Create an outdoor learning garden

Give back to the school or community by installing and using an outdoor learning garden. Gardens are designed to teach students about gardening, wildlife, eco-systems and provide physical activity. Adding a vegetable garden can also provide food and nutritional connections.

www.nwf.org/schoolyard

Greening Your Community

Eco-Schools USA provide 8 different pathways to make a difference in your community. Create eco-action plans and devise a vision statement for what you can do to make a change for the better. Pathways include: Energy, Water, Transportation, Grounds, Green Hours, Climate Change and more.

www.eco-schoolsusa.org

Trees - more than shade

Trees for Wildlife teaches youth about trees, and their role in their community and how to plant and care for trees in their community. Step by step activities and instruction for groups and individuals walk you through the learning, planting and caring for trees. You can also potential receive free trees.

www.nwf.org/trees

Need activities that get Scouts outside and active?

For 40 years, NWF has provided quality activities and lessons for youth from Elementary to High School in environment and nature skill exploration.

Be Out There online activity database provides a host of simple games, crafts and activities that can be done any time of the year.

www.beoutthere.org

Climate Classroom

Climate change is a pressing issue in the world today. Our world is in flux and we can help by reducing our impact. Climate Classroom provides age appropriate talking points to discuss climate change from what it is (science), what its impacts are, and what the solutions are. Included on the site are ideas for service projects for middle school and teenage students.

www.climateclassroom.org

Sign up to receive an update from National Wildlife Federation about these activities or other ways to get your communities outside.

FREE enrollment at educators@nwf.org
Special Acknowledgement to Contributors
National Wildlife Federation would like to thank the former staff, education advisory committee and contributors who worked to develop the Trees for Wildlife program and educational materials. Your dedication to building a lasting relationship between future generation of stewards and nature is inspiring.

National Wildlife Federation

OUR MISSION

National Wildlife Federation mission is to inspire Americans to protect wildlife for our children’s future. For 70 years, National Wildlife Federation has been a leader in conservation and environmental education shaping the future of stewardship for the earth in the United States. Through our educational programs, publications and multi-media outreach, NWF is dedicated to three objectives: connecting people with nature, safeguarding wildlife and wild places and providing solutions to climate change.

ERNXT merger with NWF in 2010 extends our programmatic connections for adults and youth by offering an opportunity to learn about the importance of trees to our planet’s health, the ability to tangible experience to make a difference by planting trees and dedication to pass on an appreciation for nature to future generations.

Trees for Wildlife program provides adult leaders with fun, hands-on science-based activities to help young people learn about the importance of trees and how to plant and take care of trees for the future. This initiative aims to educate and prepare a generation of environmental stewards, expand the world inventory of trees and to protect and improve natural resources.

National Wildlife Federation
11100 Wildlife Center Drive, Reston, Virginia 20190
703-438-6000 • 703-438-6468 (FAX)
www.nwf.org

We would like to continue to develop and improve our program. If you have comments or ideas, please email: trees@nwf.org

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Purpose and Organization of this Guide

Trees for Wildlife program is designed to helping young people learn about the importance of trees in the environment, how to plant and take care of trees, and share the information they have learned with others.

Each section of the guide provides information and activities for different age levels (grades k–1, 2–3, 4–5, 6–8, and 9–12) and tips for the adults who will encourage and guide participants in the Trees for Wildlife program.

Objectives will be outlined for each activity so that both adults and children can quickly understand some of the key learning points.

The time suggested to complete each activity is estimated. Some groups move quickly through an activity, while others might enjoy longer discussions, have more questions, or need more help following directions. The focus should be on learning, working with others, and having fun, rather than on the amount of time the activity takes.

Materials needed for each activity are provided in each lesson to help you prepare for a session. Whenever possible, let the participants take on the responsibility for gathering supplies. Building leadership and taking responsibility including planning, delegating, and work as a team are objectives of each activity.

The activities are preceded by background information, which will provide you with details that you might need to answer questions or guide a discussion. You will find extension activities for each grade level that are a great way to keep participants engaged if you have more time or find particular interest in a topic.

This guide includes a section on tree planting. Included are guidelines for identifying and assessing a planting site, organizing a planting day, and caring for trees after planting. Every participant will have at least one opportunity to plant or care for a tree. The glossary will assist with definitions of many relevant terms which are italicized throughout the activities.

The Trees for Wildlife program guiding principles include:

- Educate a generation of young people on the value of trees to the environment, built and natural;
- Plant trees to replace trees lost to deforestation, and
- Develop lifelong advocates for planting and caring for trees, and for nature and wildlife in general.
Trees for Wildlife Patches and Pins

Embroidered patches and lapel pins are available to purchase as a recognition for your students successful completion of the program. We suggest that participants complete two to three activities appropriate for their grade level to earn a patch and planting a tree can count as an activity. For all participants, the patch will be a proud reminder of what they have learned and what actions they have taken as advocates for trees and nature. (order www.nwf.org/trees)

Resources and Expansion Activities

Additional resources and activities to continue students engagement with nature, wildlife and how they can make a difference in their community are available on the Trees for Wildlife website (www.nwf.org/trees)

Using This Activity Guide

Trees for Wildlife program activity guides provide information and age appropriate activities (grades k–1, 2–3, 4–5, 6–8, and 9–12) and tips for the adults who will encourage and guide participants through the program.

Objectives will be outlined for each activity so that both adults and children can quickly understand some of the key learning points.

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The activities are preceded by background information, which will provide you with details that you might need to answer questions or guide a discussion. You will find extension activities for each grade level that are a great way to keep participants engaged if you have more time or find particular interest in a topic.

You can also access additional resources online that can help you with the activities.

Tree Planting Guide

You can download the step by step tree planting and care guide. This guide will assist you for identifying and assessing a planting site, organizing a planting day, and caring for trees after planting. Every participant will have at least one opportunity to plant or care for a tree.
Introduction

A critical starting point for the program and your journey with your students to learning about trees – is to understand the foundation building blocks: Trees themselves

- What is a tree and what are its parts
- What types of trees are there
- What is the lifecycle of a tree
- Why do trees play in the community

What is a Tree?

Trees similar to all living things grow, reproduce and respond to their environment. Trees like all plants manufacture their food through photosynthesis. Trees are in the family of woody plants which have cambium a special layer of cells that allow the tree to increase in girth. Trees are self-supporting with a single stem.

The leaves of the tree produce sugar for the food through photosynthesis by combining carbon dioxide and sunlight. Through the process the resulting is the production of oxygen. The sugar is fed to the trunk and roots of the tree through the cambium.

The roots gather minerals and water which are needed in the process of photosynthesis and

Leaves prepare the food obtained from the air and soil and give off moisture by transpiration. Light and heat are necessary for these chemical changes.

Air supplies carbon to the tree, through the under-surface of leaves.

The breathing pores of the entire tree—located on the leaves, twigs, branches, trunk and roots—take in oxygen.

Events such as flooding, poisonous gases, or smoke may damage or even kill a tree.

Root tips or root hairs take up water containing small quantities of minerals in the solution.
for feeding the tree’s growth and development. The tree has one tap root and many lateral roots which help to keep it stable in wind and snow.

Learn more about trees at www.arboretum.harvard.edu/programs/tree_basics

Part of the trees

The CROWN of the tree is made up of the leaves and branches.

The TRUNK of the tree supports the crown and serves as a highway for food made in the leaves to travel to the roots and for water and nutrients from the roots to travel to the leaves.

The HEARTWOOD of the tree develops as the tree gets older. It is old sapwood that no longer carries sap, and gives the trunk support and stiffness. In many kinds of trees, the heartwood is a darker color than the sapwood, since its water carrying tubes get clogged up.

The CAMBIUM is a layer or zone of cells, one cell thick, inside the inner bark. The cambium produces both the xylem and phloem cells. This is where diameter growth occurs, and where rings and inner bark are formed. In the Xylem (sapwood) layer, tree sap (water plus nitrogen and mineral nutrients) is carried back up from the roots to the leaves. In the Phloem (inner bark) layer, sugar that is made in the leaves or needles, is carried down to the branches, trunks, and roots, where it is converted into the food (starch) the tree needs for growth.

The BARK layer protects the tree from insects and disease, excessive heat and cold, and other injuries.

The ROOTS of the tree support the trunk and crown, and also anchor the tree in the soil.

They serve as a storage facility during the winter for the food produced by the leaves during the growing season. The roots also absorb water and nutrients from the soil for use by the tree.

Tree Lifecycle

All living things have a life cycle – they are born, they grow, they produce, they die. A tree life cycle has four general steps. Along the cycle, each component has to build off the next and then re-start again.

SEED

Seed – whether it is an apple seed or pine cone or acorn – contains the foundation for what the tree will become (the type of tree, the size, what fruit it will produce). Seeds come in a wide variety of shapes, weights, colors, and sizes, depending on the species. All seeds develop from male and female parts of the trees producing fruits but not all of them are easily recognizable or edible. A seed need to germinate or sprout and begin to grow. Germination for different trees can take different amounts of time and waiting to see if the seed has successful germinated – till when you can see the first shoots – can be the longest aspect for tree growth.

SPROUT/SEEDLINGS

Favorable environmental conditions enable the seed to grow, expand, and break through the seed coat using the stored food supply of the seed for the necessary
energy to grow. The root grows downward to the soil to anchor the sprout and search for water and nutrients, while the sprout emerges from the ground seeking sunlight.

A sapling is a small tree usually between 1 and 4 inches in diameter at 4.5 feet. This is the standard height where a tree’s diameter is measured. In this juvenile state, the tree is not mature enough to reproduce. However, it is growing rapidly. The sapling encounters similar types of competition and threats to that of a seedling.

**Mature**

With favorable conditions, a sapling will continue to develop into a mature tree. During this stage in the cycle, each tree will grow as much as its species and site conditions will permit. In addition, flowers develop, reproduction ensues, fruits form, and seed dispersal can now occur.

The life span of a tree is as wide-ranging as the number of tree varieties, yet death is inevitable. Usually it is a combination of factors that finally overcome a tree and cause it to die. Injury, drought stress, followed by disease, rot, root dieback, coupled with a lightning strike and insect infestation is just one of many scenarios. However, sometimes it can be just one factor serious enough to cause mortality.

**Snag (Decline)**

A standing dead tree, also called a snag, still plays a vital role in the life cycle. A snag slowly breaks down and returns nutrients to the soil as small limbs, bark, and branches fall to the ground. The snag also provides habitat, cover, and food for wildlife and insects. In turn, animals, insects, and fungi help break down the tree.

**Fallen Trees (Decomposition)**

Trees will fall to the ground and gradually return nutrients to the soil where they are taken up again by other trees by providing for their growth.

**Type of Trees**

Trees can divide into deciduous and coniferous categories.

**Deciduous Trees** are also known as broadleaf trees because the leaves are generally larger and wider than those of conifers. The larger leaf size means a greater surface area for photosynthesis, but it also means the leaf is too fragile to withstand winter conditions. Therefore, most deciduous trees drop their leaves in autumn.

**Coniferous Trees** keep their leaves throughout the year, shedding only the oldest leaves. Usually these leaves are lower down on the tree and do not receive as much sunlight as newly developed leaves higher up. Some of the best-known members of the conifer family are pines, spruces, firs, and hemlocks. The cones of the conifers are its flowers.
The Value of Trees!

Trees are a truly beautiful part of the natural environment, but they are also amazingly efficient machines—constantly working to make Earth a healthier planet. The Trees for the 21st Century program is designed to help you guide children and teens through activities that will deepen their understanding of how trees make a difference in their lives and in the world.

Here are 10 proven ways that trees make a big difference:

1. **Trees improve air quality.**
   Trees are sometimes called the lungs of the Earth because they absorb pollutants through their leaves, trapping (or “sequestering”), and filtering contaminants in the air. Like all green plants, trees also produce oxygen through photosynthesis.

2. **Trees improve water quality, reduce flooding and erosion.**
   A tree’s leafy canopy catches precipitation before it reaches the ground, allowing some of it to gently drip and the rest to evaporate. Tree roots hold soil in place, reducing erosion. In these ways, trees lessen the force of storms and reduce the amount of runoff into sewers, streams and rivers, improving water quality. One hundred mature trees can intercept about 100,000 gallons of rainfall per year.

3. **Trees temper climate.**
   Trees lower air temperatures and humidity; they can also influence wind speed. Evaporation of water from trees, or transpiration, has a cooling effect. Cities develop “heat islands” because dark roofs and pavement absorb solar energy and radiate it back. Trees in parking lots have been shown to reduce asphalt temperatures by 36 degrees and car interiors by up to 47 degrees Fahrenheit.

4. **Trees conserve energy.**
   Three or more large trees strategically placed on sunny sides of a house shade it from the hot summer sun, reducing air-conditioning costs by as much as 30 percent. Deciduous trees are best for this use because they lose their leaves in winter, exposing the house to the warming winter sun, which lowers the energy needed to heat the house. Coniferous trees, because they retain their needles year-round, serve to reduce wind when placed on the north and northwest sides of a building, resulting in significantly lower winter heating costs.

5. **Trees are good for the economy.**
   Economic analyses have found that the value of homes near trees is 9 to 15 percent higher than homes without. Research shows that shoppers linger longer along a shaded avenue than one barren of trees and are even willing to pay more for goods and services.

6. **Trees create habitat for plants and animals.**
   Wherever trees are established, wildlife and other plants are sure to follow, ensuring a healthier ecosystem. Trees provide shelter and food for a variety of birds and small animals.

7. **Trees improve health.**
   Research demonstrates that exposure to trees has a relaxing effect on humans, reducing stress and imparting a sense of well-being. Hospital patients with a window view of trees recover faster than those without. Children with Attention Deficit Disorder are better able to concentrate after time spent in outdoor green settings.
8. Trees reduce crime.

Data show that apartment buildings with high levels of greenery had significantly fewer crimes than those without any trees.

9. Trees reduce noise pollution and can serve as screens.

A belt of trees 100 feet wide and 50 feet tall can reduce highway noise by up to 10 decibels, reducing the sound volume by half. Densely planted trees can also block unsightly views.

10. Trees promote community.

Trees can enhance a community’s sense of pride, and ownership. Active involvement in tree planting programs leads to a stronger sense of community and the promotion of environmental responsibility and ethics. Planting programs also project a visible sign of change and provide the impetus for other community renewal and action programs.

It takes many years for a tree to grow large enough to give back many of these benefits. Existing trees are living things that will not last forever, so it is critical that we continue to replenish the forests and plant new ones in our communities. Young trees need our care and stewardship to grow strong—ensuring a healthy future for our planet and all its inhabitants.

REFERENCES


Activities for Grades 6-8

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Glossary ............................................................................. 28
### OBJECTIVES
- Observe a stream habitat
- Examine the many ways streams are used and impacted by humans
- Identify characteristics of good or poor quality streams

### TIME
Total time a month or several weeks. The group will need to be at a stream for two to three hours each time. Repeated visits to the same site several times over many months or even a year or more are very useful, particularly if the participants are collecting data for an environmental organization, water company, or government office.

### MATERIALS
- Stream observation assessment sheets
- Pencils
- Containers
- Paintbrushes
- Magnifying lenses
- Sensitivity to pollution identification charts
- Plastic spoons

### BACKGROUND
Observations of the types and numbers of animals that live in stream habitats can provide information about the health of the stream. For example, certain insects can only live in very clean water while others are able to survive in polluted water. Collecting, identifying, and counting the types of insects can give us important information about the health of a stream, vital knowledge for the many people in the United States and throughout the world who get their water from streams.

When people use the area directly next to a stream for buildings, roads, farming or other uses, pollution has a chance to enter the streams. When trees and shrubs are removed, less shade is a result, which is harmful to those animals
that need cold water to survive. In addition, the absence of nearby trees hurts animals in the stream that rely on falling leaves as a source of food.

Some streams have been straightened so that they no longer curve as they flow downstream. The water then moves too quickly, erodes the stream banks, and may cause flooding downstream. Leaving a natural area of trees and shrubs next to streams—referred to as the riparian zone—provides a buffer area that can stop pollution from getting into streams and provides shade and leaves for stream animals. Planting trees next to a stream is a simple and effective way to help keep water clean and healthy both for the animals who live there and for people living downstream who may use the water for drinking.

Prior to conducting this activity, you and your group will need to locate a stream in an area that is safe and has public access.

**DISCUSSION**

Before beginning the activity, talk to the children about stream habitats. Ask them the following questions:

- How are streams affected by the actions of people?
- How can you tell if a stream is in good health?

Other discussion questions will be part of the activity.

**ACTIVITY**

1. Have the participants pace 300 steps to mark the start and end points of their stream detective work.

2. If the group is large, divide them into teams of three to five people. If the group is relatively small, divide the children into pairs. Each team will observe the entire section of a stream that has been marked. Using the stream observation assessment sheet, each team will circle the answers that best describe the stream. Encourage the participants to spend time observing and discussing their observations as they try to arrive at consensus responses.

3. Have each team count up the number of circled answers in each column. Ask the participants to decide whether the condition of the stream is good, ok, or not good and to explain the reasons for their rating.

4. Bring the group together to discuss the following:
   - What is happening upstream that could be affecting the stream?
   - If the stream is in good condition, what can be done to keep it that way? If they think there is a problem, what could be done to help improve the stream?

5. Have each participant collect about an inch of water in the bottom of a container and then pick up a rock from the stream and hold it over the container of water. After examining the rock for any signs of movement or life, participants should use a paintbrush to gently brush anything on the surface of all sides of the rock into the container. The process should be repeated for several rocks.

6. Have the participants place the rocks back into the stream where they were found.

7. With their magnifying lenses, they can now examine any animals found and identify them, using the sensitivity to pollution identification charts (see pages 6–7). Remind participants to gently return the animals to the section of stream where they were collected, using the plastic spoons if needed.
8. Ask the participants:

- Did you find mainly animals that were sensitive, somewhat sensitive, or not sensitive to pollution?
- What do your findings say about the health of the stream?

EXTENSION ACTIVITIES

- Monitor long-term water quality by having participants compare changes over time if they repeat this activity several times a year (or longer), always recording and saving the data collected. If changes occur, see if the group can explain what caused the changes in the quality of the stream’s water.
- Researching the ways the land in the area of their stream had been used throughout history and what may be impacting the stream.
- Participants might want to contact local, state, or other environmental organizations that are interested in collecting information on water quality to report their findings. Or your group could adopt the stream and make regular trips to clean up the trash in and around it.
- Draw the stream life under the water and the trees surrounding the stream.
Stream Observation Assessment

<table>
<thead>
<tr>
<th>Name of Observer:</th>
<th>Date</th>
</tr>
</thead>
</table>

**Location**

| Stream Observation (General) | ☐ Good | ☐ Okay | ☐ Not Good | | | |
|-----------------------------|--------|--------|------------| | | |
| Check off your team’s observations | | | | | | |
| Does the stream bend and curve? | ☐ Bends or curves | ☐ Little curving | ☐ Straight | | | |
| Is there trash in or near the stream? | ☐ None | ☐ Some | ☐ Lots | | | |
| Do you notice any unusual smells, such as sewage, rotten eggs, or chlorine? (Streams may have some natural odor.) | ☐ None | ☐ Some | ☐ Stinky | | | |
| Does the stream bank look natural (plants and roots along the edge of the stream)? | ☐ Lots of plants | ☐ Mostly bare soil | ☐ Concrete | | | |
| Are there trees near the stream? | ☐ Many trees | ☐ Some trees | ☐ Few or no trees | | | |
| Is the stream shaded? | ☐ Very shaded | ☐ Some shade | ☐ Little or no shade | | | |
| Are there good places for animals to live in the stream? (Logs, sticks, and leaves provide good habitats for stream animals.) | ☐ Lots | ☐ Some | ☐ Little | | | |
| Do you see any fish in the stream? | ☐ Lots | ☐ Some | ☐ None | | | |

**TOTALS** *(Count up number of checks in each column and enter total)*

**SENSITIVITY TO POLLUTION IDENTIFICATION**

| Class One: Sensitive to Pollution | | | |
|----------------------------------|--------|--------| |
| Mayflies | Stoneflies | Caddisflies | Water Pennies | | | |
| Class Two: Somewhat Sensitive to Pollution | | | |
| Dragonflies | Net-Spinning | Caddisflies | Crayfish | | | |
| Class Three: Tolerant of Pollution | | | |
| Flat Worms | Midges | Segmented Worms | | | |

(Online field guide for images can be located at www.seanet.com/22leska/online/guide)
### OBJECTIVES
- Understand what a riparian area is and it’s of the importance to wildlife and humans
- Identify animals and plants that inhabit riparian zones

### TIME
About two hours are needed for the discussion, imagery exercise, drawing, and visit to a riparian zone.

### MATERIALS
- Guided imagery for escape to the riparian zone sheet (page 11)
- Paper
- Colored pencils
- Markers
- Paint
- Paint brushes

### BACKGROUND
Riparian zones are the green areas of life found on the edges of streams, lakes, and rivers. These zones range in width from narrow ribbons in desert and mountain settings to wide bands on the plains and lowlands. Riparian areas provide space, shelter, and food for plant and animal communities. Healthy riparian areas typically contain trees and shrubs native to the region, which provide shade for aquatic plants and animals and land-dwelling creatures at the water’s edge. Riparian vegetation strengthens riverbanks to prevent erosion and maintains the stream channel, keeping the water clear.

Natural riparian areas (typically containing native shrubs and trees) also help keep the water clean by working in a similar fashion to a kitchen sponge. Like a sponge soaking up a spill, a healthy riparian area can collect pollution coming off of the landscape (oil from parking lots or chemicals from farms), trapping it before the pollution reaches the stream. Healthy riparian areas also can trap extra water when a stream floods, again similar to how a sponge soaks up spilled liquid.

Since this session involves a visit to a riparian habitat, you and your group will need to do prior research to locate a good place for the visit.

### DISCUSSION
Introduce the concept of riparian zones by asking the following questions:
- When you visited a stream or river, what was it like?
- Were plants growing there? What did they look like?
- Was the area hot or cool?

Encourage the participants to share descriptions of any area by a stream or riverbank they have seen. Then tell them that the kind of area they have been describing has a special name: the riparian area or riparian zone.
ACTIVITY

1. Ask the participants to get into a comfortable position, close their eyes, and listen to the passage you will be reading to them on Escape to the riparian zone (next page). Once they are ready, tell them to imagine everything they hear being described. Then slowly read the passage aloud to the group.

2. After the reading, ask the group to continue to sit quietly with their eyes closed and review the whole experience. Ask the children to pay particular attention to their favorite images.

3. Invite the children to open their eyes and share their favorite images.

4. Now it is time for the participants to draw or paint their favorite images.

5. Have them tape up their work to create a display. Ask them the following questions:
   - What are some of the characteristics of riparian areas?
   - What kinds of plants are there? What kinds of animals?
   - Was the environment different near the water than it was farther away? In what ways?
   - What are some of the main reasons that riparian areas are important and have value to humans?

6. The group has been discussing, imagining, and drawing a riparian area. Now it is time to visit a real one. Encourage the participants to look for things they encountered in their imagery as well as things they have not. Ask how the imagery exercise helped them to observe the live riparian zone. Hold a discussion about how young people can visit a riparian zone without damaging it.

EXTENSION ACTIVITY

- Conduct research the specific types of plants or animals that depend on local riparian areas. Invite a local naturalist who can answer questions and guide the research on local riparian habitats.
You are camping near a small river with your family on a sunny summer weekend. You wake up early due to many new and different noises outside the tent. As you lay there in your sleeping bag you can hear the song birds up above and the buzz of the cicadas in the brush. Outside your tent the bright blue sky greets you as you prepare for your morning hike. Lacing up your shoes you try to understand why your parents don’t want you to take your iPod down to the river bank—parents—sheesh! The iPod stays back at camp, and off you go to explore the area.

Farther down the trail you notice a thick swarm of insects near a tree. The bugs seem to just hover effortlessly.

As you approach the river bank you can hear the rushing of the water and the smell in the air changes. Suddenly there is a splash as a small fish leaps up while looking for food.

At the edge of the river you see small creatures darting back and forth in the water. You reach down to pick up a rock and they all scatter. You toss the rock sidearm and watch it skip across the top of the water one hop at a time. The hops are shorter with each skip and then the rock sinks to the bottom.

You take off your shoes and wiggle your toes in the water. The bottom is silky smooth to the touch. You can see tiny river creatures darting around, but you can’t feel them. The water is cool and you rest your feet on a group of rocks to dry.

A noise catches your attention and farther down the bank you see a mound of intertwined branches. A beaver’s head pops up out of the water and heads to shore to find more branches and twigs for its home. The water swirls around the edge of the branches but doesn’t wash them away. You can see mud between the twigs and leaves holding it together. The beaver heads back to the water and you hear his large flat tail flap the surface.

Just as you are putting your shoes back on you hear the crackle of branches back near the trees. You jump up in time to see a doe and her fawn foraging for food. They are nibbling on some small green leaves, but they don’t seem to see you. You stay quiet until they have moved on, then you head down the trail back towards camp.

You think about all of the creatures that you saw this morning and how much they rely on the riverbank to thrive. You realize all the sounds and sights you would have missed if your parents had let you take the iPod—maybe they are on to something!
OBJECTIVES

- To understand how invasive species endanger native plants
- To identify community needs by researching where in the park the invasive plants need to be removed
- To improve a community area by removing invasive plants
- To transform invasive plants into useful and attractive products

TIME

About two – one hour session. If all parts of the activity are done at one time, a full morning or afternoon is needed. But you and your group might decide to break up the activity into two sessions—one for preparation and one for pulling up invasive plants and transforming them. Because pulling invasive plants is hard work, include time for a break with refreshments.

MATERIALS

- Gloves
- Pictures or samples of invasive plants
- Gardening tools, such as shovels and trowels
- Magnifying lenses
- Containers for transporting the invasive plants
- Scissors
- Hot glue guns
- Twine, yarn, or raffia

BACKGROUND

Invasive species take over many areas and crowd out indigenous or native plants, which are trying to grow. Often these invasive trees and plants are not “bad” in their own right but are merely ill-placed and create problems by spreading aggressively.

A list of invasive species for your state through the US Department of Agriculture website (http://plants.usda.gov/java/noxiousDriver) or by contacting your local cooperative extension office

Prior to conducting this activity, you will need to:

- Contact your local park authority or cooperative extension service to learn about invasive plants and how to properly identify and remove plant. They will be able to also connect you with a local group of “weed warriors” to work with.
- Identify a location where you would like to conduct a “weed warrior project”

The black swallow-wort, for example, an invasive perennial vine native to Europe, has been introduced into the United States and is now found in California, New York, Wisconsin, and other states. Black swallow-wort crowds out and replaces goldenrod and grasses, decreasing grassland bird populations in some areas. Lack of predators allows invasive plants to multiply, which also creates problems for animals that are dependent on food sources from native plants. The monarch butterfly is threatened by black swallow-wort because when it lays its eggs in this non-native milkweed the larvae do not survive.
• Confirm a date when a chosen local park, state forest, cemetery, community garden, etc.

• Obtain the support of a conservation professional at your local nature center, museum, community group, park, or conservation district, who can teach the participants about invasive plants and guide them in pulling up these unwanted species.

• Research how to transform invasive plants into baskets and other art objects or obtain the participation of an artist or art teacher who can work with the participants immediately following the invasive “pull.”

**DISCUSSION**

Start the session by asking the children to brainstorm what “throw-away” products they have in their home that could become useful items.

Discuss with the students that plants also can be good or bad and that the US Department of Agriculture has a list of good and bad plants. (This is a great opportunity to have your local nature center or native plant society come to talk with the students)

Discuss why a plant may be good (native) and why a plant can be bad (invasive) but depending on where you are… a plant is not always bad.

Find out what the participants know about invasive plants.

Provide additional information, as needed. Show them illustrations, photographs, or samples of invasive plants that live in their community.

Ask them the following:

• How can you tell the difference between invasive and native plants?
• What happens when invasive plants are allowed to grow without interference?
• How do invasive plants take hold in an area?

Then tell them that after they have spent time in the park pulling out invasive plants, they will have an opportunity to make something useful and/or attractive out of those plants. show them some examples of invasive plants and ask them to brainstorm what they might want to make.

**ACTIVITY**

1. Once the group arrives at the site, but before they actually start their work, talk to them about the following:

   • Avoiding poison ivy and other toxic plants in the area
   • Being careful to avoid unintentionally spreading invasive plants by dropping seeds as they are transported
   • How to pull the invasive plants and separate them into plant parts (roots, stems, leaves, flowers, fruits)

2. Make sure the participants use gloves and the proper tools to pull out the invasive plants. Have the individual containers handy and labeled so that the participants can sort the plant parts as they work. The participants might want to use their magnifying lenses to learn more about the invasive plants they have pulled.

3. Discuss what plant parts would be most useful and attractive for different parts of a design for the nature sculpture they will be creating once they return to their indoor meeting place.
4. The group might decide to work in teams or individually to construct their sculpture. As the participants are working, ask them to keep track of what plant parts they are using so they can include a detailed label with their sculpture.

5. Once the sculptures have been completed, the teams will decide what they will do with them (for example, donate them to a school or library, sell them and give the proceeds to a charity, or keep them to include in a traveling display about invasive plants).

**EXTENSION ACTIVITIES**

- Learn about other invasive plants within your region. Why are they a problem? Were invasive plants found more in some areas than in others? Why might this be so?

- Writing a press release about their day pulling invasive plants. Local newspapers are often happy to accept stories that describe interesting activities in which young people are taking the lead. If you’ve taken photographs, include them with the story. Newspaper coverage might motivate other people to take action to improve their local environment.

- Create a wildlife habitat garden with native plants. Download the planning guide and activities at www.nwf.org/schoolyardhabitat
OBJECTIVES
- Understand that consumer products come from renewable or non-renewable resources
- Practice making decisions with sustainable outcomes
- Recognize the value of limiting wasteful consumption and recycling

BACKGROUND
All materials that we consume—foods, fuels, construction materials, etc.—can be classified as either renewable or non-renewable. Non-renewables come from sources that are finite and will eventually be depleted such as these fossil fuels: coal, petroleum, and natural gas. A renewable resource is defined as capable of being replaced by natural ecological cycles or sound management practices; this does not necessarily mean there are infinite reserves. Some materials that are generally considered renewable, such as fish and timber, may not be renewable if they are not managed in a sustainable way.

TIME
About two hours for this activity, which will include a trip to a store. Before the visit to the store, you or one of the participants may want to get permission from the store manager to conduct a scavenger hunt there.

MATERIALS
- Easel paper
- Markers
- Paper
- Pencils
- Timber
- Fruit and veg
- Meat from animals

Examples of Nonrenewable Resources are:
- Fossil fuels like coal, oil and gas
- Minerals like copper

Examples of Renewable Resources are:
- Water
- Oxygen

DISCUSSION
Talk with the participants about the difference between renewable and non-renewable materials and have them give some examples of each.
the later activity. Have the group brainstorm a list of items that are made from renewable resources like trees, and items that are made from non-renewable materials, like petroleum. If necessary, join the brainstorming to be sure items like plastic containers (from petroleum), cotton fabric, wood furniture, chewing gum, plant-based cooking oil vs. motor oil, are listed. You can see how when products are made up of multiple resources it can become complicated!

**ACTIVITY**

1. Ask the participants to put together a list of 10 items of renewable resources from the discussion they have just had and a list of 10 items that are non-renewable.
2. Divide the group into small teams, giving each the 20-item list.
3. Now it’s time to take a trip to a supermarket or other store to find examples of the products made from items on the list. The scavenger hunt begins as soon as they go outside. For example, when they see a metal street sign, they might check that item off the list. Once the teams are inside the store, tell them how much time they have to complete their hunt.
4. The participants might decide to purchase some of the edible items on the list for a snack when they return to their meeting place.
5. Ask the participants the following questions:
   - Are all products from all kinds of trees equally sustainable? Think about how many resources (energy, water, trees) are needed to harvest the material and how slowly trees grow.
   - How could the information you now have influence what products you choose to buy? How can you influence your family in their purchasing decisions with this information?

**EXTENSION ACTIVITIES**

- Design a poster to promote renewable products (such as trash bags made of cornstarch) over non-renewable ones (made from plastic) that serve the same functions. A school, community center, or library might be interested in displaying the poster. Participants may also want to share their posters with their families to help family members make buying decisions that are more environmentally friendly.
- Hold a party with the theme of renewable resources. Everything from invitations to party favors would be made from renewable and recyclable materials. Making some of these items, such as greeting cards from recycled paper, beeswax candles, dried flower decoration, or wreaths made from vines, could be one of the activities at the party. This could involve parents and other family members.
- Host an eco-party at your school or for your community. Download audits you can conduct and get ideas at www.eco-schoolsusa.org.
# RESOURCES RENEWABLE AND NON-RENEWABLE

<table>
<thead>
<tr>
<th>Non-Renewable</th>
<th>Renewable</th>
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<tbody>
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</tbody>
</table>

## Renewable Energy

- Solar Energy
- Hydropower Energy
- Geo Energy
- Wind Energy
- Biomass Energy

## Non-Renewable energy

- Fossil Fuel Oil
- Coal
- Nuclear
- Natural Gas
OBJECTIVES

- Apply mathematical principles in the natural world
- Practice identifying trees by their characteristics
- Learn teamwork

TIME

About 1 1/2 hours for this activity if the site is nearby. Before the day of the activity, take time to scout out a location that has enough trees for several teams to measure.

MATERIALS

- Yard sticks
- Measuring tapes
- Paper
- Pencils for recording
- Data/calculation sheets
- Tree-mendous tree official measurement forms
- Tree identification guide, if available

BACKGROUND

Foresters have a special formula to measure trees. This formula includes the tree’s height, circumference, and crown spread. A tree receives one point for every foot of height, one point for every inch of circumference (taken at 4.5 feet above the ground), and W point for every foot of average crown spread.

DISCUSSION

Ask the group the following:

- What is the difference between an actual measurement and an estimate?
- Under what circumstances would you have to use estimates?
- Why would you want to know the measurement of a tree?

ACTIVITY

1. Take the group to the site that has been selected, bringing along the tree identification guide and other supplies. Winners of the tree-mendous tree contest can fall into any of the following categories:
   - Greatest amount of space the tree takes overall
   - Greatest crown spread
   - Largest circumference
   - Tallest tree
   - Most accurate measurements
   - Smallest tree overall
   - Fastest tree measuring

The idea is to give participants an opportunity to practice measuring and feel successful.

2. Review the steps in the measuring procedure (described on pages 24–26).

3. Have the participants practice measuring trees.
4. Divide the group into teams of four people. Distribute supplies to each team.

It may be helpful to assign roles to each team member. Group jobs are the following:

- Investigator: takes the measurements
- Manager: assists the investigator to make sure measurements are accurate and is responsible for the measuring tape and yard stick
- Reporter: assists the investigator, as needed
- Recorder: records measurements and tallies points

5. In advance, a neutral party identifies each tree with a number. Corresponding numbers are written on pieces of paper, and each team blindly selects one of those papers. Each team will then search out their numbered tree, which they will measure. Ask them to note the type of tree and any problems with measuring (e.g., not all trees are straight up and down). Have them use the official Tree-mendous Tree form.

6. Each team should check another team’s results. Announce the winners of the tree-mendous tree contest.

**EXTENSION ACTIVITY**

- Read the following passage as the participants and take a few minutes to relax in the presence of a tree:

  Extend your fingers out towards the tree. Imagine your energy waves extending towards the tree and then your energy and the energy coming out from the tree touching. Remember that trees help us breathe by taking carbon dioxide out of the air (that we exhale) and producing oxygen (which we inhale). Take a few minutes to breathe in the oxygen coming from the tree and exhale; imagining the tree taking in the carbon dioxide from you.

- Visit with a forester or arborist: Contact a local state park, arboretum, or environmental center and ask if their professional tree staff with give a climbing demonstration or other educational offering to help expand upon this tree measuring activity. Learning how and why tree measurements are important and learning about career opportunities involving trees will provide another perspective for your participants.
Measuring Procedures

**HEIGHT (SEE DIAGRAM BELOW)**

Step 1: All of the participants stand on level ground to take measurements.

Step 2: The investigator extends an arm out straight so that the top of the fist is at eye level. Carefully using the yardstick, the manager makes sure the top of the investigator’s fist is at eye level and then measures the distance from the investigator’s fist to the investigator’s eye. The recorder writes down this information.

Step 3: The investigator directly faces the tree to be measured holding the yardstick vertically in an extended fist so that the distance from the top of the fist to the top of the yardstick is the same eye-to-fist distance measured in the previous step. The manager checks the measurement while making sure the investigator’s arm is straight out, fist at eye level with the yardstick straight up and down.

Step 4: The investigator slowly (and carefully) walks backward away from the tree until he/she can see the base of the tree by looking over the top of the fist and the top of the tree over the top of the yardstick.

Step 5: The manager measures the distance, in feet, from the investigator to the tree. This distance is the height of the tree.

Step 6: The recorder writes down the height measurement and gives the tree one point for every foot of height.

**CIRCUMFERENCE**

The circumference of a tree is the distance around its trunk. The circumference is measured 4.5 feet from the ground. If the tree forks or if there are branches at the 4.5 ft. mark, the circumference is measured at the narrowest point below the 4.5 ft. level.

Step 1: The investigator holds one end of the tape against the tree trunk at a point 4.5 feet above the ground.

Step 2: The manager wraps the tape completely around the trunk. Be sure it stays level!

Step 3: The investigator reads off the measurement in inches. This is the circumference of the tree.

Step 4: The recorder writes down the circumference and gives the tree one point for every inch of distance around the trunk.

**CROWN SPREAD**

The crown spread of a tree is the distance its branches spread away from the trunk. The crown spread is calculated by measuring the distance of the widest spread and the distance of the narrowest spread. These two figures are then added together and divided by two to get an average. A tree receives 1/4 of a point (.25) for every foot of the average crown spread. Follow these steps to measure crown spread:
Step 1: The investigator finds the branch that sticks out the farthest from the trunk and stands directly under its tip.

Step 2: The reporter goes to the opposite side of the tree and stands under the tip of the branch extending farthest out on that side.

Step 3: The manager measures the distance in feet between the investigator and the reporter. The recorder records this number. This distance is the widest point of the crown spread.

Step 4: The investigator finds the branch expanding the least distance from the tree and stands directly under its tip.

Step 5: The reporter goes to the opposite side of the tree and stands under the tip of the branch closest to the trunk on that side.

Step 6: The manager measures the distance in feet between the investigator and the reporter and the recorder records this number. This distance is the narrowest point of the crown spread.

Step 7: The recorder adds the two distances together and divides by two to get an average crown spread. The recorder then awards the tree 1/4 of a point (.25) for every foot of average crown spread.
**Tree-Mendous Tree Official Measurement Form**

<table>
<thead>
<tr>
<th>Manager</th>
<th>Investigator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recorder</td>
<td>Reporter</td>
</tr>
<tr>
<td>Tree Location:</td>
<td></td>
</tr>
<tr>
<td>Tree Type (indicate which type):</td>
<td>Conifer</td>
</tr>
</tbody>
</table>

**HEIGHT**

- Fist to eye measurement
- Top of fist to top of yardstick measurement
- Number of feet from the investigator to the tree = tree height

**SUBTOTAL HEIGHT**

Points: 1 foot = 1 point

**CIRCUMFERENCE**

- Number of inches around tree at 4.5 feet off the ground

**SUBTOTAL CIRCUMFERENCE**

Points: 1 foot = 1 point

**CROWN SPREAD**

- Distance in feet between tips of two farthest branches
- Distance in feet between tips of two closest branches
- Add the two distances together. Then divide by 2 to get the average crown spread

**SUBTOTAL CROWN**

Points: Average Crown spread multiplied by .25 = points

**Add it UP!**

Total Points  total points
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Camouflage</td>
<td>A way of hiding by blending in with the surrounding environment.</td>
</tr>
<tr>
<td>Carbon cycle</td>
<td>A series of chemical reactions beginning with the production of carbohydrates by plants during photosynthesis, proceeding through animal consumption, and ending in the exhalation of carbon dioxide by animals and the decomposition of animal or plant matter, which start the cycle again.</td>
</tr>
<tr>
<td>Carbon dioxide</td>
<td>A heavy colorless gas (CO₂) that is non-flammable, is formed especially in animal respiration and in the decay or combustion of animal and vegetable matter, is absorbed from the air by plants in photosynthesis, and is used in the carbonation of beverages.</td>
</tr>
<tr>
<td>Carbon footprint</td>
<td>A representation of the effect human activities has on the climate in terms of the amount of greenhouse gases produced. A carbon footprint is often expressed as tons of carbon dioxide or tons of carbon emitted, usually on a yearly basis.</td>
</tr>
<tr>
<td>Circumference</td>
<td>The distance all around a tree trunk, taken from 4.5 feet above the ground.</td>
</tr>
<tr>
<td>Community</td>
<td>A group of organisms inhabiting the same area and interacting with each other.</td>
</tr>
<tr>
<td>Compound leaves</td>
<td>A leaf composed of a group of smaller leaflets like a locust tree or ash.</td>
</tr>
<tr>
<td>Crown spread</td>
<td>The distance tree branches spread away from its trunk. The crown spread is calculated by measuring the distance of the widest spread and the distance of the narrowest spread. These two figures are then added together and divided by two to get an average.</td>
</tr>
<tr>
<td>Deciduous</td>
<td>A tree that drops its leaves at the end of the growing season; non-evergreen.</td>
</tr>
<tr>
<td>Drought</td>
<td>A prolonged period of dryness that can cause damage to plants.</td>
</tr>
<tr>
<td>Ecosystem</td>
<td>An environmental system made up of a community of animals, plants, and bacteria and their interrelationships.</td>
</tr>
<tr>
<td>Fossil fuel</td>
<td>A fuel, such as coal, oil, or natural gas, formed in the earth from plant or animal remains.</td>
</tr>
<tr>
<td>Fruit</td>
<td>The ripened seed-bearing part of a plant, such as a cherry or apple.</td>
</tr>
<tr>
<td>Germination</td>
<td>The sprouting of a plant seed.</td>
</tr>
<tr>
<td>Global warming</td>
<td>An increase in the Earth’s atmospheric and oceanic temperatures widely predicted to occur due to an increase in the greenhouse effect resulting especially from pollution.</td>
</tr>
<tr>
<td>Habitat</td>
<td>A place where an animal or plant lives; the type of environment where a particular species is likely to be found.</td>
</tr>
<tr>
<td>Indigenous</td>
<td>Native and original to the region.</td>
</tr>
<tr>
<td>Invasive species</td>
<td>A species, not native to an area that spreads aggressively from the original site of planting.</td>
</tr>
<tr>
<td>Native Species</td>
<td>A species occurring naturally in an area and not introduced by humans; they are also known as indigenous species.</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
</tr>
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<td>-------------------------------</td>
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<tr>
<td>Nobel Peace Prize</td>
<td>Any of the prizes (five in number until 1969, when a sixth was added) that are awarded annually from a fund bequeathed for that purpose by the Swedish inventor and industrialist Alfred Bernhard Nobel. The Nobel Prizes are widely regarded as the most prestigious awards given for intellectual achievement in the world.</td>
</tr>
<tr>
<td>Nonrenewable resource</td>
<td>A natural resource that can’t be remade, regrown, or regenerated on a time frame similar to its consumption. (e.g., coal, oil, natural gas)</td>
</tr>
<tr>
<td>Photosynthesis</td>
<td>The manufacturing of sugar through the action of sunlight.</td>
</tr>
<tr>
<td>Pollution</td>
<td>The addition of any substance or form of energy (e.g., heat, sound, radioactivity) to the environment at a rate faster than the environment can accommodate it by dispersion, breakdown, recycling, or storage in some harmless form.</td>
</tr>
<tr>
<td>Renewable resource</td>
<td>Any natural resource that can be replenished naturally with the passage of time (e.g., timber, solar energy).</td>
</tr>
<tr>
<td>Riparian</td>
<td>Of, or relating to, rivers or streams.</td>
</tr>
<tr>
<td>Role model</td>
<td>A person whose behavior in a particular role is imitated by others.</td>
</tr>
<tr>
<td>Sap</td>
<td>The fluid that circulates through a plant, carrying food and other substances to different parts of the plant.</td>
</tr>
<tr>
<td>Sapling</td>
<td>A young tree.</td>
</tr>
<tr>
<td>Seed</td>
<td>The part of a plant produced by the flower that may grow into a new plant.</td>
</tr>
<tr>
<td>Seedling</td>
<td>A young (embryonic or baby) plant in a covering.</td>
</tr>
<tr>
<td>Shrub</td>
<td>A woody perennial, smaller than a tree, usually with several stems.</td>
</tr>
<tr>
<td>Species</td>
<td>A group of organisms having many characteristics in common and are able to reproduce.</td>
</tr>
<tr>
<td>Stewardship</td>
<td>The careful and responsible management of something entrusted to one’s care.</td>
</tr>
<tr>
<td>Team</td>
<td>A number of persons working together.</td>
</tr>
<tr>
<td>Terrarium</td>
<td>A small artificial environment for a specified habitat. A terrarium generally has a woodland setting, with the emphasis on plants rather than animals.</td>
</tr>
<tr>
<td>Trunk (tree)</td>
<td>The main stem of a tree.</td>
</tr>
</tbody>
</table>
Order your trees (minimum order of three trees) and download your planting and care guide by visiting www.nwf.org/trees.

Planting trees is a great activity for people to do together or with others, organize a tree planting day.

**Tree Kits Details**

All trees are shipped in bare root form. Shipping and handling costs are included. You will receive an email with a link to download your age appropriate activity guide within one week of placing your order.

**Notes for Tree Shipments:**

- Tree species are native to your area.
- You can select from list of native plants for your state.
- Please note: we recommend all locations within northern U.S. (hardiness zones 1–4) plant trees ONLY during Spring.
- Trees are shipped 4-5 days prior to your specified planting day.

**Order your Trees at**

www.nwf.org/trees

- Spring Planting—Place your tree orders between January through May.
- Fall planting—Place orders between September through December.
- Trees should not be planted in winter or summer months to ensure tree survival.
Continue Your Exploration of Nature

Plan a weekly or monthly activity outdoor by getting activity ideas for a Green Hour. NWF’s Green Hour activity database has over 300 activity ideas for you and your “Little” to find fun ways to get outside, get active and learn about nature. Activities are added monthly and you can sign up to receive an email about new activities by visiting www.beoutthere.org.

Create a home for wildlife in your own backyard with your “Little.” NWF has certified the yards of some 120,000 U.S. homeowners as “backyard wildlife habitats” – these micro habitats provide adults and children a place to observe wildlife and enjoy the outdoors in a safe setting. You can create a habitat by offering food, water and shelter for local birds and wildlife. www.nwf.org/gardenforwildlife/

Join your family, and friends by participating in one of NWF’s signature outdoor events – starting with the Great American Backyard Campout (an annual outdoor camping experience) and extending to other events such as outdoor hikes and walks, conservation fairs and more. www.nwf.org/BackyardCampout/

Read about nature and wildlife through NWF children’s nature magazines. NWF publishes a series of popular, award-winning magazines that introduce children, ages 2 to 12, to wildlife and nature. These magazines are a great opportunity to teach reading as well. Order a subscription at www.nwf.org/magazines/ or copies may also be available in many local libraries.

Need supplies for your outdoor adventures? NWF’s nature catalog offers a variety of suggestions and materials for you to use in your adventures. Log on to www.nwf.org/shop.

Take a walk outdoors and help us by watching and recording the wildlife in your community. Start today by downloading your own wildlife watch list. Be sure to get one for each season. Just log on to www.nwf.org/watch.