFORMITIES
ROLLED, CRINKLED
OR FUNNY SHAPED



ROTTEN SPOTS

DEAD TREES

STUDENT PAGE

READING LEAF SYMPTOMS

Trees can't tell us when they are sick. Instead, we must interpret the signals trees send out to determine what and how serious their health problems are.

The leaves usually communicate the first symptoms of disease, insect or physical damage, so by learning leaf-reading, you can diagnose your tree's condition. Here are some common leaf symptoms and their probable cause.

1 **Ragged leaves with holes in them.**
Suspect insect feeding, especially if it's summer and the leaves were not showing damage earlier. But if it's springtime, and the leaves never developed properly, chances are the damage is due to low temperatures during the bud stage.

2 **Leaves suddenly turn brown or black.**
If a frost occurred a day or two earlier, that's probably the cause. Sudden high temperatures in springtime also cause problems. If no temperature extremes are noted, suspect either a leaf or a stem disease. If the symptoms show up on a branch or two at a time, trunk or branch invasion or injury is probably the cause.

3 **Spots or bumps on the leaves.**
Insects and mites cause most leaf swellings. Leaf spots are usually the result of disease or insect activity. Chemicals, such as sulfur dioxide from nearby coal-burning plants, or improperly applied fertilizer or pesticides, can cause leaf blotches, too.

4 **Margins of leaves turn brown.**
Moisture deficiencies or high temperature stresses are usually to blame. Sometimes root or trunk damage, including injury from road salt, can be involved.

5 **Sudden leaf drop.**
This may or may not be serious. If inner leaves are dropping during a dry spell, or if a few leaves fall from throughout the tree, it shouldn't be serious. Drought or squirrels may be to blame. But if leaves are dropping heavily from one branch and then another, there is a problem somewhere with the water-conducting system of the tree—probably disease, possibly insect borers.

6 **Light green or yellow leaves.**
Probably a "micronutrient" disorder, such as iron or manganese deficiency. Curiously, trees rarely show deficiencies of the major plant nutrients such as nitrogen and potassium.

7 **Leaves twisted or malformed.**
The most common cause for this is stray herbicide drift, but insects, occasionally a disease, and sometimes low temperature injury can all produce similar-appearing symptoms.

8 **Leaves turn fall-colored prematurely.**
A serious symptom suggesting trunk or root damage of some kind.

Trees can withstand a certain amount of abuse to the leaves, but leaf injury becomes serious when: heavy losses occur two or more years in a row, early season loss causes a new flush of leaves, the tree is marginally hardy to the area, or the tree is under some form of stress, such as recent transplanting. Your county extension agent has a number of publications to help in diagnosis and treatment of tree problems, or you may need to call an arborist who is competent in tree health diagnosis.

Gayle Worf, UW-Extension plant pathologist
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TREES MAY TELL EACH OTHER OF ATTACKS

Trees may warn each other of attacks by insects or disease by emitting a special chemical from their pest-ravaged leaves, according to preliminary evidence gathered by two researchers.

The two University of Washington researchers say their findings, if confirmed, could significantly change the understanding of trees' behavior, particularly in light of recent discoveries about how trees combat insects and disease.

Changes in the chemical composition of leaves by trees to ward off insects or diseases was discovered in sugar maples and oaks by a group of New Hampshire researchers last year.

The nutritional content of Sitka willow leaves also changed in trees that had suffered damage by western tent caterpillars and fall webworms, according to a report by the two Washington researchers, David F. Rhoades and Gordon H. Orians. To their surprise, leaf quality also declined in undamaged trees up to 200 feet away, they said.

"This effect may be due to a defensive response in unattacked trees stimulated by volatile compounds emitted from attacked trees," the researchers said in a report to the National Science Foundation.

Orians said similar reactions have been seen in red alder trees as well, "but not as strong as with the willow."

"Presumably, this is not a reaction unique to one or a few species, but we have not yet had the opportunity to examine others," he said.

With a new science foundation research grant, the two scientists will place Sitka willows in closed chambers in an attempt to isolate any chemicals that influence the trees' behavior.

From The Associated Press, Washington, DC

COMO DETECTAR LOS PROBLEMAS EN LOS ARBOLES

RAMAS DESPRENDIDAS PEGADAS

RAMAS DESPRENDIDAS COLGANTES

RAMAS DESPRENDIDAS EN EL SUELO

TRONCO DAÑADO
LESIONADO POR UN AUTOMÓVIL O CORTACÉSPEDES

LAS CEPAS DE LOS ARBOLES
DEBEN PODARSE PARA QUE SE SANE EL ÁRBOL

TRONCO RESQUEBRADO DEBIDO
A RELÁMPAGOS O ESCARCHA

TRONCO PARTIDO

ARBOL INCLINADO

ARBOL QUE HA SUFRIDO UN ACTO DE VANDALISMO
RAMAS TORCIDAS Y TRONCO GRABADO

ARBOL QUEBRADO

PROBLEMAS CON LOS ARBOLES SUJETOS
CON ESTACASESTACAS TORCIDAS, ALAMBRESSUELTOS ARBOL NO BIEN SUJETO

ALIMENTACIÓN INSECTIL

DEFORMACIONES DE LAS HOJAS
HOJAS ENROLLADAS, ARRUGADAS, O CON FORMA IRREGULAR

PARTES CON PUTREFACCIÓN

ARBOLES MUERTOS

COMO DIAGNOSTICAR SINTOMAS DE ENFERMEDAD EN HOJAS

Los árboles no pueden decirnos cuando están enfermos. En vez, nosotros tenemos que interpretar las señales que los árboles presentan para determinar cuán serio es el problema de su salud.

Las hojas normalmente son las que comunican los primeros síntomas de enfermedad, de daño físico o insectil, así que al aprender a detectar los síntomas, podrás diagnosticar el estado de tu árbol. A continuación se encuentran algunos de los síntomas comunes y su probable causa.

1 Hojas desiguales con agujeros.
Posible alimentación insectil, especialmente si es verano y las hojas no mostraban señales de daño anteriormente. Pero si es primavera, y las hojas nunca se desarrollaron debidamente, es probable que el daño sea el resultado de temperaturas bajas durante la etapa de brote.

2 Las hojas repentinamente se tornan marrones o negras.
Si hubo una escarcha un día o dos antes, probablemente ésta será la causa. Las alzas de temperaturas súbitamente en la primavera también causan problemas. Si no se detectan extremos de temperatura, sospecha enfermedad de hoja o de tallo. Si los síntomas se manifiestan en una o dos ramas simultáneamente, es probable que el tronco o las ramas hayan sido invadidos, o lesionados.

3 Manchas o bultos en las hojas.
Los insectos y acáridos causan la mayoría de la hinchazón en las hojas. Las manchas normalmente son el resultado de enfermedad o actividad insectil. Las sustancias químicas tales como el dióxido de azufre de cercanas fábricas que queman carbón o fertilizantes y pesticidas indebidamente aplicados, pueden causar manchas en las hojas también.

4 Los bordes de las hojas se vuelven marrones.
La deficiencia de humedad o el estrés de altas temperaturas normalmente son culpables. Algunas veces, implica daño de la raíz o el tronco, incluyendo perjuicio de la sal de carretera.

Gayl Worf, UW-extensión
reimprimido con permiso UW-extensión

5 Caída súbita de hoja.
Esto podrá o no podrá ser serio. Si las hojas de adentro están cayéndose durante la temporada seca, o si unas pocas hojas caen de todas las partes del árbol, no debe ser serio. La sequía o las ardillas podrían ser los culpables. Pero si las hojas están cayendo copiosamente de una rama y después de otra, hay algún problema en algún lugar con el sistema irrigador de agua del árbol—probablemente enfermedad, o posiblemente a causa de insectos taladradores.

6 Hojas de color verde claro o amarilla.
Probablemente un trastorno "micronutriente" como deficiencia de hierro y manganeso. Curiosamente, los árboles raramente demuestran deficiencias de principales nutritivos como el nitrógeno y potasio.

7 Hojas torcidas o malformadas.
La mayor causa es el herbicida que se dispersa, pero los insectos, ocasionalmente una enfermedad, y algunas veces la baja temperatura, también pueden causar daño y producir síntomas que parecen similares.

8 Hojas se tornan color otoñal prematuramente.
Síntoma serio que sugiere algún tipo de daño al tronco o a la raíz.

Los árboles pueden resistir cierta cantidad de abuso a las hojas, pero las lesiones a las hojas se convierten serias cuando: ocurren copiosas pérdidas dos o mas años consecutivos; la pérdida temprano en la estación produce un brote nuevo de hojas; el árbol es marginalmente próspero en el área; o el árbol se encuentra bajo algún tipo de estrés como transplantación reciente. El agente de divulgación agrícola de su condado tendrá varias publicaciones para ayudar en la diagnosis y el tratamiento de los problemas arbóreos, o puedes llamar a un arbolista que esté capacitado en la diagnosis de la salud de árboles.

ARBOLES PODRIAN AVISAR A OTROS DE ATAQUES

Según evidencia preliminaria recopilada por dos investigadores, los árboles podrían avisarse unos a otros de ataques por insectos o enfermedades al emitir una sustancia química especial por sus desfiguradas hojas.

Los dos investigadores de la Universidad de Washington dicen que sus descubrimientos, si fueran confirmados, podrían cambiar de modo significativo el entendimiento del comportamiento de los árboles, particularmente desde el punto de vista de los descubrimientos recientes acerca de cómo los árboles combaten los insectos y las enfermedades.

El contenido nutritivo de las hojas del sauce Sitka también cambió en árboles que habían sufrido daño por las orugas occidentales de carpa, y orugas de seda de otoño, según un informe de dos investigadores de Washington, David F. Rhoades y Gordon H. Orians. Los investigadores dijeron que inesperadamente habían encontrado que la calidad también había declinado en árboles en buen estado ubicados hasta 200 pies de distancia.

"Este efecto podría ser el resultado de una respuesta defensiva en los árboles no atacados estimulados por los compuestos volátiles emitidos por los árboles atacados," dijo el investigador en un informe a la Fundación Nacional de Ciencia.

Orians dijo que se han detectado reacciones semejantes en alisos rojos también, "pero no tan fuerte como en el sauce."

"Probablemente, esta reacción no será única para una o unas pocas especies, pero todavía no hemos tenido la oportunidad de examinar otras," dijo él.

Con una nueva donación de la fundación científica, los dos investigadores pondrán el sauce Sitka en cámara a puerta cerrada para intentar aislar cualquier influencia química del comportamiento del árbol.

De la Asociación de Prensa, Washington, DC

Active Citizenship Today (ACT) is an innovative civic participation program for middle and high school students, planned and implemented in collaboration with the Close Up Foundation and Constitutional Rights Foundation. ACT breathes new life into the study of government and civics by challenging students to apply the knowledge and skills they are learning in the classroom to vital community problems. Designed for social studies classes, the ACT curriculum, including student and teacher materials built around a problem-solving framework, has been adapted by teachers across the country in a variety of subjects. Close Up Foundation, 44 Canal Center Plaza, Alexandria, VA 22314; Phone: 800-336-5479 x640; Constitutional Rights Foundation, 601 South Kingsley Drive, Los Angeles, CA 90005; Phone: 213-487-5590.

American Youth Policy Forum is a nonprofit professional development program, primarily for federal policy aides in the U.S. Congress and executive branch. The Forum's field trips and policy reports often feature developments in community service and service-learning as elements in a comprehensive youth development strategy for youth success. To request publications list: 1001 Connecticut Avenue, NW, Suite 719, Washington, DC 20036; Phone: 202-775-9731.

The Corporation for National and Community Service is a federal agency whose mission is to engage Americans of all ages and backgrounds in community-based service that addresses the nation's education, public safety, human, and environmental needs. The Corporation administers three main programs: AmeriCorps, the National Senior Service Corps, and Learn and Serve America. Learn and Serve America provides grants to state education agencies, community organizations, nonprofit organizations, and institutions of higher education to integrate service and service-learning into the daily academic lives of students and community members in K-12 and higher education. 1201 New York Avenue, NW, Washington, DC 20515; Phone: 202-606-5000; Web:http://www.cns.gov.

The Council of Chief State School Officers (CCSSO) is a nonprofit membership organization of all heads of public education departments across the nation, responding to and providing leadership on a broad range of education issues. CCSSO is currently conducting a study of the connections between service-learning and school-to-work through a series of site visits. Findings from this study will be included in a forthcoming publication. One Massachusetts Avenue, NW, Suite 700, Washington, DC 20001-1431; Phone: 202-408-5505.

FYI Youth is a multi-phase initiative that promotes youth development by linking young people directly to other young people, adults, and their communities. FYI Youth consists of three main components: YouthMapping, in which young people "map" the programs, services, and opportunities available to them and their peers in their communities; YouthData, which synthesizes the data obtained from YouthMapping; and YOUTHLINE, which provides the information from YouthData directly to local practitioners. Contact: Greg Taylor, Center for Youth Development and Policy Research, Academy for Educational Development, 1875 Connecticut Avenue, NW, 9th Floor, Washington, DC 20009; Phone: 202-884-8273; E-mail: gtaylor@aed.org.

The National Association of Partners in Education (NAPE) is a national membership organization dedicated to providing leadership in the formation of effective educational partnerships between a school or a school district and one or more community organizations and businesses. NAPE provides leadership to educators, citizens, businesses, and other community organizations, helping to create understanding and build trust among these partners. Service-learning is a central component of NAPE's efforts. 209 Madison Street, Suite 401, Alexandria, VA 22314; Phone: 703-836-4880.

The National Association of Service and Conservation Corps (NASCC) is the membership organization for 120 state and youth corps programs around the country. Since its founding in 1985, NASCC has served as an advocate, central reference point, and source of assistance for the growing number of state and local youth corps. Corps programs engage young people, generally 16 to 25 years old, in paid, productive, full-time work, which benefits both the youth and their communities., Corps members devote part of each week to improving their basic education skills and to preparing for future employment. 666 Eleventh Street, NW, Suite 500, Washington, DC 20001; Phone: 202/737-6272; E-mail: emonascc@igc.apc.org.

National Service-Learning Clearinghouse: University of Minnesota, Department of Work, Community & Family Education; 1954 Buford Avenue, Room R-460; St. Paul, MN 55108; Phone: 1-800-808-7378; Fax: 612-625-6277; Web: http://nicsl.jaws.umn.edu

The National Helpers Network, Inc. (NHN) provides training and technical assistance to schools, school districts, and community-based organizations working to develop service-learning programs for youth. In addition, NHN operates a database, which includes information on model service programs, research, publications, organizations, and professionals relevant to the field of service-learning. NHN also publishes Community Youth Roles, a quarterly newsletter offering updates and insight on service-learning programs and practices. 245 Fifth Avenue, Suite 1705, New York, NY 10016-8728; Phone: 800-646-4623; E-mail: helpnet@igc.apc.org.

The National School-To-Work Learning and Information Center: 400 Virginia Avenue, Room 110, Washington, DC 20024; Phone: 1-800-211-7236; Fax: 202-401-6211; E-mail: stw-lc@ed.gov; Web: http://www.stw.ed.gov.

The fourteen member **National Service-Learning Cooperative** provides leadership, knowledge, and technical assistance necessary to support and sustain service-learning programs for Learn and Serve America grantees and sub-grantees, K-12 teachers and administrators, community-based organizations, state and local officials, colleges and universities, and the general public. The Cooperative Clearinghouse provides a toll-free information number, a national database of programs and other resources, an electronic database and listserv, and referrals to training and other resources. University of Minnesota, 1954 Buford Avenue, Room R-290, St. Paul, MN 55108-6197; Phone: 800-808-SERVE; E-mail: serve@maroon.tc.umn.edu; Web: http://www.nicsl.coled.umn.edu.

The National Society for Experiential Education (NSEE) is a membership organization that supports the effective use of learning through experience for students' academic and career development, civic and social responsibility, career exploration, cross-cultural and global awareness, and ethical and leadership development. NSEE houses the National Resource Center for Experiential and Service-Learning, which contains publications, research materials, program information, and other resources on experiential education and service-learning. NSEE also refers practitioners to consultants who help develop programs integrating service and learning. 3509 Haworth Drive, Suite 207, Raleigh, NC 27609-7229; Phone: 919-787-3263; E-mail: nsee@interpath.com.

Public/Private Ventures (P/PV) is a nonprofit organization that works to improve youth-oriented private and public sector policies and practices. P/PV has undertaken a number of projects in the area of work and service-learning, most notably WorkPlus, Community Change for Youth Development (CCYD), Bridges to Work, the Summer Training and Education Program (STEP), the Urban Corps Expansion Project (UCEP), and Practical Education for Citizenship and Employment (PECE). Through its work, P/PV has developed a wide variety of model curricula, tool kits, resource guides, and other resources useful to practitioners of service-learning programs. One Commerce Square, 2005 Market Street, Suite 900, Philadelphia, PA 19103; Phone: 215-557-4400; E-mail: ppvg@dolphin.upenn.edu.

The Youth Volunteer Corps of America (YVCA) is a national network of over 40 local affiliates that promote civic responsibility through structured volunteer service among middle school and high school young people. YVCA's mission is to create and increase volunteer opportunities to enrich America's youth, address community needs, and develop a lifetime commitment to service. Local YVCs arrange for young people to do full-time, team-based volunteer service during the summer, and they organize service projects and community-based service-learning (often in partnership with schools) during the school year. Youth volunteers participate actively in structuring YVC service activities, developing and refining their employability skills. 6310 Lamar Avenue, Suite 125, Overland Park, KS 66202-4247; Phone: 913-432-YVCA.

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Project Learning Tree

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