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Animal Tracks Northern Forest Action Pack

Elizabeth Soper

Marsha A. Lakes Matyas

Sara Bradley

Cheryl Dixon

Elenor Hodges

See next page for additional authors

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Authors

Elizabeth Soper, Marsha A. Lakes Matyas, Sara Bradley, Cheryl Dixon, Elenor Hodges, Jennifer Kier, Margaret Tunstall, and Charles Wilkinson

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Thanks!

Follow the Tracks

*Animal
Tracks*

**Northern
Forest**
action pack



...To Action

200
GC
SOP
1998



NATIONAL WILDLIFE FEDERATION®



✓

Animal Tracks[®]
NORTHERN
FOREST
Action Pack

March 23, 1998

NSLC
c/o ETR Associates
4 Carbonero Way
Scotts Valley, CA 95066

Animal Tracks® Northern Forest Action Pack

Written by Elizabeth Soper

K-2 component written by Marsh A. Lakes Matyas

Edited by Sara Bradley, Cheryl Dixon, Elenor Hodges, Jennifer Kier, Margaret Tunstall, and Charles Wilkinson

Spanish translation by Education Consulting Services

The **National Wildlife Federation** (NWF) unites people of all walks of life to conserve our land, water, and wildlife in our own communities and around the world. Since our beginning in 1936, NWF has believed that educating people about conservation is the best way to encourage them to practice it. We act on this belief with programs that make conservation understandable and accessible to all.

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Mark Van Putten, President and CEO

Stewart J. Hudson, Vice President, Educational Outreach

Margaret Tunstall, Director, Classroom Programs Division

Elenor Hodges, Animal Tracks Senior Program Coordinator

Cheryl Dixon, Animal Tracks Training Coordinator

Sara Bradley, Animal Tracks Assistant Coordinator

Jennifer Kier, Administrative Aide, Classroom Programs

Sharon Levy, NWF Librarian

Special thanks to: R. Montgomery Fischer and Andrea Colnes

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NATIONAL WILDLIFE FEDERATION®

People and Nature: Our Future is in the Balance

Dear Educator:

Welcome to **Animal Tracks®**, a classroom education program of the National Wildlife Federation focusing on teacher training and environmental education resources. In Animal Tracks materials, the animals and their tracks lead educators and students on an exploration of conservation issues.

Thank you for using this Action Pack, our newest resource. We hope you find the Action Packs useful and as a “work-in-progress,” we welcome any comments you might have for improvements. As you turn the page you’ll see our questionnaire. Please take a minute to fill it out and put it in the mail. We’ll include you on our mailing list and you’ll get invitations to any Animal Tracks educator workshops that we hold in your area as well as the latest information on Animal Tracks programs and materials.

Animal Tracks Workshops are a large part of the Animal Tracks program. The Action Pack series was originally developed as our teacher training module. The workshops are designed to help teachers easily fit environmental and conservation issues into their lesson plans across the curriculum. Animal Tracks workshops emphasize learning by doing and include an interactive discussion of how to successfully incorporate action projects into learning.

Animal Tracks has educator materials and information available **online** at <http://www.nwf.org/atracks> including the Water and Habitat Action Packs, Current Events Hotline, information about NWF’s EarthTomorrow® program for Detroit area schools, Environmental Education Online Conference, Animal Tracks Workshop schedule, and Animal Tracks Online classroom activities. There are also Animal Tracks kids’ pages at <http://www.nwf.org/nwf/kids/> with our *Cool Tour of the Environment*, Ranger Rick® site, resources in *Spanish*, games, and more fun.

The next pages of the Action Pack are a questionnaire and an explanation about how to effectively use the Animal Tracks Action Packs. Again, we hope you find this a valuable resource and be sure to check out all the Animal Tracks Action Pack titles!

Sincerely,
The Animal Tracks Staff

Welcome to the Animal Tracks Action Pack!!!

Each action pack is specifically designed to be an introductory unit for educators that work with students in grades K-8. The Animal Tracks theme of *Follow the Tracks to Action* is reflected in each Action Pack as the section works together to compliment the learning process. Students are taken from *Discovery* of the topic to *Awareness* of the issues related to the topic and then encouraged to take individual *Action* to positively impact the environment. To maximize comprehension of the topic, we recommend using the Action Pack as a unit, but activities can also be used separately to enhance other units.

Following is a description of each section of the Action Pack and suggestions for using the sections together as a unit.

Discovery section - provides a *quick look* at the background information surrounding the topic. It also contains *fun facts* to engage the interest of your students. The learning objectives contained in the discovery section help you include the activities of the Action Pack into the curriculum.

Awareness section - contains several indoor and outdoor activities for students in grades K-8 which can be used consecutively in a unit or individually to enhance other units. These activities illustrate key environmental concepts through fun-filled and challenging cross-curricular lessons. A ready-to-copy Kids' Page is included for individual student work. As a special bonus all student pages, including the Kids' Page, are translated into Spanish for content accessible to ESL students or foreign language classes.

Action section - uses step by step guidelines for environmental action and service learning projects to help students go the next step in understanding complex issues. This section contains worksheets for students to plan their action projects. A case study features an action project implemented by students to heighten community awareness of their environment. Also included, are a number of ideas for projects to help get groups started.

Appendices section - provides educators with quick references and resources to help in the planning of the unit. These appendices include a glossary, guide to additional activities, resources for teachers and children, related organizations and web sites, opportunities for getting recognized, and information on other NWF education programs.

Special Features:

- ▶ Special activities just for early elementary (K-2) students
- ▶ Kids' Pages with "self guided" activities and information for students
- ▶ Assessment activities with extensions/modifications ideas
- ▶ Student pages in English and Spanish
- ▶ Resources for further reading for teachers and students
- ▶ Additional related activities from other NWF resources referenced by grade level

Let us hear from you!

The Animal Tracks staff is committed to serving you and other educators. Write, call, or e-mail us your thoughts and comments on how you used the Action Pack and what you would like to see in its next revision. Refer to the following "Send Your Comments" questionnaire.

Animal Tracks

Questionnaire

.....

Name: _____

Address: _____

Email: _____ Phone: _____ Fax: _____

I am a(n): Teacher Parent Home Schooler Other

Grade(s): _____ Subject Specialty _____

How did you find out about Animal Tracks Action Packs?

Animal Tracks Brochure NWF's Website Workshop Conference Other _____

Please make any comments on the different sections of the Action Pack below.

Discovery:

Awareness:

Action:

Appendices:

Suggested Topics for future Animal Tracks Action Packs:

Place
Stamp
Here

Animal Tracks
National Wildlife Federation
8925 Leesburg Pike
Vienna, VA 22184

*Thank You for Your
Thoughts and Comments!*

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DISCOVERY

**“Forests are the ‘lungs’ of our
land, purifying the air and
giving fresh strength to our
people.”**

-Franklin D. Roosevelt

Fun Facts

DID YOU KNOW?

The Northern Forest is so large that it could hold 10 Yellowstone National Parks!

DID YOU KNOW?

Acid rain damages trees, plants, and animals, and it even dissolves stone.

DID YOU KNOW?

Over the last 15 years, over 5000 square kilometers of Maine's Northern Forest have been clearcut.



DID YOU KNOW?

The Northern Forest contains more than 7,000 lakes that cover over 4 million square kilometers and 10 million square kilometers of wetlands.

DID YOU KNOW?

Nearly a quarter million people in the Northern Forest depend on the forest for their livelihood. About 2/3 of these jobs are in recreation and tourism and about 1/3 are in forest products manufacturing.

A Quick Look: *The Northern Forest*

The *Northern Forest* is one of our country's last great forests. It covers a region of over 26 million acres (larger than the states of Vermont and New Hampshire combined!) composed of woodlands, mountains, rivers, streams, and lakes that stretch from the northern woods of Maine through New Hampshire and Vermont into the Adirondack Mountains and the Tug Hill region of New York.

We all depend on forests everyday. Forest products are everywhere in our daily lives: paper products, wood furniture, foods, and lumber for building. We also depend on these areas as a source of clean water and air, for recreation, and as a home for wildlife. With increased pressure from development, large scale *clearcutting*, acid rain, and the use of *herbicides*, parts of the Northern Forest and the resources it provides are presently in danger of being lost. The future of the Northern Forest and other wild places is in our hands. We each can make a difference in protecting these important areas.



This Action Pack will help you answer the following questions about the *Northern Forest*:

- ✓ What is the Northern Forest, and how is it unique?
- ✓ Why are *forest ecosystems* important for us and for wildlife?
- ✓ What are the parts of a forest ecosystem?
- ✓ What critical habitats exist in the Northern Forest, and what wildlife species depend on these areas?
- ✓ What are the current threats to the Northern Forest?
- ✓ What can you and your students do to help preserve and restore this unique region and other areas like it?

Background

A Unique Resource

The Northern Forest is unique. Its combination of size and location, spanning over 450 miles in the northeast, makes it unusual. What also makes the Northern Forest unique is its ecosystem of transitional spruce/fir and hardwoods. This ecosystem provides critical habitat for many wildlife species, including many species such as spruce grouse and pine martin found only in this area. The Northern Forest also provides critical nesting habitat for many of the world's migratory songbirds, and all of the region's major rivers have their *headwaters* in this region.

What also sets this region apart from other forested areas in the US is that much of the Northern Forest land is privately owned. Over 84% (21.8 million acres) is controlled by private landowners, many of whom are large corporations. The management of these private lands has a profound impact on the quality of resources the Northern Forest has to offer for wildlife, water, air, and recreation.

Forest Ecosystems —Good For Wildlife and Humans

Wildlife and people coexist in the Northern Forest, and both depend on its rich resources. People have lived and worked throughout the Northern Forest for centuries, and today over one million people live within this area. More than 70 million people (more than 1/3 of the total U.S. population) live within a day's drive of the Northern Forest as well. People everywhere depend on the world's forests to provide the oxygen we breathe, clean water, soil protection and flood control, climate control, and forest resources such as wood products, food, recreation, and tourism. Wildlife also depend on the habitat and *diversity* found in forests for their food, water, shelter, and places to raise young.

Layers of Life —The Components of a Forest Ecosystem

The Northern Forest is similar to other forests in that it provides a wide variety of smaller ecosystems where an abundance of wildlife make their homes. A forest ecosystem is composed of several layers. Different kinds of wildlife can be found in every cubic inch of the forest from the top of the forest *canopy* to the bottom of the *forest floor*.

A forest can be thought of as a high-rise building in a city with many layers starting at street level and rising high into the sky. In the forest, each level is a different ecosystem supporting different kinds of wildlife. The canopy, which is the uppermost forest layer, consists of the branches and leaves of the tallest trees. It is exposed to the most sunlight and serves as the food-making layer. Under the canopy are the layers of the *understory*, composed of smaller trees, shrubs, ferns, plants and grasses. Below the understory is the forest floor—the area where soil, hollow logs, fallen branches, leaves, lichen and mosses collect and decomposition takes place. Even the dead trees or “*snags*” are home to wildlife, providing critical nesting cavities and a rich source of food. Most forest species are specific to one or two layers, where they find everything they need to thrive. With so many different habitats, diversity is rich and the competition among species is reduced as each finds everything it needs to survive in its particular layer of the forest.

A Self-Sufficient Community

Forest ecosystems are self-sufficient “food-making machines.” The *primary producers*—trees and other green plants—make the food needed by *consumers*. Consumers are the animals in the forest that either eat green plants themselves or get energy by eating animals that feed on green plants. Once these plants and animals die, *decomposers* such as fungi, bacteria, earthworms, and other organisms break down the dead material in the forest ecosystem community. This efficient process allows the forest to recycle wastes, turning dead plants and animals into nutrients that are then absorbed by the roots of the trees and other producers.

A Dynamic Ecosystem that is Always Changing

The forest community is always changing. This changing process is called succession. *Ecological succession* is the gradual change in plant and animal communities over time. Herbs give way to shrubs, which give way to seedlings, then to a young forest, and finally into a mature forest. There is also *secondary succession* which occurs on landscapes where the natural vegetation has been removed or destroyed but the soil has remained intact. The Northern Forest is a good example of secondary

succession. Most of the original forest was cut for timber or cleared for agriculture by European settlers in the 17th, 18th, and 19th centuries. As farms were abandoned, the fields began to grow back into forests. The Northern Forest is actually more forested today than it was at the turn of the 20th century. Human intervention has been a major factor in affecting forest succession.

Critical Habitat For Wildlife

The Northern Forest has tremendous biological diversity. It is composed of a rich mixture of mountain ranges, wild rivers, lakes, and wetlands, providing a diversity of ecosystems and an abundance of wildlife species. Approximately 400 species of birds, 55 species of mammals, 11 species of reptiles, and 19 species of amphibians are found in the Northern Forest. Moose, black bear, many species of fish, and beaver utilize the uplands and wetland areas, while fish such as the Atlantic Salmon live in the wild rivers that flow through the region. Many wildlife species including the mink frog, northern bog lemming, pine martin, and spruce grouse are unique to the north country where they depend on spruce/fir and hardwood forest for their survival.

The Northern Forest also provides critical nesting habitat for many of our migratory songbirds. Black-throated blue warblers, ovenbirds, and vireos all spend their winters in South and Central America and then migrate to the Northern Forest to nest. Species like the ovenbird, which prefer older forests for nesting, return to the same area year after year. Often it is this critical habitat, mature timber stands, that are the first to experience large scale clearcutting.

The Northern Forest is also a vital source of water for the northeast. The headwaters of the Northeast's main river systems, such as the Hudson and Connecticut, begin in the Northern Forest. This amazing source of water— 68,500 miles of rivers and streams, over 1 million acres of lakes and over 2½ million acres of wetlands— must be preserved and restored where possible to maintain the critical habitat for wildlife and the abundant clean source of water for everyone.

The Human-Forest Relationship

Since the first settlers began cutting wood back in the 1600s, the Northern Forest has seen an uninterrupted cycle of use which continues today. With over 84% of the Northern Forest in private ownership, this resource is experiencing the stress of development, excessive logging, and the over-use of herbicides. Currently, the value of some lands is higher for development than it is for growing timber, encouraging land owners to subdivide and develop their land. In the late 1980's, over a million acres of the Northern Forest were sold to developers. This, along with continued *clearcutting* of huge tracts of land, has *fragmented* the forest, making it difficult for migratory birds and wildlife with large home range needs to survive. Herbicide use and acid rain are additional factors threatening the delicate ecosystems of the Northern Forest. These toxins impact the water quality of this area and thus the health of both humans and wildlife dependant on it.

The Northern Forest has proven to be remarkably resilient. Through centuries of exploitation the forest has continued to come back, but it doesn't always grow back as it was before. The composition of the Northern Forest is very different today than it was centuries ago. Only ½ of one percent (0.5%) is currently *old growth forest*. The demand for wood and land has never been as high as it is today. With continuing advances in timber cutting technologies and development, the resilience of the Northern Forest is being tested to its limit.

Reaching Sustainability

The solution to these problems is threefold; the protection of large tracts of land or “wildlands,” encouraging sustainable timber management practices, and strengthening local economies and communities. But until we find a way to reduce human dependence on wood products, the Northern Forest must also remain a “working forest” at sustainable levels with good stewardship.

Each one of us can have a say in how the Northern Forest and other forested areas in our country are protected and managed. Each one of us can also reduce our impact on these forested areas, helping wildlife and the critical habitat they depend on. Ways for you and your students to become more aware of this great resource and get involved in its protection will be discussed in the next sections of this Animal Tracks Action Pack.



AWARENESS

**“All the flowers of all the
tomorrows are in the seeds of
today.”**

-Chinese Proverb

Awareness Notes...



A series of horizontal lines for writing, consisting of 20 parallel lines spaced evenly down the page.



Forest in the Supermarket

SUMMARY: In this activity students will discover the wide variety of forest products they use nearly every day.

GRADE LEVEL: 3-7

TIME ⌚: 30 minutes

SUBJECTS: Science

SKILLS: Observation, Deductive Reasoning

MATERIALS:

- Items from Forest Products List
- 1 blanket, sheet, or tablecloth
- pencil and paper for each student

DID YOU KNOW?

It takes all the trees from 4,047 square meters (one acre) of forest to build one average-sized house?

LEARNING OBJECTIVES: Completing this activity will allow students to...

- ✓ name several common household products that originate in the forest.
- ✓ understand forest uses by people and wildlife.

BACKGROUND:

Every day people use items that they may or may not realize come from the forest. The forest provides us with food, shelter, entertainment, and a host of paper-related products. Our everyday needs are dependent on forest products. For instance, 80% of the materials used for home construction in the US are wood-based.

Many of these products come from parts of trees that you may not normally consider. Medicine and extracts have been derived from the roots of trees; bark can be used to make cork and dyes, and some tree saps produce delicious syrups and useful waxes.

The forest provides people and wildlife with more than just merchandise. Moderating area climates, cleansing water sources, recharging the oxygen cycle, supplying habitat for wildlife, and providing places for recreation are just a few of the services a forest provides. Life would be very different, and more difficult, without these benefits.

At the turn of the 20th century, much of the forested land in the Northern Forest had been cleared for agriculture and wood supplies. As these resources were depleted and coal and oil become more plentiful, the land was abandoned and the forest began to re-establish itself. In fact, there are now more forested acres in the Northern Forest than there were a hundred years ago.

Every year population pressures, along with local and international demands for forest products, have increased. As the forest grows back, its composition is not the same. Paper and wood industries develop large tracts of fast-growing trees with limited diversity. The less diverse the environment, the less diversity it can support. Old growth forest stands that many wildlife species depend on for survival have been greatly reduced. Development and common timber harvesting practices have increased fragmentation—the breaking up of continuous forested areas into smaller patches—in the Northern Forest to the detriment of other

other wildlife species. Foresters are exploring ways to reduce these negative effects and ways to create more sustainable forestry practices.

PREPARATION:

Before the students come into the classroom, place 15-20 items from the Forest Products List (p. 12) on a table and cover them with a sheet, blanket, or tablecloth.

PROCEDURE:

1. Explain to the students that on the table there are several items which are somehow related to one another. Have the students come up to the table in groups small enough that everyone will be able to see all the items when the cover is removed. Remove the cover and give the students 20-30 seconds to observe without touching the items before covering them again. Then instruct the students to write the names of as many items as they remember on a sheet of paper.

2. After the students have had sufficient time to write their observations down, ask them to look at their lists and try to determine what all the items have in common. You may wish to have students join forces in small groups to brainstorm the relationship between all the items.

3. After the students have discovered that all the items are products from the forest, you can remove the cover and discuss any of the items on the table. Discuss the origin of the items. What part of the tree or forest is each item from? Were they surprised to learn the source of some of the items?

4. Have the students form small groups to discuss how their lives would be different without these products. Then, brainstorm some alternatives to using these wood-based products. What are the sources of the materials that would make the alternative products?

EXTENSIONS/MODIFICATIONS:

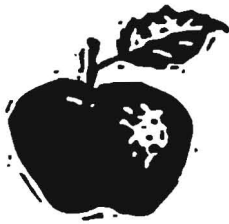
- ❖ Have the students inventory the products in their homes or at school that come from trees or a forest. Explore whether those items come from a local or distant forest.
- ❖ Take a walk through a forest. Have the students make lists describing all the things wildlife can use in the forest.
- ❖ Test students' observation skills further by secretly removing one or two items from under the cover, then ask them to observe again and name the item(s) that is(are) missing.
- ❖ Make recycled paper with your class. For instructions on ways to make your own paper, check out:
 - 🌳 Project Learning Tree: Environmental Education Activity Guide, Pre-K - 8
by the American Forest Foundation,
1111 19th Street, NW, Washington, DC 20036
 - 🌳 Or: Project Seasons: Hands-on Activities for Discovering Wonders of the World
by Shelburne Farms, Shelburne, VT (802) 986-8686.



Forest Products

Foods

Chestnuts
Maple syrup
Pecans
Apple
Walnuts
Mushrooms
Teas
Root beer
Nutmeg
Cocoa



Paper Products

Baseball Cards
Books
Cereal boxes
Cardboard
Magazines
Newspaper
Paper towels
Photographs
Facial tissue
Writing & wrapping paper



Wood Products

Furniture
Lumber
Carvings
Toys
Models
Cedar wood chips
Baseball Bats
Wooden bowl
Ruler



Gums & Resins

Cosmetics
Mouthwash
Paint thinner
Varnish
Perfumes & soaps (from Oils)
Rubber gloves
Chewing gum
Balloons
Erasers
Shoes
Tires
Rubber bands
Rubber balls
Crayons



Canes & Fibers

Bamboo
Rope
Twine
Burlap
Clothing
Furniture



Cellulose

Carpets
Ping-pong balls
Wallpaper paste
Shampoo
Coffee filter



Tree Bark

Bottle corks
Dyes
Tannin (for leather)
Cinnamon



**Everywhere we look we see
forest products!**

Layers of Life: From Canopy to Forest Floor

SUMMARY: Students will research and create a wall size forest ecosystem in their classroom that shows the different layers of ecosystem interactions.

GRADE LEVEL: 3-6

TIME ⌚: Two or more class periods, depending on whether or not you can do a field trip

SUBJECTS: Science, Art, Ethics

MATERIALS:

- Large open wall or bulletin board
- Roll of craft or butcher paper
- Colored paper
- Markers
- Yarn or string
- Push pins
- Field guides
- Notepaper

DID YOU KNOW? The Northern Forest is home to regional endangered species such as the bald eagle and peregrine falcon.

LEARNING OBJECTIVES: Completing this activity will allow students to...

- ✓ understand the parts of a forest ecosystem.
- ✓ understand the interactions between plants and animals — forest food web.
- ✓ understand how humans and forests interact.

BACKGROUND:

The Northern Forest is a diverse and rich ecosystem. Like other forests, the Northern Forest is able to support a diversity of plants and animals because of its unique structural layers. Plants make up three distinct forest layers: the canopy, the understory, and the forest floor. Different wildlife species make their homes in one or two of these layers, which define the areas where they search for food, shelter their young, and set their territories.

The canopy is the uppermost layer, consisting of the branches and leaves of the forest's tallest trees. Most of the *photosynthesis* in the forest takes place in the canopy which receives the most sunshine. The forest canopy acts as a filter, affecting the quantity and quality of light that reaches the understory. Many of the Northern Forest's small spring flowers, such as the trout lily and spring beauty, begin to emerge even before winter snow is gone to capture as much sunlight as possible before the canopy closes in.

Below the canopy is the understory, which consists of shorter trees, shrubs, ferns, plants, and grasses. Many of these shorter trees may be offspring of the canopy trees and with time will replace their parents. Below the understory is the forest floor, where on top of the soil, hollow logs, fallen branches, leaves, lichen, and mosses collect. This is the area where decomposition takes place, creating important nutrients for growing plants and animals.

Many also consider the tree trunk to be an important and distinct forest layer. Many forest insects and other small animals spend their entire lives under the bark of a tree, and other wildlife species such as

woodpeckers and screech owls nest in and/or feed on the trunk. Leaving dead trees or “snags” standing is crucial for the survival of some wildlife species.

Most wildlife species are “tied” to one or two layers. For example, in the Northern Forest you would most likely find wild turkey, deer, and ruffed grouse in the understory and forest floor. It would be unlikely to find them in the canopy, where you would be more likely to see bats, owls, and red squirrels. The forest floor contains a unique mixture of salamanders, centipedes, earthworms, and ground nesting birds such as ovenbirds. Even songbirds who fly from great distances tend to be tied to a certain layer. In this way, a diverse number of animals are able to live in a forest without competing for food or nesting sites.

Forests are also considered to be self-sufficient “food making machines.” The diverse number of plants and animals that live in a forest are constantly recycling energy and nutrients through the system. Plants are the producers. They take sunlight and produce the food that is necessary to feed the consumers. The consumers are animals in the forest that either eat plants or feed on other animals that eat plants. The decomposers are the fungi, bacteria, worms, insects, and other organisms on the forest floor that take the forest’s “waste” products and break them down into useful nutrients. A forest that supports a large diversity of plants and animals to maintain this process is a balanced ecosystem. When one or more critical species are lost, it has a negative effect on the health of the entire forest community.

PROCEDURE:

1. Start by introducing the concept of the forest ecosystem to your students. Explain that a forest ecosystem is complex and contains a diverse number of plants and animals, each playing a role in the health of the community. Work with your students to define the different layers in a forest and the roles that plants and animals play in each.
 2. Once they have grasped the concept of the forest ecosystem you have two choices:
 - A. If you have access to a forested area (think about town parks and forests as potential sites) take your students on a field trip and explore the forested area. Have students work in pairs, writing down everything they see. Have them get down on their hands and knees and look at the forest floor. What did they find? Have them turn over a dead log or look into a cavity in a tree. Have them lie on their backs and look up into the canopy. If possible engage a local or state forester to join you in your exploration.
 - B. If a site is not available, you can brainstorm in your classroom with your students. Ask them to imagine the types of things they might find in a forest. Have them research in pairs or have a forester come in to explain the types of plants and animals that might live in a forest and in what layers they might be found.
 3. Once your inventory is complete, help your students take the information and classify it according to layers. Help them list the plants and animals that belong in the canopy, the understory, on the forest floor and on the tree trunk. Once they have done this, you can also have them classify the plants and animals as producers, consumers, and decomposers.
 4. Your students are now ready to produce a forest ecosystem in your classroom. You will need a large bulletin board or wall in your room. If this isn’t available, maybe a hall in your school or gymnasium could provide the space. Divide your class into three groups. Give each group the responsibility for creating one layer of life: the forest floor, understory, and canopy. Have them use their inventories to help

them determine what will be in their layer, and using construction paper, magic markers, and other art supplies have them create this layer on a long sheet of kraft or butcher paper. For example, the group that is responsible for the forest floor should be thinking about the types of plants and animals might be found there. The bases of canopy trees, roots, mushrooms, fungi, bacteria, and fallen logs are all good examples of things your students could use to illustrate the forest floor. Wildlife might include earthworms, beetles, salamanders, frogs, and birds.

5. Once students have created their layers, let them work with the other groups to put together the entire forest ecosystem. This might take a bit of work, but the end result will be a wall-sized mural of your students' research into the elements of a forest ecosystem.

6. The final step of this activity involves using your classifications from the beginning of this activity to produce a wall-sized forest food web. A food web is a way of explaining the transfer of energy between animals and plants. It is more complex and more accurate than a food chain, since most animals tend to eat more than one kind of food. Either directly or indirectly, each plant and animal that your students have created on their mural depends on the others for their survival. Explain that plants, which are producers, form the base of almost every food web, using the sun as their energy source. In turn, consumers eat the plants and each other. The decomposers are those bacteria, fungi, worms, insects, and other organisms that help to decompose waste materials and turn them into nutrients.

Have students determine what each animal on their mural needs to survive. Using household string or yarn and push pins create a food web that shows the connections between the plants and animals on your mural. Once these connections are made, have students discuss what might happen to this food web if one of the connections were broken or disrupted. Encourage your students to think about what would happen if all the producers were killed by pesticides or if there were too many consumers. Are there activities that people engage in that might affect this food web?

EXTENSIONS/MODIFICATIONS:

- ❖ Have students add human beings to this ecosystem. Brainstorm with your class about the types of human activities that occur in a forest. Encourage them to think about more than just recreation. Think about forest products like timber and paper, food sources like maple syrup and apples, and consumptive recreation like hunting and fishing. Have them include drawings of these activities on the mural and discuss the kinds of impacts these activities may have on a healthy forest ecosystem.
- ❖ Write a creative story about the forest ecosystem focusing on the life of one animal or plant and its part in that ecosystem. (Consider "Bambi" as an example, just to get students started.)
- ❖ For older students, have students create a forest ecosystem replica in an aquarium. They can use twigs, branches, and leaves for the plants and mold wildlife from clay. They should use their imaginations to help them represent each layer of the forest ecosystem.




Need to Succeed:

Natural Succession of Natural Forest

SUMMARY: Students will explore the dynamic process of succession in a natural area.

GRADE LEVEL: 3-8

TIME : 50 minutes outside and 40 minutes inside

SUBJECTS: Science, Math

SKILLS: Prediction, Measuring, Mapping

MATERIALS: (One for each group)

- pencil
- clipboard
- tape measure
- 4 sticks or stakes
- 4.5 meters of string
- 6 overhead transparencies for each group, overhead transparency markers

Did You Know?
In the western United States, the biggest cause of forest fires is lightning?

HANDOUT: 

- Succession Inventory Data Sheet (p. 20)

LEARNING OBJECTIVES: Completing this activity will allow students to...

- ✓ understand the natural forest process of succession.
- ✓ understand the role of natural and man-made disturbances on the forest ecosystem.

BACKGROUND:

Succession is the natural cycle of a forest. Forests are dynamic and forever changing in shape and species composition. Over time, the plant species represented in an area will be replaced by other species more tolerant of the gradually increased competition for limited resources, e.g. space and sunlight. The stages of succession are defined by the species types dominant in the forest at a given time and many successional stages are represented throughout the natural life-cycle of a forest. Each of these stages has unique characteristics which are beneficial to different species.

The successional cycle generally begins in a recently disturbed area where areas of bare soil have been exposed. These areas can be caused by fire, disease, logging, or other events which kill existing trees or other ground cover. In a very short period, this area will give way to non-woody pioneer plants. These pioneer plants are fast growing, sun-loving and are the first to dominate an area. Many of the plants to grow at this time are grasses and non-woody plants, such as wildflowers. This type of forest provides tender vegetation for browsing deer and cover for a mouse hiding from a hawk. As these pioneer plants become established, young woody shrubs and pioneer trees begin to take root in the area. In the Northern Forest, you would expect to find eastern white pine, tamarack, paper and grey birch, black cherry, aspen, and poplars to establish quickly in a recently logged or burnt area.

Trees that grow at a slower rate and that can tolerate less light are called intermediate trees. Intermediate trees include yellow birch, white spruce, red maple, and white ash. Pioneer species can't compete with the partial shade created by intermediate trees and are eventually shaded out. As the pioneer trees fade out, room is made for the next stage of trees—the shade-tolerant climax trees.

Climax trees can reproduce in their own shade and are usually considered the last stage in succession before a disturbance returns the successional story to the beginning. Climax species in the Northern Forest are black and red spruce, northern white cedar, American beech, sugar maple, and eastern hemlock. The altitude of a forest area plays a role in determining which climax species are found there. For example, areas at higher elevations are more likely to have a spruce/fir forest, where lower elevations and valleys might consist of beech and maple trees. With a full tree canopy and shaded forest floor, climax forest areas have a limited amount of understory. Even with the diminished understory used by large numbers of wildlife, many species like the ovenbird depend on climax forests for their habitat and survival.

Disturbances may keep an area from ever reaching its climax stage. Fire, storms, grazing, and timber harvesting are examples of the disturbances that can move a forest backwards in the successional process. These disturbances may occur in small pockets of a forest, creating a variety of successional stages in close proximity. This can be important to some wildlife species, such as deer or fox, because these disturbances may create “edges,” with young, tasty pioneer species next to areas with thicker understory for cover.

Foresters sometimes manage the forest to keep it from progressing to other stages in order to use the products from a desired stage. For instance, pine is a pioneer tree in the Northern Forest which is harvested for lumber. On the other hand, wildlife managers like to maintain a variety of successional stages to benefit a larger number of wildlife species. A mixture of successional stages increases the diversity of plants and animals, allowing a complex food web of producers and consumers.

PROCEDURE:

1. Introduce your students to the concept of succession and the forest as a dynamic ecosystem. Explain that the composition of the forest was different 100 years ago and it will be different in another 100 years. The forest goes through stages of growing up, similar to people, except the forest can start over at an early stage if it is disturbed by fire, disease, grazing, tornados, people, etc. These stages do not change overnight. A forest slowly changes its dominant *cover type* over time. Some forests never reach their climax stage.

2. Find an area that represents a number of different successional stages. An area that transitions from a meadow into a forest works well, as long as it's not mowed and the edges of the meadow do not abruptly change into the forest area.

3. Students will work in teams to inventory the different stages of succession represented in this area. Have the students start with the early stage and set up a plot to work with. They may use sticks and strings to mark the borders of their plot. An area 0.9 m by 0.9 m is a manageable size.

4. Inside each plot the students should count the number of plants of each cover type and record them on the Inventory Data Sheet (p. 20). When the students are done, have them pick up the sticks and string to use in the next plot.

5. Students should take 5 steps toward the older successional stage and set up the next plot area. Then repeat the inventory, recording the number and kind of plants on the Inventory Data Sheet. The distance between plots can vary, depending on how gradual the transition is between youngest and oldest successional stages. If the transition is abrupt, plots should be closer together. If the transition is very gradual, plots may be as far as 30.5 meters apart. Plots should not be so far apart that different stages are skipped in the sampling.

In the Classroom:

6. Have students graph the data from their inventory. Discuss the trends students found from their inventory. In which plot did they start to see young trees? Which plot had very few non-woody plants? Were there any areas where natural succession had been altered? How or by what had succession been altered? How did they tell the difference between shrubs and young trees?

7. Next, have students draw transparencies of their plots from a bird's eye view. Give each group a number of different colored markers and one transparency for each plot they inventoried.

8. Beginning with the youngest successional stage and moving to the oldest they explored, students should draw one successional stage on each transparency. If the area surveyed did not represent many stages of succession, have the students fill in the gaps as best as they can.

9. Have the students go back to each stage and brainstorm about the animals that might live in that area. They can then go back and add the animals to the appropriate transparency.

10. Place the transparencies in order on top of one another, youngest stage on the bottom of the pile. Now tape one side of the pile, like the binding of a book. The class can now read the successional story of the forest, starting from the back and reading to the top (oldest stage) transparency.

EXTENSIONS/MODIFICATIONS:

❖ Use spring or fall as a high-speed analogy of succession. Watching an area in the spring is similar to succession. As grasses grow, shrubs bloom, and trees leaf out, it simulates the linear process of succession. Watch an area on a regular basis during the spring and record when the following succession stages happen:

- ☞ Grasses and non-woody plants start to show through the dead plant material.
- ☞ Wildflowers start to bloom as woody plants and shrub buds start to swell.
- ☞ Woody plants and shrubs bloom, and wildflowers begin to die

Note that these changes support different wildlife species a well.

❖ Have the students draw a map of the area they surveyed and show all the successional stages represented in that area.

❖ What are some signs that succession had been altered in this area? Have the students identify places that have been disturbed and how that disturbance has changed the successional phase of that area.

❖ Look for signs of wildlife in each successional area. What types of wildlife would you expect to find in each area?

❖ Have each student write a story about the successional stages and changes of an area. They might want

to use the technique of “anthropomorphosis,” and give each area a personality that developed as its stages changed.

❖ Students can draw a mural of the forest profile for the area they inventoried and the overlays they created. This activity can be done in conjunction with the “Layers of Life: From Canopy to Forest Floor” activity (p. 13).

❖ Students can graph the types of plants in their plots.

❖ Succession happens in almost all ecosystems. The specific species vary according to local climate and soil conditions. To do this activity in regions outside the Northern Forest area consult a field guide that includes the plants likely to be found in that region.





Succession Inventory Data Sheets

Plot #1

_____ # of non-woody plants

_____ # of woody shrubs

_____ # of young trees

_____ # of mature trees



Plot #4

_____ # of non-woody plants

_____ # of woody shrubs

_____ # of young trees

_____ # of mature trees



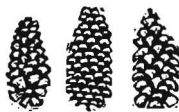
Plot #2

_____ # of non-woody plants

_____ # of woody shrubs

_____ # of young trees

_____ # of mature trees



Plot #5

_____ # of non-woody plants

_____ # of woody shrubs

_____ # of young trees

_____ # of mature trees



Plot #3

_____ # of non-woody plants

_____ # of woody shrubs

_____ # of young trees

_____ # of mature trees



Plot #6

_____ # of non-woody plants

_____ # of woody shrubs

_____ # of young trees

_____ # of mature trees



Going with the Flow

SUMMARY: Introduce the concept of a *watershed* and the important role that forests play in maintaining a clean, healthy watershed.

GRADE LEVEL: 4-8

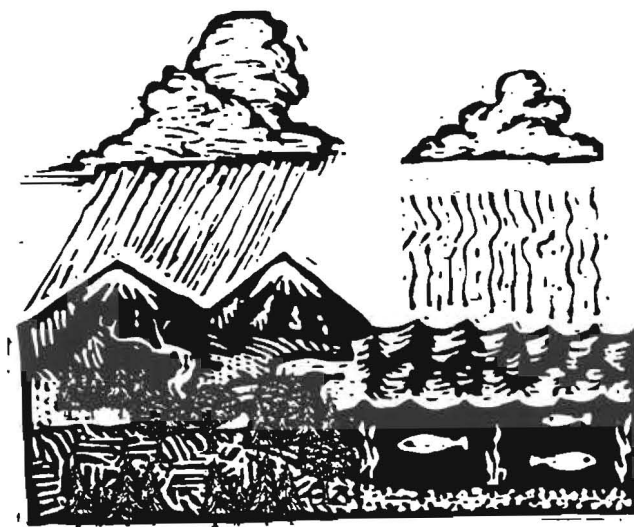
TIME ⌚: 30 minutes

SUBJECT: Science, Art

SKILLS: Observation, Analysis, Interpretation

MATERIALS:

- Aluminum foil
- Plastic cups (varying sizes)
- Packets of unsweetened dry drink mix (grape or cherry)
- Lunch trays or large platters or pans
- Watering cans or spray bottles
- Green sponges



LEARNING OBJECTIVES: Completing this activity will allow students to...

- ✓ understand the importance of watersheds to water quality.
- ✓ understand the role of forests in a healthy watershed.

BACKGROUND:

Water is a prominent feature of the Northern Forest. It contains over 40,000 rivers and streams, as well as 7700 lakes and nearly 2½ million acres of wet meadows, marshes, swamps, peatlands, and bogs. These wetlands are important to the area's water supply, wildlife habitat, plant diversity, recreation, and aesthetics. The Northern Forest contains the headwaters for the major rivers of the northeast, including the Hudson, the Connecticut, the Saint John, the Kennebec, the Penobscot, and the Saint Croix rivers. These and other rivers are major waterways leading to New York City, Albany, Augusta, Bangor, and Hartford. These rivers and their tributaries weave an intricate web of water resources to form the northeast watershed systems.

The Northern Forest plays a vital role in the water quality of its rivers and tributaries. The forest reduces soil erosion, filters toxins from runoff, and moderates seasonal flooding. Trees and ground cover reduce the amount of soil that enters the stream ecosystem that could potentially harm aquatic invertebrates and fish populations. The roots of trees prevent floods from washing away the forest floor. A forest also acts as a buffer to decrease runoff from local agricultural fields. Forests slow potentially ravaging floods by dispersing the force of excess water.

The pollution problems in the Northern Forest and any other ecosystem can be described in terms of point and *non-point pollution*. Non-point pollution involves toxins that don't come from a particular, identifiable source, including materials that wash off of streets, lawns, farms, and other surfaces. *Point pollution* involves toxins that come from a particular identifiable source, such as from a factory or sewage treatment plant.

PROCEDURE:

1. Discuss the term "watershed" with the students. Have them look at a map of the northeast region and outline the watershed systems that feed into the Atlantic ocean. Also, have them identify the headwaters

of the major rivers in the area. What is “land management” and how do the land management practices in each watershed affect the quality of the water entering the ocean?

2. Have the students divide up into groups of four. Explain to the groups that they will be designing their own watershed with the materials provided: aluminum foil (land), plastic cups (molds for mountains and hills), and the tray (bedrock). Place two or three plastic cups upside down on the tray. Have the groups mold aluminum foil over the cups to create the mountains, valleys, and rivers. (Students should spray their watersheds to map the flow of water across them.)

3. When the watersheds are complete, invite the groups to discuss the types of land use that take place in their watershed: agriculture, industry, urban development, roads, recreation areas, etc. How might these land use areas affect the water quality in your watershed?

4. Ask the groups to sprinkle some pollution or bare soil (represented by the dry drink mix) over areas where they think the land use may affect the water quality. Invite the group to make some predictions as to what will happen when rain falls on the pollution and bare soil.

5. Give the groups spray bottles or watering cans to simulate a rainstorm in their watershed. Where did the water travel? What happened to the color of the water after traveling through the land use areas? Does this happen in real watersheds? How can we decrease the amount of *non-point source pollution* reaching our water supply? How might a forest improve water quality in these areas?

6. Have the students try the experiment again using new pollution. However, this time place the sponges in some places in the watershed to represent forests. The forest should range in size from small to large areas. What do the students think will happen to pollution or soil erosion when the rain storm begins this time? In which example is the water cleaner?

EXTENSIONS/MODIFICATIONS:

❖ Take a look at runoff in your own community. Are there areas that are particularly vulnerable? Describe the vulnerability and consider ways that those areas might be improved.



A Piece of the Forest

SUMMARY: Students will demonstrate how the health of a forest ecosystem is a reflection of land uses and natural factors. They will learn how human activities have an impact on forests and explore how forests are managed to meet a variety of human and environmental needs.

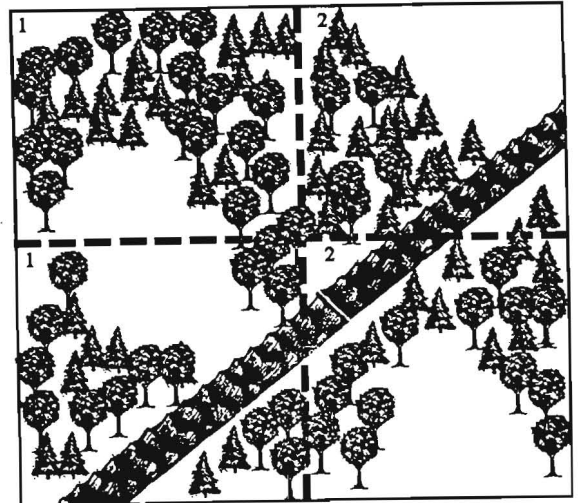
GRADE LEVEL: 4-8

TIME ⌚: preparation: 30 minutes;
activity: 60 minutes

SUBJECTS: Science, Environmental Studies

MATERIALS:

- Large piece of poster board or newsprint
- Art Supplies (pens, pencils, magic markers, etc.)
- Paper clips or other small items



LEARNING OBJECTIVES: Completing this activity will allow students to...

- ✓ recognize that everyone contributes to and is responsible for a healthy forest ecosystem.
- ✓ recognize how wildlife habitats change as a result of land use activities.
- ✓ identify ways to manage a forest area for multiple uses and sustainability.

PREPARATION

Using markers, draw a green forested area and a blue river on poster board as shown above. Divide the forest in half horizontally, then into sections vertically. Each section should include a bit of forest and blank space for students' drawings. Some sections should include water. The number of sections should correspond with the number of students or groups of students working together. Number the sections in order in the upper left-hand corner starting with the top section and moving across to the end of that row, then repeating the same numbers on the bottom row of sections. In addition, label the top row 'A,' and the bottom row 'B,' to assure that when the class puts the pieces back together they go back in their original places. Cut out the sections of the forest.

BACKGROUND

The Northern Forest, which is both privately and publicly owned, is often managed for multiple land uses. In the Northern Forest these uses center around forest products, recreation, and tourism. For example, many forestry companies manage their land for forest products but at the same time allow hiking, fishing, and camping on the land.

Because of our dependence on forest products, many of our forested areas like the Northern Forest must be managed for multiple uses. Multiple use management involves making choices about the types of activities that can take place in particular areas. Some forest ecosystems cannot support certain activities, and certain activities cannot take place in the same area at the same time. For example, you wouldn't want a hiking trail to pass through a clearcut, and loggers wouldn't want hikers traveling through an area being harvested, for obvious safety reasons. Many conflicts involving forests are a result of individuals, agencies, and organizations having different ideas and beliefs about the management of forested land.

To a large extent the health of a forest is a reflection of natural factors and how well people manage the land. When the land is managed incorrectly, the health of the forest ecosystem is in danger. For example, breaking large forested areas into small patches through cutting or development can harm wildlife that require large areas in which to live. The development of the forest, separating the land into small patches—*fragmentation*—has been happening for decades, but rapidly growing human populations have increased this pressure, and fragmentation has become a major threat to the survival of wildlife species such as the wood thrush, ovenbird, or Acadian Flycatcher, that depend on the interior of continuous forested areas. The breaking of vast areas of forest into small patches exposes the forest and wildlife that depend on these areas to all kinds of exterior influences such as climate changes, *exotic species*, and *predation*.

In the Northern Forest almost 84% of the land is privately owned. It is important that individuals and companies understand that what they do to the land on their own may not have a major impact, but collectively these impacts, both negative and positive, add up significantly.

PROCEDURE:

1. Tell students that they have just inherited a piece of forested land and \$10,000 dollars. Have them brainstorm a list of ways they could use this land and the money. For younger students you may want to review with them what types of products come from forests (consult Forest Products sheet on p. 12), what type of recreational activities occur in these areas and what wildlife species depend on forests to help them think about how the land could be used.
2. Pass out “pieces” of property and drawing pens and pencils. Explain that each of their properties has a portion of a forested land, and many have a water source. The money they received should be used to develop the land as they wish. This could include: logging the land for wood; developing resorts or second homes; preserving the land for wildlife, i.e. keeping it in its “wild” state; managing it as a sugarbush to make maple syrup; building a hunting camp; creating an interpretive nature center, etc.—whatever they like.
3. When students have completed their drawings, ask them to look in the upper left-hand corner of their property for a number and a letter. Explain that each piece is actually a part of a puzzle. Starting with 1A, have students assemble their pieces. This will re-form the original forested area.
4. Have each group of students describe how they developed their land and used the resources on the land. They should also explore the impacts their actions had on the neighboring land, water, or wildlife resources. Have students represent their impacts with paper clips or other items. They can contribute a small number of paper clips for each impact.
5. After everyone has reviewed what they have done with their properties, have them add up what the impacts were for the forest. Collect all the paper clips and see how many you have. A large number indicates a large impact on the forest ecosystem.
6. After all the items have been counted, discuss the activity. How did the students feel about how others used their land? How did they feel after they started to see the impacts add up? Could a forested area be affected by multiple uses? Did their forest experience fragmentation? What impact might this have on wildlife? How can these multiple uses be managed sustainably?

EXTENSION/MODIFICATIONS:

❖ We have always depended on forests for wood products. Human beings depend on these areas for wood to build their houses, make paper, and provide many other products that we have come to expect in our daily lives. How this wood is harvested can have a important impact on the health of a forest ecosystem.

An innovative way in which forest managers and conservationists are coming together to ensure forest health is through “Green Certification.” The National Wildlife Federation’s Northeast Natural Resource Center has collaborated with the Rainforest Alliance and their “SmartWood” program to evaluate forestry operations of companies and private landowners, and certifies those operations that meet a strict set of environmental standards. Consumers who purchase wood products from certified companies are assured that they have been sustainably harvested.

Have your students take a look at some of the impacts of their land use activities. Are there alternatives that they can come up with to reduce or eliminate these activities or their effects? Have your students repeat this activity and use their \$10,000 to develop a forested area that is ecologically sound, but still allows human land use activities.





Animal Tracks Kids' Page

Welcome to Animal Tracks!

Learn more about the environment and what you can do to make a difference.

Just follow the tracks...

Did You Know?

- Rainforests contain half of all the known species of plants and animals.
- Fungi, bacteria, termites, bark beetles, millipedes, snails, mushrooms, daddy longlegs, pill bugs, earthworms, ants (some species), salamanders, woodpeckers, and click beetles are just some of the species you can find living off a rotting log.
- One teaspoon of forest soil can contain about 1,000,000 microscopic animals.

Forest Factory

Link the forest product with the part of the Forest they come from. *Hint: Forest Parts can be used more than once.*

FOREST PARTS	PRODUCTS
WOOD PULP	Baseball bats
GUMS & RESINS	Photographs
WOOD PRODUCTS	Paper
CANES & FIBERS	Chewing gum
TREE BARK	Lumber
FOOD	Maple syrup
	Varnish
	Magazines
	Shoe soles
	Rope
	Cork
	Crayons
	Walnuts

FORESTS – From Floor to Canopy

A forest can be thought of as a high-rise building in a city with many layers starting at street level and rising high into the sky. In the forest, each level is a different ecosystem supporting different kinds of wildlife. The canopy, which is the uppermost forest layer, consists of the branches and leaves of the tallest trees, it is exposed to the most sunlight and serves as the food-making layer. Under the canopy are the layers of the understory, composed of smaller trees, shrubs, ferns, plants and grasses. Below the understory is the forest floor – the area where soil, hollow logs, fallen branches, leaves, lichen and mosses collect and decomposition takes place. Even the dead trees or “snags” are home to wildlife, providing critical nesting cavities and a rich source of food. Most forest species are specific to one or two layers, where they find everything they need to thrive. With so many different habitats, diversity is rich and the competition among species is reduced as each finds an abundance of what it needs to survive in a particular layer of the forest.

A Self-Sufficient Community

Forest ecosystems are self-sufficient “food-making machines”. The primary producers – trees and other green plants – make the food needed by consumers. Consumers are the animals in the forest that either eat green plants directly or get energy by eating animals that feed on green plants. Once these plants and animals die, decomposers such as fungi, bacteria, earthworms, and other organisms break down the dead material in the forest ecosystem community. This efficient process allows the forest to recycle wastes, turning dead plants and animals into nutrients that are then absorbed by the roots of the trees and the other producers.

Action! Things You Can Do

- **Explore and Adopt-a-Forest.** Trees are wonderful ecosystems within themselves. Walk through the forest. Get down on the ground and see what is on the forest floor. Look up into the canopy to see what is up in the trees. Think about what might be missing, or what problems might exist in your “adopted” forest. Is there anything you can do to address these problems? Contact a local or state forester to learn more about the history and current use of your forest.
- **Conduct a Tree Product Inventory** of all the things you use at home and at school that come from the forest. What can you do to reduce your impact on the forest? Recycle paper and other products if possible.
- **Read “The Lorax” by Dr. Seuss,** a make-believe story about what happened to a forest when people didn't use it wisely.

The full-color Animal Tracks kids' book contains more games, puzzles, information and activities about conservation issues. Order your copy from the National Wildlife Federation. Have an adult call 1-800-822-9619 for more information.

Answer: Wood Pulp: magazines, paper, photographs; Gums & Resins: varnish, chewing gum, crayons, shoe soles; Wood Products: lumber, baseball bats; Canes & Fibers: rope; tree bark; cork; Food: maple syrup, walnuts



Animal Tracks

Para Niños

¡Bienvenidos a Animal Tracks!

Aprende más sobre el medio ambiente y lo que puedes hacer para mejorarlo

Sigue la pista...

¿Sabías que...

- los bosques pluviales/los bosques húmedos contienen la mitad de todas las especies de plantas y animales conocidas en el mundo?
- los hongos, bacterias, termitas, escarabajos horadadores, milpiés, caracoles, hongos, papacitos, piernaslargas, cochinillas de humedad, lombrices de tierra, hormigas (algunas especies), salamandras, pájaros carpinteros y escarabajos de resorte no son sino algunas de las especies que pueden vivir en un tronco de árbol podrido?
- una cucharadita de tierra del bosque puede contener como un millón de animales microscópicos?

La Fábrica Forestal

Conecta el producto forestal con la parte del bosque de donde viene. ¡Ojo!: las partes del bosque se pueden usar más de una vez.



LOS BOSQUES — Del Suelo al Dosel

Un bosque puede ser comparado a un edificio de muchos pisos en una ciudad, con varias capas que empiezan al nivel de la calle y se elevan hacia el cielo. En el bosque, cada capa es un ecosistema diferente y sustenta diferentes tipos de vida silvestre. Las ramas y hojas de las copas de los árboles más altos forman el dosel, que es el nivel que está expuesto a la mayor cantidad de luz solar y que sirve para producir alimento. Debajo del dosel, están las capas del sotobosque y aquí se encuentran los árboles más pequeños, los arbustos, helechos, plantas y pastos. Por debajo del sotobosque está el tapiz vegetal — el lugar donde la tierra, troncos huecos, ramas caídas, hojas, líquenes y musgos se juntan y ocurre la descomposición. Hasta los árboles muertos o «tocones» sirven de refugio para la fauna silvestre: son una rica fuente de alimentos y sus cavidades son críticas para sus nidos. La mayoría de las especies pertenecen a una o dos de las capas, donde encuentran todo lo que necesitan para prosperar. Con tantos hábitats diferentes, la diversidad es amplia y la competencia entre especies se reduce puesto que cada una encuentra en abundancia, en una misma capa del bosque, lo que necesita para sobrevivir.

Una Comunidad Autosuficiente

Los ecosistemas forestales son máquinas autosuficientes «productoras de alimento». Los productores principales — los árboles y otras plantas verdes — producen el sustento que necesitan los consumidores. Los consumidores son los animales del bosque que se comen directamente las plantas verdes o que obtienen energía comiéndose a los animales que se alimentan de plantas verdes. Cuando estas plantas y animales se mueren, los organismos descomponedores como los hongos, bacterias, lombrices de tierra y descomponen el material muerto de la comunidad del ecosistema forestal. Este proceso eficiente permite al bosque reciclar sus desperdicios, transformando a las plantas y animales muertos en nutrientes que a su vez son absorbidos por las raíces de los árboles y otros organismos productores.

¡ACCIÓN! Cosas que puedes hacer

- **Explora y adopta un bosque.** Los árboles son ellos mismos ecosistemas maravillosos. Pásate por un bosque. Agáchate y mira qué está pasando en el tapiz vegetal del bosque. Mira hacia el dosel y observa lo que pasa en lo alto de los árboles. ¿Qué falta o qué problemas crees que existen en tu bosque «adoptado»? Comunícate con un guardabosques local para aprender más sobre la historia y uso actual de tu bosque.
- **Haz un inventario de los productos de los árboles que usas en tu casa y en el colegio.** ¿Qué puedes hacer para reducir tu impacto sobre el bosque? Si puedes, recicla papel y otros productos.
- **Lee «The Lorax» por el Dr. Seuss,** un cuento imaginario sobre lo que le pasó a un bosque que las personas utilizaron mal.

El nuevo libro a colores de Animal Tracks contiene más juegos, rompecabezas, información y actividades sobre cuestiones de protección ambiental. Pide tu copia a la National Wildlife Federation. La llamada debe hacer un adulto al: 1-800-477-5560 para más información.

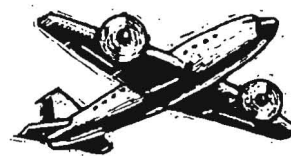
Fibras de maderas: revistas, papel, fotografías; Gomas y Resinas: barniz, chicle, crayones, suelas de zapato; Productos de la Madera: madera, bates de béisbol; Cañas y Fibras: soga/cuerda; Corteza de Árbol: corcho; Comida: miel de maple, nueces

ACTION

“...We who live here know that things cannot stay the same...We do not just live and work and play in the forest—we are part of it. We are ingrained in it; and it is ingrained in us.”

**- John Harrigan
Editor,
*North Country Newspaper***

Taking Action



Getting Started

Participating in student-driven action projects is an important means of helping students develop a strong connection to the environment. An action project that focuses on improving the local environment will let students experience first-hand how they can make a difference. By accomplishing something tangible that addresses a community concern, students gain both a capacity for action and citizenship skills. An added benefit is the many connections between action projects and the curriculum. Environmental issues and project organizing skills can be connected to many subject areas, often enhancing the requirements by providing real-world examples and integrated lessons that cross disciplines.

Two important keys to success are **focusing on your local community** and **involving students in every aspect of the process**. Directing your efforts to a problem in the local area will make students active participants in the future of their communities. The benefits of a local project can be more easily seen and understood. By allowing students to direct the project and determine the focus of their efforts, they gain a sense of ownership of the project and its outcomes.

Determining how to get started on a project is often the hardest part. The following information provides a basic guideline for steps involved in organizing a project, as well as some tools for accomplishing each step. Please refer to the resources section for other references with details on project organizing.



Role of the Teacher

Let your students take charge of their own projects: Projects will be less effective if the teacher alone chooses the focus of the project. Instead, encourage your students to become involved and use their creativity to develop a project plan that works for everyone. This will both develop student leadership skills and encourage your students to take part in the project using their own unique abilities. In this role, you will be serving more as a mentor, guiding and assisting your students participation in the project.

There are many ways to approach action projects: Most projects can be done at many levels: from very simple to quite involved. To make the projects as beneficial as possible, tie the projects into the curriculum and set learner outcome goals for your students involvement in an action project. For example, by stating a goal of learning how to identify plants, a garden activity will expand students' horizons beyond just learning how to plant vegetables.

Think broadly about how the project will fit into your curriculum: Action projects can touch on a wide range of student skills including language arts skills like oral communication and report writing; math skills like mapping, estimating, and problem solving; and science skills like modeling, observing, and predicting. Specific subject areas can also be tied into the action project as appropriate, so student

knowledge can be developed using local issues. When meeting your requirements through the more hands-on approach of an action project, the level of student interest and motivation will help to increase learning.

Keep the project moving: Perhaps the most important role of the teacher is to help students overcome obstacles. The scope of an action project should be realistic—sometimes you may need to keep your students open to other options in case their initial strategy doesn't work. Refer to the steps in the "Implement Plan" stage for more guidance.



Follow the Tracks to Action

Taking part in an action project is a creative process, unique to each situation. The steps below are designed to give guidance on how the process might work, but the process will differ from project to project. The steps include information on how to determine what is needed in your community, how to bring out diverse skills in your students and get them involved, and how to make an action plan.

By involving students in the planning steps, they are engaged from the start. This up-front preparation process can serve as a lesson for students in itself, focusing on skills such as interviewing, making time lines, budgeting, and organizing. Also, remember that investing time in planning is critical to project success.

There are four stages to taking action in your community:

- Take Inventory**
- Make a Plan**
- Implement Plan**
- Reflect and Evaluate**

Going through these stages in sequence will help your group tackle an environmental concern in your community and learn from the process while meeting your curriculum requirements. In each stage, there are steps and tools to help you implement the plan. These steps and tools are offered as guidance and can be used however they work best for your particular group's needs.



Stage I - Take Inventory

Identify concerns in your community that indicate an environmental problem and determine resources to which you have access both among students and within the community.

This will involve:

1. Determining a project area
2. Finding local community resources
3. Conducting a needs inventory
4. Identifying student skills

1. Determining project area: Identify a place to focus your efforts.

✧ Use a map of your community and students' knowledge of the area to find possible project locations that are nearby in the community. In addition to your school campus, possible locations include parks, churches, community centers, and natural areas such as rivers, streams, and wetlands.



✧ Make sure the place is convenient, accessible, and safe. The place should also offer some opportunities for improvement. If your community is fairly small, you may want to look more broadly and decide to focus on the community as a whole. It's still important to define the boundaries of the area you want to investigate more closely.

✧ Share your educational objectives with your students, then have them visit each location and vote on the one they like best.



2. Finding local community resources: Brainstorm—list all the people and organizations within the community who may help with the project.

✧ Have students list everyone to whom they have access since it's difficult to anticipate what sorts of resources you will be able to use with your project. Don't worry now about how to use these resources. You can take advantage of what you've identified in your community during the project implementation. *Examples of local community resources:* a local university's Department of Ecology, the hardware store next to the school, a parent who works for the Chamber of Commerce, and the 4H club.

✧ Find people and groups with knowledge that might relate to your project, sources of materials, and sources of labor.

✧ Get parents and other key community members on board. Explain what you are doing beforehand in order to secure their support for involving students in action projects.

* Remember that connecting with local community resources will be an ongoing process. Start discovering who is available locally to help your group now and continue throughout the process. A wide network of community support will help your group complete a successful project.

3. Conducting a needs inventory: Take some time to get to know your project area.

* Have students draw maps of the area identifying key locations and things to investigate. Depending on your location, things to identify are natural areas, signs of wildlife, places where people meet for work or play, evidence of pollution, and special landmarks.



* Once you have mapped your project area, determine what issues to focus on and then brainstorm questions to use in the inventory for each issue. See the ⇒**Sample Inventory Questions**⇒ on p. 41 and the ⇒**Sample Project Inventory Checklist**⇒ on p. 42 to get your group started. Complete one ⇒**Project Inventory Checklist**⇒ on p. 43 for each issue you choose to assess what is happening in the area that needs attention.

* Set aside some time when students can investigate the inventory questions, taking note of what they find out and possible solutions.

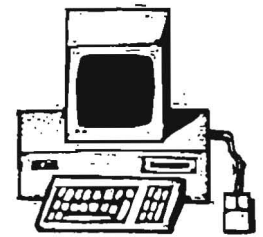
* Some questions may require surveying local residents. Figure out what you want to know more about and write three to five questions to use in a survey.

* For questions where more information is needed, allow follow up time to answer questions. Other sources of information include the archives of the local newspaper, the local library, and members of the community. Remember the community resources you found in step number two!

* Once all the questions are answered, rank each item by its importance as an issue that needs attention. The projects identified as high priorities in each category are your community's needs, which will later be narrowed down to a project for your group.

4. Identifying student skills: Work with your students to make a list of student skills.

* List all the things the students can do that might be needed in an action project. *Examples of student skills:* drawing, performing, working on a computer, giving speeches, writing letters, gardening, organizing people, researching, building models, sewing, cooking, etc...



* Include skills students use in school as well as hobbies or after-school activities.

* Encourage all students to offer something.

* This list will be used later with the **Choose a Project** chart on p. 45.

Stage II - Make a Plan

Choose a project based on the needs of the community, the skills of the group, and community resources. Then make a plan for implementing the project. This will involve:

- 5. Matching needs and skills
- 6. Choosing the right project
- 7. Making an action plan.

5. Matching needs and skills: Use the charts and sample charts (pp. 41-61) to help plan your project.

* Follow the instructions on the ⇒**Project Inventory Checklist**⇐ (p. 43) to identify needs in your community.

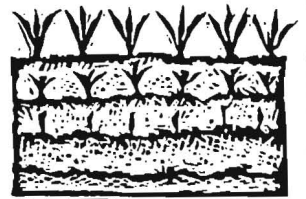
* Next, follow the instructions on the ⇒**Choose a Project**⇐ chart (p. 45) to match the skills you identified (in Step 4) with the needs of your defined project area. This will involve listing all the skills identified by students and matching them with the priority environmental needs identified in the needs inventory step. Don't forget to consider the skills of your community resources when matching needs and skills.

* After you have completed the chart and identified a final list of possible projects, use the information in the next step to choose a project.

6. Choosing the right project: There are a few things to consider when choosing a project.

* Have your students think about which of their final project choices most meets the needs of the community. One way to determine this is interviewing residents of the community near your project area to see what they think is most important. You can also take a look at the issues people are talking about or are being covered in the newspapers.

* Another way of evaluating projects is by measuring each project's level of impact. Look at how many people you will reach or how greatly the wildlife of the area will be affected.



* See who else is working on projects in your area and try to join forces.

* Which project are students most excited about? A beginning level of excitement will keep the momentum going so you can complete your project.

* If there are projects that you are interested in that require skills that your group doesn't have, figure out how to find help in these areas from community resources. Local companies are often able to donate large equipment and supplies that would make some project more attainable.

- * After weighing each option, have students vote on the project they like best.
- * Make sure each the project chosen will comply with local regulations.

7. Making an action plan:

* Follow the instructions on the ⇒**Action Plan Worksheet**⇐ (p. 47). This will involve determining a name for your group, the project goal, and the start and end dates of the project. You will then break down the overall goal into smaller tasks, deciding completion dates, people responsible for each task, and what materials and funding are needed.

* When brainstorming what your students hope to accomplish with their project, be sure to guide students toward a project that can be realistically accomplished.

* For the project time line, remember that some tasks can be done simultaneously. If time is short and you have an absolute deadline for completion of the project, it may help to work backwards from your completion date.

* Consider the community resources you identified earlier for help with labor, materials, and funding for the project.



Stage III - Implement Plan

Now that you have chosen your project and made a plan for how to get it done, you can get started. While you are moving forward, take time out to keep track of what's happening and make sure students are still interested and excited about the project.

- | |
|--|
| <p>8. Communicating project progress</p> <p>9. Keeping project moving forward</p> <p>10. Publicizing the success of the group</p> |
|--|

This will involve:

8. Communicating project progress: Sharing what's happening with all the group members will help the group stay organized and enthusiastic.

* Get together regularly for updates on the project.

* Keep track of who's working on what, what's been accomplished, and outside people or organizations who have contributed to the project. Make sure everyone is doing what they're responsible for and that you aren't duplicating efforts.

- ✧ Get student volunteers to act as project managers and keep track of progress.
- ✧ Encourage students to work together on tasks so they can support each other.

9. Keeping project moving forward: Don't worry if things happen differently from how you planned. Unforeseen events are common when working on a big project and students may have to do some creative problem solving to overcome encountered obstacles. It's all part of the learning process.

✧ Your action plan should not be considered a rigid document. It should be used as a guidance tool to help manage the project, not control the project.

✧ Take stock periodically and modify the project plan if necessary. Being flexible will enable your group to keep moving forward.



✧ Don't give up! Try something else if your first idea doesn't work.

✧ It is possible to get past problems. Turn to your community contacts for skills and resources your group needs. Seek help from higher sources like the principal or someone in the local government to help with bigger challenges.

10. Publicizing success of group: It's important to document and highlight your group's successes throughout the project.

✧ Network with lots of people and organizations to get ongoing project support.

✧ Show off what the group accomplishes each step of the way. You are more likely to get support and publicity once you have initial successes. Other people may also get interested in your work and want to help out.

✧ Use numbers as an impressive way to show off what you've done. Instead of "our group picked up trash," say "our group picked up 47 bags of trash." Try to find out things like how many people you reached, how much water/energy (or the quantity of other resources) you saved, or how many hours your group worked. Determining these figures make excellent math problems.



✧ Take photographs or videos in the beginning, middle, and end of your work.

✧ Give tours of your project area to the community highlighting your visible achievements.

✧ Get letters of support from people you work with on the project.

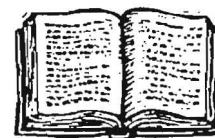
✧ Alert the radio, television, and newspaper media of exciting project events through press releases or public service announcements. Many local media outlets will cover student activities (including cable TV that often has community access channels for such projects).

* Keep a project journal as a record of what you did, and a scrapbook with all the memorabilia collected along the way.

Stage IV - Reflect and Evaluate

Completing a successful project is something to celebrate. It's important to end the student's experience with a chance to reflect on and evaluate what happened. Take advantage of your accomplishments and get some recognition for your students and school. This will involve:

- 11. Reflecting on the project
 - 12. Evaluating the project
 - 13. Getting recognized



11. Reflecting on project: In order to enhance the students' understanding of what they accomplished, take time to get together as a group and process what happened. Use the ⇒**Sample Reflection Questions**⇐ sheet on p. 48 to guide your discussions.

* Schedule discussions throughout the project as well as at the end of the project. You should also encourage students to document their thoughts in a journal.

* Having a group discussion will give students the opportunity to listen to other thoughts on the experience, perhaps hearing a new perspective.

* Focus on how students changed their thinking or behavior as a result of the project. Often students will be surprised at things they learned or changes in themselves.

* Make sure everyone has a chance to share and allow students multiple options for sharing their experiences. Public speaking, journal writing, hands-on activities, and performing arts are some examples of approaches. These reflection activities will allow you to assess your students' performance as well.

* Allow students time to respond to the questions. This will give them a chance to organize their thoughts.

12. Evaluating the project: In addition to processing the project on an experiential level, it is probably a good time to assess what happened, what your students learned, and possible improvements for the future.

* Have students evaluate each step of the project. Discuss how to give constructive feedback and focus the discussions on how well your group accomplished the original project objectives.

* Use journals, videos, photos, or other materials collected during the project as a springboard for discussions on the environmental issue your group worked to improve. Talk about what the students learned and how their thinking has changed during the project process.

* Ask community members who were involved with the project to evaluate the group's project. Initiate discussions by sharing videos or scrapbooks from the project. Another option is to develop a form or survey questions to assess what worked and didn't work.

* Spend time to determine how to keep the project going. Keep up your network of community contacts to maintain a successful project that will last into the future.

* Discuss what else your group can accomplish. Now that you have a team mobilized with a variety of skills and contacts, it should be easy to build on your initial project.

13. Getting recognized: You did it! Wrap up the project by getting more recognition for your final project.

* Use the information you gathered previously (statistics, photographs, letters) to tell everyone you can about what the group accomplished.

* Send a press release to the local newspaper or television station, hold an awards ceremony for the participating students, and publish in-print and on-line the story of what happened.

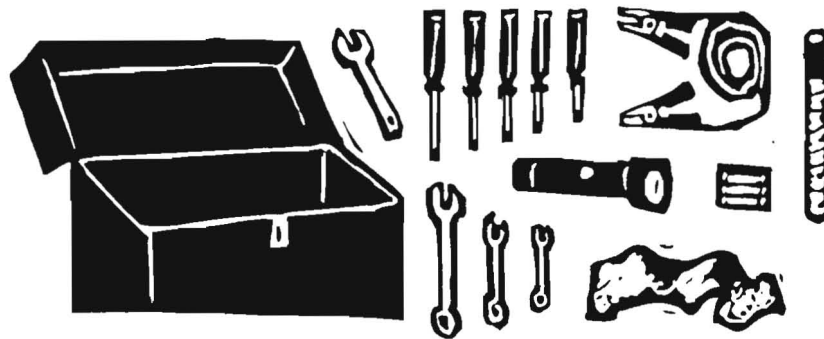
* Get in touch with nationwide awards programs that recognize environmental projects. (See page ?)



Action Tools

The following pages contain the action tools referenced in the action steps. Each tool is designed to be copied and distributed to your students.

• Sample Inventory Questions	Page 41
• Sample Project Inventory Checklist	Page 42
• Project Inventory Checklist	Page 43
• Sample Choose a Project	Page 44
• Choose a Project	Page 45
• Sample Action Plan	Page 46
• Action Plan Worksheet	Page 47
• Sample Reflection Questions	Page 48



Sample Inventory Questions

Note: Many of these questions will require brainstorming to determine strategies for finding the answers.

I. Water Quality

- How many concrete or blacktop surfaces such as playgrounds or parking lots that allow water to run off into the street and storm sewers are in your community?
- How are construction or other bare areas managed to prevent soil from being washed down storm sewers? Are erosion control measures required on construction sites in your area?
- Has local drinking water been tested? For what contaminants (lead, bacteria)?
- What is the maintenance plan for parks or gardens in the area in terms of the amount of pesticides and fertilizers used?

II. Preserving Natural Areas

- What impact do people have on natural areas when used for recreation purposes such as hiking, biking, boating, or picnicking?
- Does your community protect and preserve wildlife habitat such as wetlands, forests, or prairies?
 - ▶ Does the community have a land-use plan which specifies which areas will be kept natural or as greenways?
 - ▶ Do more areas need to be added? Get more information from the office of permits/inspections/building/planning or the conservation district office on these questions.
- How extensive is the use of native trees, shrubs and grasses on community and school grounds? Do these areas use landscaping that provides food, water, and shelter to attract wildlife?

III. Water and Energy Conservation

- How are homes and businesses insulated and weatherproofed to keep energy consumption at a minimum? What energy conserving techniques are people using (i.e. turning off appliances when they're not being used and adjusting the thermostat for the air conditioner up and heat down when people aren't around)?
- Is watering of lawns, parks, or gardens being done in ways that ensure water isn't wasted?
- What water conservation techniques do homes/businesses use (i.e. low-flow shower heads and aerators on the faucets)?

IV. Air Quality

- What forms of alternative transportation are available in your community?
- Are there areas that have been cleared of trees for construction projects? What tree planting efforts occur in the community?

V. Waste Reduction

- Are there locations where people can recycle (aluminum, plastic, glass, newspapers, oil)? Are these easy to find and use?
- What products made from recyclable materials do stores in the area sell?
- Does your community/school buy materials made with recycled content? Can these efforts be increased?

VI. Environmental Awareness

- Does your community educate citizens about conservation in the home and yard? How can this be improved?
- Is environmental education incorporated into your school?
 - ▶ Are environmental topics covered in your classes?
 - ▶ Are there environmental clubs at school?
 - ▶ Do you have a school nature area where you can do experiments and study and enjoy nature?
- How does your school or community celebrate Earth Day, National Wildlife Week, Arbor Day, National Drinking Water Week, Wetlands Month, National Beach Clean-up Day, or other environmental awareness days?

Sample Project Inventory Checklist

Issue: Waste Reduction

1. Question: Are there locations where people can recycle (aluminum, plastic, glass, newspapers, motor oil)? Are they easy to find and use?

What we found out: *Recycling bins for glass, aluminum, and plastic in the cafeteria. Paper recycling in the hallways. No place to recycle newspapers.*

Possible solutions: *Set up bins for newspaper.*

We need more information about: *Does recycling company collect newspaper?*

Priority ① 2 3

2. Question: Does school store sell products made from recyclable materials?

What we found out: *Store only sells recycled notebooks.*

Possible solutions: *Could sell recycled folders, notebook paper, rulers, and pencils.*

We need more information about: *Prices of recycled products.*

Priority 1 ② 3

3. Question: Does your school have a policy of buying materials with recycled content?

What we found out: *All paper for copy machine is recycled--this is county policy.*

Possible solutions:

We need more information about:

Priority 1 2 ③

4. Question: _____

What we found out:

Possible solutions:

We need more information about:

Priority 1 2 3



Project Inventory Checklist

Instructions: Pick the issues you want to focus your investigation on. For each issue you choose, brainstorm inventory questions—use the list of sample questions to get you started. Prepare the inventory checklists by filling in the issue and the questions. Then work in groups to answer the questions for each issue. For each question, note what your group found out and possible solutions. If your group can't answer the question completely, check the box indicating that "we need more information" and list ideas for further investigation. Continue for all of the questions until completed. Then for each issue, rank the items by their importance as an issue that needs attention with "1" indicating the most pressing problems and "3" indicating the least important ones.

Issue: _____

1. Question: _____
 What we found out: _____
 Possible solutions: _____
 We need more information about: _____
 Priority 1 2 3

2. Question: _____
 What we found out: _____
 Possible solutions: _____
 We need more information about: _____
 Priority 1 2 3

3. Question: _____
 What we found out: _____
 Possible solutions: _____
 We need more information about: _____
 Priority 1 2 3

4. Question: _____
 What we found out: _____
 Possible solutions: _____
 We need more information about: _____
 Priority 1 2 3

This portion of Action is adapted with permission from the *Give Water a Hand* Action Guide, a youth program for local environmental action, ©1996 University of Wisconsin Board of Regents. For more information on *Give Water a Hand*, call 1-800-WATER20.

Sample Choose a Project

What We Know How To Do (Skills and community resources)	Priority Environmental Needs (identified problems)				
	Set up recycling bins in park	Organize an alternative transportation day	Build bat boxes		
drawing	X				
using Internet	X	X	X		
riding bikes		X			
talking on phone	X		X		
working in woodshop			X		
watching backyard wildlife			X		
sewing					
reading	X	X	X		
driving bus (Wyatt's dad)		X			
hardware store (David's mom)			X		



Choose a Project

Instructions: List all the skills and community resources you identified earlier in the column "What We Know How to Do" on the left side of the chart. Then, take the problems identified as priorities in each category of the Project Inventory Checklist and write them along the top of the chart in "Priority Environmental Needs". See where the student and community skills and resources in "What We Know How to Do" match up with the "Priority Environmental Needs" and put an "X" in the box.
Example: if a priority environmental need is creating an educational display and one of the student skills is art, put an "X" in the box where the two things meet. The projects that have the most "X's" in their columns are the ones that best match your students' skills.

	Priority Environmental Needs (identified problems)				
What We Know How To Do (Skills and community resources)					

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Sample Action Plan

Environmental Project: Building bat boxes

Group Name: Room for Bats

Project Goal: Build bat boxes to encourage bats to nest on school campus.

Project Start Date: 2/1/98

End Date: 4/20/98

Specific Project Tasks	Completion Date	People Responsible	Materials/Funding Needed
Choose a site.	2/15/98	Elenor, Jean, and Linda	None.
Research bats and how to make bat boxes.	2/28/98	Sara and Joe	Library. Postage for letters.
Map site and determine location of bat boxes.	2/28/98	Joe, Margaret, and David	Art supplies for map.
Get materials and tools to build bat boxes.	3/15/98	Mitchell and Jennifer	Wood, nails, and tools. Estimate \$75 with borrowed tools.
Build boxes.	4/1/98	Everyone	None.
Put boxes up.	4/8/98	Cheryl, Ronald, and Mr. Nelson	Nails and ladder. Estimate \$5 with borrowed ladder.
Watch and record data about bats using boxes.	ongoing	Everyone	None.



Action Plan Worksheet

Instructions: Write down the name of your project and the name of your group on the worksheet. List your main goal next to "Project Goal." Document when you can start on the project and the end date when the project needs to be completed. Break down the overall goal into smaller tasks and organize the tasks by priority, with what needs to be done soonest first. List each of the tasks in order on the "Specific Project Task" column. Go through the list of tasks and write a target completion date for each one. For each task determine who will be responsible for which task and what materials and funding are needed and list this information in the appropriate columns of the worksheet.

Environmental Project:

Group Name:

Project Goal:

Project Start Date:

End Date:

Specific Project Tasks	Completion Date	People Responsible	Materials/Funding Needed

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Sample Reflection Questions

Reflection questions are usually open-ended. For example....

- ☛ What happened when...?
- ☛ How did people respond to you?
- ☛ What did it feel like when?
- ☛ What did you feel good about?
- ☛ What did you learn as a result of...?
- ☛ How can you use what you've learned?
- ☛ What academic skills or information did you use?
- ☛ What would you like to know more about?
- ☛ Where is this situation likely to occur in the future?
- ☛ What would you do differently?
- ☛ What advice can you pass on to others?
- ☛ What was your biggest challenge?
- ☛ How did you solve a problem?
- ☛ Why was there a need for your service?
- ☛ What could be done to solve the problem permanently?

Sample reflection questions were adapted from Learning by Giving, from the National Youth Leadership Council, St. Paul, MN 55113. For more information call 612-631-3672.

Project Ideas

❖ **Explore and Adopt-a-Forest**— Have your students identify and explore a forested area. If you don't have a site near your school area, try a town forest or park. If you are unable to locate a forested area, have your students adopt trees. Trees are wonderful ecosystems themselves. Once you have located a forested area, have students inventory what they see as they walk through the forest. Have them get down on their hands and knees to see what is on the forest floor. Encourage them to look up into the canopy to see what is up in the trees. Once they have inventoried the site, have them think about what might be missing, or what problems might exist in their "adopted" forest. Is there anything they can do to address these problems? Have students keep journals about their adopted forest and note changes through the seasons. Encourage them to meet with a local or state forester to learn more about the history and current use of the area.

❖ **Make An Interpretive Trail and Guide for Your Community**— Once your students have inventoried their adopted forest, encourage them to develop an interpretive trail and educational materials for their school and community. Once this trail has been developed, engage students in leading field trips through the site for younger students, families and community members.

❖ **Conduct a Tree Product Inventory**— Have each student conduct a survey of their home to determine what things are made from wood products. Have them discuss how they would feel if these products were not available. Are there alternatives? Is there a way to reduce the volume and number of wood products we use in our homes? Help students develop strategies for accomplishing this to share with their classmates and families. Do the products that they have listed require cutting down the tree, or do they use a part of the tree e.g. fruit and sap that regenerates?

❖ **Inventory Paper Usage in Classroom and School**— Have students survey the paper/paper products use in their classrooms and/or school. Can any of these products be reduced, reused, or recycled? Encourage students to develop a paper reduction and recycling plan for their school. Start a model plan in your classroom.

❖ **Explore other Forest Regions**— Have your students explore other forested regions throughout the US and globally. Compare these areas with the Northern Forest and determine if other areas are experiencing the same pressures and threats. Have them research what is being done in these areas to help solve the problems and encourage them to contact resource specialists in these areas. If possible, contact another school in their research area and share information through e-mail or as pen pals.

❖ **Low Impact Recreation**— Students may want to survey the types of recreation in forest areas in which their fellow classmates and teachers (and the rest of the community) engage. Discuss the types of impacts this recreation may have and encourage students to develop ideas on how they can create interpretive information and educational materials for their school and community on low impact recreation.

❖ **Watershed Quality Projects**— Students may research the watershed in which their school is located. Have them determine relationships between their watershed and any forested areas in their region. Encourage students through research or interviewing local watershed organizations or town officials to determine what type of water quality issues face their watershed. Have students research and generate possible solutions to their water quality problems and have them work with local community members and businesses to solve these problems. A great addition to this action project would involve students developing and implementing

a community-wide river clean-up event in a portion of the watershed that students have identified as being in need of help.

❖**Raise Funds for Conserving Forested Lands**— Have your students work with the community to help raise funds through bottle drives, bake sales, etc., to raise money to help conservation groups purchase key forested parcels of land. Funds could be used to include land that has been recently cut and is in need of long-term restoration, as well as land that is still considered wild.

❖**Write Articles/Letters to Your Local Paper**— Have your students write letters to the editor or articles to their local paper expressing their understanding, concerns, and support regarding forestry issues. Students could also submit drawings, paintings, or photography on a forestry issue to help visualize issues.

❖**Participate in a Local Town Meeting or Debate (for older students)**— Encourage your students to investigate local forestry issues, attend, and perhaps, participate in any local town meetings or debates. Have them provide either written or oral student testimony. Ensure that this testimony is scientifically based and well researched.

Did You Know?

A recycled stack of newspapers 1.2 meters (4 feet) high is enough paper to save one tree?

Action Resources

Taking Action: An Educator's Guide to Involving Students in Environmental Action Projects. Published by Project WILD, 5430 Grosvenor Lane, Bethesda, MD 20814 (301)493-5447, \$3.00. K-12. A guide to help teachers and students through the process of developing and implementing action projects.

Environmental Education for Empowerment, Action Research and Community Problem Solving. Published by GREEN (Global Rivers Environmental Education Network.) Available through the Acorn Naturalists (800) 422-8886. This guidebook presents a number of case studies, as well as follow-up activities, references, and contacts to enable students, teachers, and administrators to get involved.

Kids Can Make a Difference! Environmental Science Activities, by Steven H. Dashefsky. Published by McGraw Hill. Available through the Acorn Naturalists (800) 422-8886. This book is about empowerment — using the experimental method to increase awareness and provide children with a sense of positive direction. Ages 8-14.

Give Water a Hand. Published by the University of Wisconsin, 216 Agriculture Hall, 1450 Linden Drive, Madison, WI 53706. (800) WATER20. Free. A great “soup to nuts” action guide for water conservation and quality.

Case Study:

Vermont Elementary School Works to Protect Fragile Alpine Northern Forest Ecosystem

Every time the students at Underhill Central School looked out their window they saw groups of hikers passing their school and heading toward the Underhill State Park. Part of a series of parks related to the Mount Mansfield State Forest, the Underhill State Park and its many visitors are an important part of the local community. The students decided that they wanted to do something to help protect this important alpine forest while educating visitors to the park about the history of Mount Mansfield and the importance of preservation.

Elementary school teachers Pam Foust and Peg Dorta of the Underhill Central School in Underhill Vermont, worked with their integrated 1st-4th grade classes and made several field trips to the site. They followed up their outings with historical research projects to investigate the history of this area and to learn why the Mount Mansfield State Forest is so important to Underhill and its residents. From this research students developed a "Guide to Hiking Mount Mansfield" public education brochure.

This short guide gives some history of the area and also provides tips to hikers on how to protect the forested area that they are visiting. The guide features a section called "*Do the Rock Walk*," which is one way the kids decided visitors could help protect this fragile area. The "*Rock Walk*" encourages hikers to walk on the rocks and not to tread on the fragile alpine plants on the top of the mountain. The kids also emphasized the need to stick to all trails, and they ask that all visitors "*Pack out everything you pack in*" to avoid litter and trash problems.

The students distributed the guide to every school in their area and also supplied the guides to the State Park for visitors to pick up as they went on their hikes. Pam, Peg, and their students hope that this guide will help visitors and citizens of Underhill help to protect the unique and fragile natural resources that the Underhill State Park has to offer.



APPENDICES

**“[One] who plants a tree
Plants hope”**

- Lucy Larcom
Plant a Tree

Glossary

- boreal forest**— systems of woodlands in northern regions of the northern hemisphere.
- canopy**— the uppermost layer of the forest consisting of the branches and leaves of the tallest trees.
- clearcutting**— a generic term used to describe a timber harvest in which all trees are cut down.
- consumers**— animals in the forest that either eat green plants or get energy by eating animals that feed on green plants.
- cover type**— the dominant plant species in an area.
- decomposers**— organisms such as fungi, bacteria, and earthworms that break down the dead organic material in the forest community.
- diversity**— the different living things on Earth, reflected in the variety of habitats and species, and the genetic variation within species.
- ecological succession**— the gradual change in plant and animal communities over time.
- exotic species**— a non-native species that has been introduced to an ecosystem.
- forest ecosystems**— the interaction of living and nonliving things in a forest habitat.
- forest floor**— the ground area of the forest where soil, hollow logs, fallen branches, leaves, lichen, mosses, and other species collect and decomposition takes place.
- fragmentation**— the result of breaking up continuous forested areas into small patches from cutting or development, dangerously limiting habitat for wildlife that require large areas in which to live.
- headwaters**— the source of bodies of water such as rivers and streams. The headwaters of northeastern river systems such as the Hudson and Connecticut all begin in the Northern Forest.
- herbicides**— chemicals used to kill plants.
- non-point pollution**— pollution that doesn't come from a particular, identifiable source; includes materials that wash off of streets, lawns, farms, and other surfaces.
- non-sustainable use**— habitat or resource destruction that occurs at a rate that results in a profound loss of biodiversity and natural resources that cannot be recovered. Sustainable use involves development that meets the needs of all without compromising the ability of future generations to meet theirs.
- Northern Forest**— a system of woodlands, mountains, rivers, streams and lakes covering a region of over 26 million acres that stretches from the northern woods of Maine through New Hampshire and Vermont into the Adirondack Mountains and the Tug Hill region of New York.
- old growth forest**— forests containing trees hundreds to even thousands of years old providing unique habitats.
- photosynthesis**— the process by which plants use the sun's energy to convert carbon dioxide and water into sugar.
- point pollution**— pollution that comes from a particular identifiable source, such as from a factory or sewage treatment plant.
- pollution**— a human-caused change in the physical, chemical, or biological conditions of the environment that creates an undesirable effect on living things.
- predation**— the act of an animal hunting, capturing, and eating another animal for food.
- primary producers**— trees and other green plants that provide food energy at the base of the food chain.
- secondary succession**— the process in which landscapes that have had the natural vegetation removed or destroyed begin to grow back into forests by stages.
- snags**— dead trees in the forest that are home to wildlife, providing critical nesting cavities and a rich source of food.
- understory**— the layers of the forest, such as smaller trees, shrubs, ferns, plants, and grasses that grow beneath the canopy.
- vertebrate wildlife**— animals with a backbone: mammals, birds, reptiles, fish, and amphibians.
- watershed**— the land area which delivers run-off water and sediment to a major river or stream and its tributaries.

Guide to Forest Activities

Looking for more activities for your class? The following chart lists National Wildlife Federation activities from the *Animal Tracks Activity Guide* and the *NatureScope* series that apply to forest studies. For easy cross-reference, each activity is listed by grade level and subject.

Activity Name/Source	Specific Grades	Science	Math	Language Arts	Social Studies	Art/Music	Summary
A Walk in the Woods NS Trees p. 38	K-2	X					Listen to a rhyming story to discover how the animals in a forest use trees.
We All Need Forests NS Trees p. 51	K-5	X			X	X	Discuss how forests are used. Make a collage of forest uses.
Under Cover! NS Trees p. 40	K-5	X					Take a look at the animals that use a tree by making a "peek-a-tree."
From Paper to Plastic NS Trees p. 65	K-5	X					Discover some of the ways people use trees.
Web of Life AT p. 132	3-6	X		X		X	Play a game to discover the interconnectedness of organisms in a forest food web.
Wild Animals in Soil AT p. 115	3-6	X					Learn about animals including decomposers living in soil.
Tree Champs NS Trees p. 56	3-8	X	X				Measure trees and hold a contest to find the biggest tree in town.
A Rottin Place to Live NS Trees p. 41	K-8	X					Examine a decomposing log and then make a log mural.
Disappearing Trees NS Trees p. 52	K-8	X		X	X		Listen to and discuss a make-believe story about a forest that is destroyed; then read an article about the problems facing South America's rain forests.
Tree Treats NS Trees p. 66	K-8	X					Research a tree food and then sample some tree snacks.
Celebrate Trees! NS Trees p. 68	K-8	X		X	X		Participate in a week of tree activities.

Key

AT= *Animal Tracks Activity Guide for Educators Grades 4 to 6*

(Order Animal Tracks Item #10. Includes one educator's guide and one student book)

NS Trees= *NatureScope, Trees Are Terrific!* (Item 75021)

Both available from the National Wildlife Federation, 8925 Leesburg Pike, Vienna, VA 22184.

Resources

FOR TEACHERS

Background Information

The Northern Forest by David Dobbs and Richard Ober (Chelsea Green Publishing Company, 1995). Available through Chelsea Green Publishing Company, 10 Water Street, Room 310, Lebanon, NH 03766, (603) 448-0317 or (800) 639-4099. \$17.95.

<http://plainfield.bypass.com/~ddobbs.tnf.htm>

Website provides information about the authors and links to other Northern Forest websites.

Caring for our Forests (Caring for our Earth) by Carol Greene (Enslow Publishers, Inc., 1991). Available through Enslow Publishers, Inc., P.O. Box 699, Springfield, NJ 07081-0699, (201) 379-8890 or (800) 398-2504. \$12.95.

Describes the significance of forests and how they can be preserved.

Shrinking Forests (Our Fragile Planet), by Bernard S. Cayne (Editor) and Jenny E. Tesar (Facts on File, 1991). Available through Infobase Holdings, Inc., 11 Penn Plaza, New York, NY 10001, (212) 967-8800 or (800) 322-8755. \$18.95.

Explores how forest ecosystems are destroyed by pollution development and lack of careful conservation.

The Book of Forest and Thicket: Trees, Shrubs and Wildflowers of Eastern North America by John Eastman (Stackpole Books, 1992). Available through Stackpole Books, 5067 Ritter Road, Mechanicsburg, PA 17055 or Acorn Naturalists (800) 422-8886. \$16.95.

Fact and folklore are combined with detailed descriptions of plant life east of the Rockies. Plants are discussed in the context of the ecological communities in which they are found.

The Northern Forest: A Legacy for the Future (The Northern Forest Alliance, 1995). Available through the Northern Forest Alliance, 58 State Street, Montpelier, VT 05602, (802) 223-5256. Free.

A color brochure detailing the Northern Forest Alliance's three goals of protected wildlands areas, well managed forests, and strong local economies. Includes map of proposed wildland sites.

The Future of the Northern Forest by Christopher Klyza and Stephen Trombulak (University Press of New England, 1995). Available through University Press of New England, 23 S. Main St., Hanover, NH 03755, (800) 421-1561. \$19.95.

This book presents background information on the Northern Forest and the viewpoints of 16 different interests who speak out on intertwined questions of ecology, economy, ethics, and politics.

North Woods: An Inside Look at the Nature Northeastern Forest by Peter Marchand (Appalachian Mountain Club, 1987). Available through Globe Pequot Press, P.O. Box 833, Old Saybrook, CT 06475, (860) 395-0440 or (800) 243-0495. \$10.95.

This book examines the many influences that shape the ecology of northern forests and alpine areas. It presents current ecological research in a readable style.

Activity and Curriculum Guides

Project Learning Tree: Environmental Education Activity Guide (PreK-8) (American Forest Foundation, 1996). For workshop information, contact Project Learning Tree, 1111 19th Street, NW, Suite 780, Washington, DC 20036.

This guide provides students with opportunities to investigate environmental issues and encourages them to make informed, responsible decisions using trees and forests as the focus.

Project Learning Tree: Exploring Environmental Issues - Focus on Forests (American Forest Foundation). Ages 7-12. For workshop information, contact Project Learning Tree, 1111 19th Street, NW, Washington, DC 20036.

Deals with a variety of environmental issues using forest issues as the focus.

Project Learning Tree: The Changing Forest: Forest Ecology (American Forest Foundation). Ages 7-12. For workshop information, contact Project Learning Tree, 1111 19th Street, NW, Washington, DC 20036. Designed to help educators encourage kids to explore and learn about forest ecosystems through hands-on discovery and experimentation.

Exploring the Forest With GrandFather Tree by JoAnne Dennee (Food Works, 1993). Ages 5-10. Available through Food Works, 64 Main Street, Montpelier, VT 05602, (802) 223-1515. \$18.95.

This Common Roots Guidebook is hands-on and hearts-on. Children are invited to step into the forest - either a real one or one they create indoors.

Project WILD (K-12) Activity Guide (Western Regional Environmental Council (WREEC), Inc., 1996). For workshop information, contact Project WILD, 5430 Grosvenor Lane, Bethesda, MD 20814, (301) 493-5447. <http://eelink.umich.edu/wild/>

Project WILD is an interdisciplinary, supplementary conservation and environmental education activity guide emphasizing wildlife.

Project WET Curriculum and Activity Guide (The Watercourse and WREEC, 1996). For workshop information, contact Project WET, 201 Culbertson Hall, Montana State University, Bozeman, Montana 59717-0057, (406) 994-5392.

e-mail: rwwet@msu.oscs.montana.edu

Project WET is a comprehensive, integrated activity guide covering all aspects of water ranging from physical and chemical characteristics to how water resources are managed.

Tropical Rainforests: The Vermont Connection (Vermont Natural Resources Council, 1993). Available through Vermont Natural Resources Council, 9 Bailey Avenue, Montpelier, VT 05602, (802) 223-2328. \$6.95.

This middle-school curriculum is full of activities and ideas that work to link global issues with local environmental literacy.

Keepers of the Earth: Native American Stories and Environmental Activities for Children by Michael Caduto, Joseph Bruchac and Carol Wood (Fulcrum Publishing, 1997). Available through Fulcrum Publishing, 350 Indiana Street, Suite 350, Golden, CO 80401, (303) 277-1623 or (800) 992-2908. \$26.95.

Keepers of the Earth is a sensitive and well-thought out guide for helping children love and care for the Earth.

Books for Kids

A Forest Year by Carol Lerner (William Morrow and Company, Inc., 1987). Available through Wilmor Warehouse, P.O. Box 1219, 39 Plymouth Street, Fairfield, NJ 07007, (201) 227-7200. \$11.88.

Describes the adjustments that plants and animals in a forest must make when seasons change. Colorful and animated illustrations.

A Tree is Growing by Arthur Dorros and S.D. Schindler (illustrator) (Scholastic Press, 1997). Available through Penguin USA, P.O. Box 120, Bergenfield, NJ 07621, (201) 387-0600 or (800) 526-0275. \$15.95. Detailed and colorful illustrations tell about the structure of trees, how they grow, and their uses. Currently out of print; check your school or local library.

The Gift of the Tree by Alvin Tresselt (Lothrop, Lee and Shepard Books, 1992). Available through William Morrow and Co., Inc., 39 Plymouth Street, P.O. Box 1219, Fairfield, NJ 07007, (201) 227-7200 or (800) 237-0657. \$16.00.

Packed with lively illustrations, this book traces the life cycle of an oak tree and the animals that depend on it.

In the Woods: Who's Been Here? by Lindsay Barrett George (Greenwillow Books, 1995). Available through William Morrow and Co., Inc., 39 Plymouth St., P.O. Box 1219, Fairfield, NJ 07007, (800) 843-9389. \$15.00. A boy and girl journey through the forest and find many signs of wildlife.

Who Lives Here?: Forests, Volume 2 by Dawn Baumann Brunke (Northword Press, 1993). Grades 3-4. Available through Northword Press, P.O. Box 1360, Minocqua, WI 54548, (715) 356-9800 or (800) 336-6398. \$4.95.

In the Forest Volume 2 by Ann Cooper and Dorothy Emerling (illustrator) (Denver Museum of Natural History, 1996). Ages 5-11. Available through Denver Museum of Natural History, WILD Wonder Series. 2001 Colorado Boulevard, Denver, CO 80205. \$7.95.

Great introduction to the forest. Takes kids into the forest where they encounter different wildlife species. Book emphasizes ecology, food chain relationships and forest survival strategies of wildlife species.

Once There Was A Tree (Dial Books for Young Readers) by Natalia Romanova (E.P. Dutton, 1992). Ages 7-11. Available through Penguin USA, 375 Hudson Street, New York, NY 10014, (201) 387-0600 or (800) 526-0275. \$5.99.

Inspirational book that traces the events that occur following the cutting of a tree, from the animals that live in and around the stump through the growth of a seedling.

The Lorax by Dr. Seuss (Random House, 1971). Ages 7-12. Available through Random House, 400 Hahn Road, Westminster, MD 21157, (410) 848-1900 or (800) 733-3000. \$14.00.

This classic book offers a timely message regarding habitat preservation and biodiversity.

Forest Life (Look Closer) by Barbara Taylor, Kim Taylor, and Jane Burton (Dorling-Kindersley, 1993). Ages 7-11. Available through Houghton Mifflin, Wayside Road, Burlington, MA 01803 (617) 272-1500 or (800) 225-3362. \$9.95.

Using lively text and spectacular photography, this book gives children a close-up look at a forest from mushrooms on the forest floor to birds in the canopy.

The Tree in the Ancient Forest by Carol Reed-Jones and Christopher Canyon (Dawn Pubns, 1995). Ages 6-11. Available through Dawn Pubns., P.O. Box 427, North East, MD 21901, (410) 287-8916 or Acorn Naturalists (800)422-8886. \$7.95.

This book portrays the plants and animals that live in an old growth forest. Discusses interdependence, biological diversity and forest ecology.

Start Exploring Forests: A Fact-Filled Coloring Book (Start Exploring Series) by Elizabeth Corning Dudley and Helen I. Driggs (illustrator) (Running Press, 1989). Available through Running Press, 125 S. 22nd Street, Philadelphia, PA 19103-4399 or Acorn Naturalists (800)422-8886. \$8.95.

This coloring book features hundreds of line drawings of plants and animals. It also contains descriptive writing of all the major forest regions of the world. Includes a 17" X 22" rainforest coloring poster. Ages 6 to adult.

A Tree in a Forest by Jan Thornhill (Simon & Schuster, 1992.) Available through Simon & Schuster Ordering Dept., 200 Old Tappan Road, Old Tappan, NJ 07675, (800) 223-2336 or Acorn Naturalists (800)422-8886. The details of forest life are explained around the life-cycle of a maple tree. Ages 7-12.

The Giving Tree by Shel Silverstein (HarperCollins Publishers, 1986). Available through HarperCollins Publishers, 1000 Keystone Industrial Park, Scranton, PA 18512-4621, (717) 941-1500. \$14.95.

A wonderful book about a boy and a tree and the gift of giving and acceptance of another's capacity to love in return.

WEBSITES FOR KIDS

National Wildlife Federation Kids' Page

<http://www.nwf.org/nwf/kids/>

A Cool Tour of the Environment, Ranger Rick on-line including *Homework Help*, Games, and More Fun!

National Public Radio's Science Friday

<http://www.npr.org/sfkids>

The kids' version of the popular science radio show on a web page. Science Friday explores all kinds of science-related issues. Search by topic and find in-depth information with experiments to try.

Smithsonian

<http://www.si.edu/>

Tap into this great resource and find information on just about anything. Great research tool!

Bill Nye the Science Guy

<http://nyelabs.kcts.org/>

Mini-lessons, experiments, fun facts, and more fun. Based on the award-winning television program.

ORGANIZATIONS/WEBSITES

National Wildlife Federation

8925 Leesburg Pike
Vienna, VA 22184
(703) 790-4000

<http://www.nwf.org/>

Find out about all of the National Wildlife Federation's educational programs and conservation work.

USDA Forest Service

<http://www.fs.fed.us/>

Information about sustainable development and various forest preservation projects.

Northern Forest Alliance

58 State Street
Montpelier, VT 05602
802-223-5256

Contact: Andrea Stander.

The NFA is a coalition of conservation, recreation and forestry organizations united in their commitment to enhance the ecological and economic sustainability of natural and human communities in the Northern Forest..

National Wildlife Federation's Northeast Natural Resource Center

58 State Street
Montpelier, VT 05602
(802) 229-0650

The NNRC is one of ten field offices of the National Wildlife Federation. The NNRC works with individuals and organizations throughout the northeast to conduct research, education, and advocacy programs on conservation issues of regional significance such as the Northern Forest. Contact: Elizabeth Soper

SmartWood

3 Millet Street
Richmond, VT 05477
(802) 434-5491.

SmartWood is a program of the Rainforest Alliance that focuses on reducing the long-term environmental impacts of logging. SmartWood evaluates forestry operations of companies and private landowners, and certifies those that meet a strict set of environmental standards. It is the oldest and largest forestry certification program in the world.

GORP - White National Forest

Federal Building
719 North Main Street
Laconia, NH 03246

http://www.gorp.com/gorp.resource/us_national_forest/nh_white.htm

Background information about White National Forest as well as recreational activities. Can also be contacted by mail at the above address.

National Institute for Science Education

http://whyfiles.news.wisc.edu/006migration/bird_loss.html
Discusses the decline of many songbird populations in forests.

GAIA Forest Conservation Archives

<http://forests.org/gaianf.html>
Contains recent educational forest conservation articles.

Plant-It 2000

<http://www.tesser.com/plantit/>
Organization dedicated to planting trees all over the nation.

Old Growth Forests

<http://www.yahoo.com/science/ecology/ecosystems/forests>
Ideas about how to protect the virgin forests of North America.

Sierra Club

<http://www.sierraclub.org/ecoregions.northern.html>
Resources and facts about the Northern Forest and what you can do to help.

Tree Trust

Time for Trees School Program
<http://willow.ncfes.umn.edu/treetrust/school2.htm>
Educational outreach program that works with schools and communities on environmental projects.

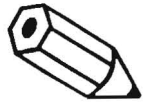
Multimedia and Other Resources

Into the Forest: Nature's Food Chain Game (Ampersand Press). Ages 8 and up.
Colorful cards represent the plants and animals of the forest. Each card lists what the animal eats and what it is eaten by. At the end of the game, players count up their energy points. Rules are easy to comprehend. Good for 2-6 players.

Bill Nye the Science Guy. Public Broadcasting Service. Available through Disney Educational Products, (800) 295-5010.
Two programs per video with range of over 60 titles focusing on science and the environment. Titles include: "Forests," "Biodiversity," and "The Food Web."



Resource Notes...



A series of 18 horizontal lines for writing, spaced evenly down the page.

Get Recognized!

Keep America Beautiful

To youth and school groups for environmental improvement. Annual.

Keep America Beautiful

Awards Program Coordinator

9 West Broad Street

Stamford, CT 06902

(203) 323-8987

President's Youth Service Awards

To youths ages 5-22 for community service.

President's Youth Service Awards

PO Box 310

New Castle, DE 19720

Albert Schweitzer Environmental Youth Award

To youths and youth groups ages 12-18 for environmental change in the community.

Albert Schweitzer Institute for the Humanities

PO Box 550

Wallingford, CT 06492-0550

(203) 697-2741

National Geographic World

National Geographic World has two ways for kids to get noticed. The first is an annual event sponsored by Pizza Hut called The Kids' Hall of Fame. The second, Kids Did It!, is a monthly feature.

National Geographic World

Dept. Hall of Fame

PO Box 96000

Washington, DC 20090-6000

Wildlife Education, Ltd.

Each monthly issue of Zoobooks contains activity pages with a Kids' Corner where kids can get noticed.

Wildlife Education Ltd.

Kids' Corner

9820 Willow Creek Road Ste. 300

San Diego, CA 92131

<http://www.zoobooks.com>

Other NWF Education Programs

The National Wildlife Federation has many education programs and resources available. Here's how to find out more about them...

ANIMAL TRACKS®

Animal Tracks® is a classroom education program of the National Wildlife Federation focusing on teacher training and environmental education resources. In Animal Tracks materials, the animals and their tracks lead educators and students on an exploration of conservation issues. For more information call (703)790-4236, e-mail kier@nwf.org, or visit our website at <http://www.nwf.org/atracks/>

NATIONAL WILDLIFE WEEK

During **National Wildlife Week**, National Wildlife Federation distributes over 620,000 kits to teachers across the country. For the 1998 Wildlife Week, April 19 to 25, the theme is "Nature's Web: Caring for the Land." National Wildlife Week Kits are distributed through individual NWF Affiliates. Consult the NWF Conservation Directory or your local library or phone book to find the address of the NWF Affiliate in your state to request a kit, or contact the National Wildlife Federation at (703) 790-4100 or wildlife@nwf.org.

SCHOOLYARD HABITATS®PROJECT

Schoolyard Habitats encourages and assists school communities in establishing habitat-based learning sites. The program emphasizes wildlife habitat conservation on school and learning center grounds, cross-curriculum learning and teaching and community involvement. For more information call 1-703-790-4100.

RANGER RICK®

Ranger Rick is a monthly magazine for kids aged 7 and up. Each 48-page issue is loaded with colorful animal photos, funny drawings, and exciting stories that turn kids on to nature, outdoor adventure, and helping the environment. Cartoons, riddles, crafts, games, and far-out animal facts make Ranger Rick fun for everyone. For subscriptions call toll-free 1-800-588-1650 and give the operator source key RRWEB7 or write to Ranger Rick at NWF for more information.

YOUR BIG BACKYARD®

Your Big Backyard® is a monthly magazine for kids aged 3 to 6. Each issue sparks a child's natural curiosity as it introduces them to the wonderful world of nature with charming photos of baby animals, read-to-me stories, poems, riddles, and games. This special magazine combines close-up pictures with simple text to help kids start on the road to reading. Your Big Backyard has a parent and educators guide that includes nature activities, crafts, developmental tips, and nature-related product reviews. For subscriptions call toll-free 1-800-588-1650 and give the operator source key RYWEB7 or mail a check or money order for \$14 (12 issues) to Your Big Backyard, PO Box 775, Mount Morris, IL 61054-8273.

BACKYARD WILDLIFE HABITAT™ PROGRAM

The Backyard Wildlife Habitat program encourages people in all parts of the U.S. and Canada to supply the basic elements that wildlife need to survive: food, water, shelter, and a place to raise young. Anyone with a yard, no matter what size, can easily create a home for wildlife. Once the basic elements are provided, one may apply for certification and join the list of over 18,500 official Backyard Wildlife Habitats. To order an information kit about this program; containing a planting guide, a copy of *The Backyard Naturalist* by NWF's chief naturalist, and an application, call 1-703-790-4100.

EARTHSAVERS®

EarthSavers is a club program for kids (ages 6-13) who care about the environment and want to help. Together with their adult leaders -- many of whom are teachers -- EarthSavers club members use the quarterly *EarthSavers* newspaper to learn more about nature and wildlife and to find out what other kids are doing to improve and protect the natural environment in their communities. In addition to the newspaper, each club leader receives free of charge an *EarthSavers Activity Guide* to coincide with each issue, as well as a leader's handbook and membership cards. For more information and a registration form, write to: EarthSavers; National Wildlife Federation; 8925 Leesburg Pike; Vienna, VA 22184.

EARTH TOMORROW®

EARTH TOMORROW® is an innovative environmental education and leadership program for high school teachers and students in the city. It is designed to create an awareness for conserving natural resources and to provide opportunities for action at the individual and community level. Teacher workshops provide training and resources in environmental education to urban educators that are not readily available within the city. Students explore environmental issues, identify, and propose solutions to local areas of concern by attending a residential summer workshop at a local university and going on field trips. On-going support and follow-up is provided as students and teachers form school clubs to implement conservation action projects that are designed to foster coalition building within the community. **EARTH TOMORROW®** is currently being piloted in Detroit, MI, by NWF's Great Lakes Natural Resource Center (GLNRC) in cooperation with the Michigan United Conservation Club (MUCC). For more information, call NWF's GLNRC, 313-769-3351, or visit our web site at: <http://www.greatlakes.nwf.org/educ/earthtom.htm>

CAMPUS ECOLOGY

Campus Ecology establishes environmentally sound practices on college campuses by promoting leadership and action within the campus community. By communicating to campus organizers what other students, faculty and administrators, and the broader environmental community have learned, Campus Ecology recognizes the efforts of people who work on outstanding projects by documenting and publishing their accomplishments. For more information, call 703-790-4318.

RANGER RICK'S WILDLIFE CAMP™

Ranger Rick's Wildlife Camp is a unique opportunity for camps and youth-serving organizations to partner with NWF and operate an environmental program model on their own site. Complete with an exciting variety of curriculum materials, program manuals and an administrative guide, the model encourages young people to develop an attitude of environmental stewardship through involvement in a series of hands-on- learning activities in an outdoor setting. Whether planning one week or two, at a day or resident camp, nature center or club house--Ranger Rick's Wildlife Camp blends nature discovery with exciting outdoor adventures. For more information about this program, call 1-703-790-4568/4536.

CONSERVATION SUMMITS®

Conservation Summits provide unique learning opportunities for teachers, outdoor educators, youth leaders and parents at some of America's most spectacular sites. During these week-long, family-oriented adventures, participants can take advantage of special classes that provide instruction on introducing children and students to the study of nature and the environment. Classes include integrating environmental education into an existing curriculum, teaching techniques for nature study, and an introduction to available environmental education materials. University credit is offered at all locations. For more information, call 1-800-245-5484.

NATURELINK®

NatureLink is an affordable family outdoor education program designed to engage families in hands-on outdoor learning, while fostering awareness of their environment and encouraging environmentally-responsible lifestyles. Participants work with mentors to learn about outdoor themes and build outdoor skills (e.g., wetland ecology, fishing). Afterwards, they create a Earth Pledge--a statement of their commitment to take action in their homes or community on behalf of the environment. The National Wildlife Federation trains and partners with community organizations to host NatureLink programs across the United States. For more information, please call 703-790-4100.

CONSERVATION DIRECTORY

The **Conservation Directory** is an annual publication of the National Wildlife Federation and continues to be the most complete source for up-to-date detailed information on environmental conservation organizations. The 1998 edition lists over 2000 governmental and non-governmental organizations and personnel involved in conservation work statewide, nationwide and worldwide. The directory may be purchased by calling 1-410-516-6583. The 1998 edition is \$61.00 plus shipping and handling. For more information about getting your organization listed, call 703-790-4402.

NATIONAL WILDLIFE PRODUCTIONS

National Wildlife Productions, Inc. (NWP) is the television, film, and multimedia arm of the NWF. NWP's mission is to produce IMAX® films, television programs, and other media that entertain people while opening their eyes to the importance of conservation. NWP creates original programming for networks such as TBS Superstation, The Disney Channel, Animal Planet, Home & Garden Television, The Travel Channel, The Outdoor Life Network, and public television. Consult our website at www.nwf.org/nwf/nwp for additional program information and the latest programming updates.





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ABOUT ANIMAL TRACKS ACTION PACKS

Animal Tracks Action Packs are a classroom resource helping educators introduce environmental issues across curriculum through Discovery, Awareness, and Action. Look for Action Packs titles: Habitat, Urban Communities, Water, and Wetlands, with more to come!

