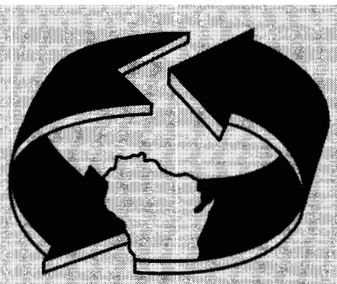

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Nature's Recyclers

Activity Guide

To Naturalists/Interpreters:

Glass, tin, paper, aluminum, oil... With Wisconsin's recycling law, people are busy recycling. Many of us don't realize that while we are washing, stomping, and separating materials, other creatures are also busy recycling. Lichens, mushrooms, sow bugs, earthworms and beetles spend their whole lives recycling for nature. Nature's recyclers are responsible for turning dead plants and animals back into usable nutrients for new plants and animals. Likewise, humans are responsible for turning garbage back into reusable materials.

Parks and outdoor recreation areas are prime locations for demonstrating the importance of recycling. The natural setting provides visual examples of cycles, recyclers, and natural resources. You can use these visual aids to make connections between natural and human recycling, and between recycling and preservation of natural resources. In addition to the physical setting being ideal, the atmosphere is too. People coming to parks to relax and enjoy resources are generally more receptive to recycling hints and ideas that will help save the natural resources they love.

This activity guide book is intended to help you teach people about natural recycling, cycles in nature and the important role people must play in recycling our natural resources.

The activities include things to do outdoors, indoors, at the property and back at home or school. They are organized by categories: **Activities, On-Site/Take Home, Games, Crafts, Songs, Plays,** and **Exhibits.** Each activity is laid out in the same format. You can assess the age level of the group, decide whether your goal coincides with the written goal, brief yourself with the background, gather materials and then perform the procedural steps. With any remaining time, encourage the group to partake in the activities listed in the **Going Beyond** section. **A glossary** is also included for your convenience.

This guide is designed for use with people 5 years old and older. You are encouraged to tailor the activities to meet each individual group's needs.

When leading groups and involving them with nature's recyclers, remember to use your basic interpretive skills. Also, remember that action is better than a thousand words. Let them feel it, touch it, smell it, and see it, not just hear it.

Trash Hunt

Age: 6-12 years old

Goals: To develop an awareness of littering and the problems it can cause, and to clarify the difference between litter and trash, renewable and nonrenewable resources, and recyclable and nonrecyclable items.

Background:

A knowledge of the definitions for the following pairs of words will make the discussion more interesting: litter and trash, recyclables and nonrecyclables, renewable resources and nonrenewable resources, and biodegradable and nonbiodegradable. These can be found in the glossary.

Not only is litter undesirable to look at, but it can also be harmful to wildlife.

- Little fish can swim through the pop-top of a soda can and get stuck.
- Birds, larger fish, and small mammals can be strangled in the loops of plastic six-pack holders.
- Loose fishing line can get wrapped around the legs, wings and beaks of water birds, impairing their movement and strangling them.
- Some wildlife may even mistake shiny litter for food. When pop-tops and bottle caps are eaten they can cause injury. Styrofoam cups, plastic cellophane wrappers and cigarette butts have been found in the stomachs of deer.
- Broken glass, edges of opened cans and empty jars are all dangerous. Animals can get cut, get infections and even die. They also can be trapped in slippery glass jars.

Some people are promoting biodegradable plastics as a partial solution to our litter and landfill problems. These plastics are made with a starch or yeast that binds the plastic polymers together. When they "break down" in the environment, the starches or yeast decompose but the plastic polymers remain.

Biodegradable plastics help our litter problem, but not our landfill problem. When buried in a landfill, they do not break down for a long time because of the lack of oxygen. In addition, starches and yeast may contaminate plastic that could otherwise be recycled.

Materials:

1 trash bag per pair (reuse old shopping bags)
1 pair of gloves per pair

Procedure:

1. Have a discussion with the group about litter. Explain the difference between litter and trash. Ask: How do you feel about litter? Why do people litter? Does nature litter? What happens to nature's litter?
2. Explain that the group's mission is to find litter in the area. It doesn't matter how big or small the pieces are.
3. Distribute bags and gloves to every pair. Set a time limit and boundaries to avoid stragglers. Set them free on their mission.
4. After the hunt, gather the group in an area sheltered from the wind. Have the children dump their litter in a pile in front of the group.
5. Pick through the pile. Find litter that is harmful to wildlife and explain how it's harmful.
6. Define renewable and nonrenewable. Have the children sort through the pile picking out examples of each.
7. Define recyclable versus nonrecyclable. Have the children decide whether the litter pieces should be put in a trash can to go to the landfill, or in a box to be recycled.
8. Define biodegradable and nonbiodegradable. Have the children decide which litter is biodegradable and which is nonbiodegradable. Discuss the pro's and con's of biodegradable plastics.
9. Dispose of the litter properly.

Going Beyond:

- Use some of the items collected during the hunt in the Mini-Composts activity.
- Put the money made from collecting recyclables towards educational materials.
- Sing the litter songs in the Sing Along section of this booklet.
- Create a "trash monster" or trash collage with the collected litter.
- Draw before and after pictures of the cleaned up area. Have the children write stories to go along with their pictures.

Litter — It's Everywhere!*

Age: **8-15** years old

Goals: To make people more aware of litter and to encourage them to think of ways to help curb our litter problem.

Background:

Food wastes from snacks, extra packaging, soda cans and paper may all be found in your area. Factors contributing to this problem may include: not enough trash cans, careless campers, the wind blowing trash against a fence, or uncovered trash cans. (For more information, see the background section in Trash Hunt).

Materials:

1 map of the nature center area/park per person
clip boards
writing utensils

Procedure:

1. Discuss litter and what a problem it is, both at the park and elsewhere. Talk about why people litter, and what can be done to help reduce litter (recycling, reusing, more conveniently placed trash cans, etc.)

2. Give each person a map. Ask them to fill in the details of the area (building, parking lots, campsites, trees, play equipment, pop machines, beaches, fences, trash cans, streets etc.) Display a legend of items for them to use.

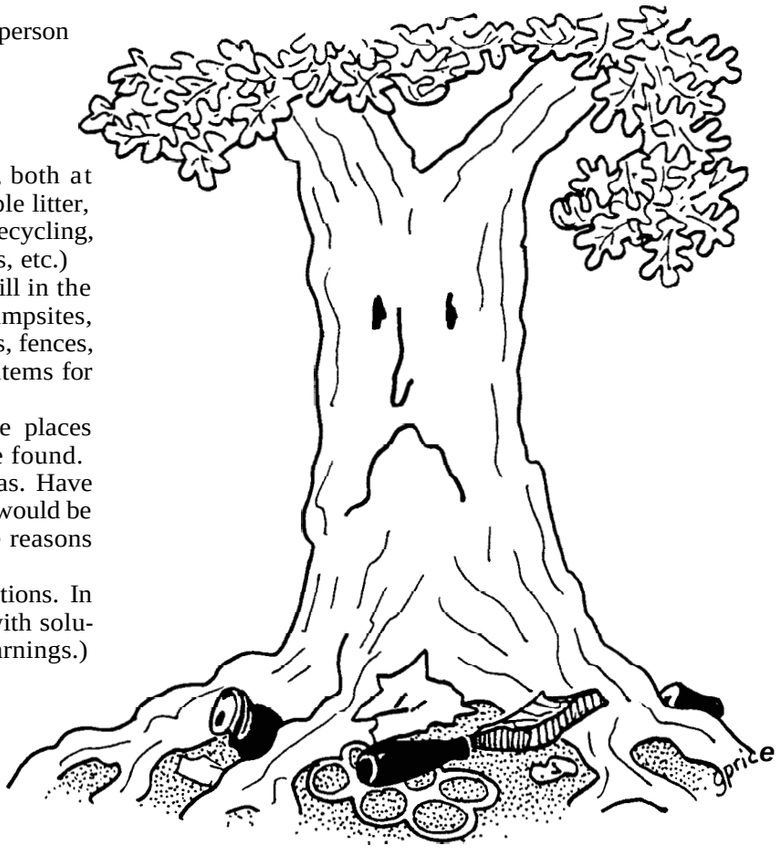
3. Tell them to circle on their maps the places where they predict that the most litter will be found.

4. Encourage people to explain their ideas. Have them consider what types of litter they think would be found in the yard, and ask for any possible reasons they have to explain this.

5. Go out on a walk to check their predictions. In key littering locations, have them come up with solutions (e.g.,"No Littering" sign, trash cans, warnings.)

Going Beyond:

- If the group comes up with a great solution, tell them you'll implement it. If it's a school group, write to them in a few weeks to let them know how their solution is working.
- Suggest that the school group redo this activity for their school grounds. Have them make suggestions to the principal and school board on ways to reduce litter. Suggest that they have a member of an environmental group talk to the class about pollution problems and solutions.
- Do the Trash Hunt activity from this booklet, or incorporate the ideas from the activity into the discussion.
- Sing the songs related to litter from the song section.



* Adapted from: **Oscar's Option.** Ocean State Clean Up and Recycling. Dept. of Envir. Management. Providence, RI. 02908

Spore Prints

Age: 6-adult

Goal: To introduce people to one of nature's recyclers — the mushroom.

Background:

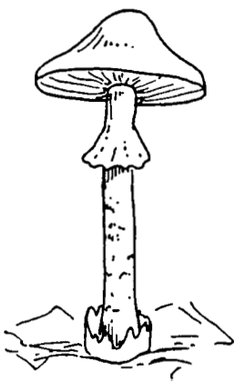
Mushrooms belong to a group of living things called fungi. **A** fungus is a plant that does not contain chlorophyll. It isn't green. It can't make its own food through photosynthesis. It must gather its food from decaying and living matter. Mushrooms are important members of nature's recycling team. These decomposers chemically break down dead vegetation, animal bodies, and manure into usable nutrients.

The part of the mushroom that people see, the fruiting body, is only part of the whole plant. The rest is hidden in the substrate. Mushrooms grow from spores which are tiny seed-like structures. **A** little thread, called a hypha, grows from each spore. The hyphae grow and become entangled with one another, forming masses of hyphae called mycelia. As the mycelia grow, chemicals are released which dissolve the object leaving food for them to eat.

When the conditions are right, small mushroom "buttons"begin to form beneath the soil. The buttons take in water, swell, and push up out of the ground. Gradually the stem grows, the cap opens, and flattens. The mushroom ripens and disperses its own spores — thus starting the cycle over again.

Use mushrooms from the grocery store rather than from your property because natural supplies could be permanently depleted. This provides a nice opportunity for people to learn by example that nature can be observed without being ruined.

In this activity you will see ripened spores. The unique pattern of spores results from the spores falling from the gill surface where they are formed.



Materials:

1 mushroom with gills, per person
1 piece of black paper per person
1 piece of white paper per person
1 bowl per person
Knife

Procedure:

1. Explain the life cycle of mushrooms to the group.

2. Distribute store-bought mushrooms and paper. Some spores are dark, and others are light. Have both black and white paper available. Use the paper that will contrast with the spore color.

3. Cut off the stem close to the cap. Place the cap, gill-side down, on a sheet of paper. If the spore color has not been predetermined, place the cap half on a white sheet and half on a black sheet.

4. Cover the mushroom cap with an inverted dish or bowl. This prevents air currents from dispersing the spores. Leave it undisturbed for several hours — overnight if possible. When the cap is lifted there will be a unique spore print. Encourage people to take the spore print home and frame it.

Going Beyond:

- Take the group on the Mushroom Adventure found in this booklet. This hike will help the group observe mushrooms outdoors in their natural setting.
- Explain that spore prints are important traits when identifying mushrooms. Distribute mushroom guides to see if the mushrooms are identifiable by their spore prints.
- To observe another one of nature's recyclers, build an Earthworm Castle, as described in this booklet.

The Lorax*

Age: 8-14 years old

Goals: To help children understand human impacts on natural systems and the environmental impacts of a consuming society.

Background:

The Lorax, a children's book by Dr. Seuss, tells of the deterioration of an environment because of reckless exploitation of "truffula trees" to produce "thneeds" to meet the incessant demands of consumers. It could very well portray our society's demands for consumer goods. We may have exploited some of our resources the same way in the United States 100 years ago. Fortunately, through individual efforts and environmentally sound legislation, many of our resources are being better managed today than the "truffula trees" were. However, our demand for consumer goods is still very high and many of our resources are still being thrown away after use instead of being recycled or reused. Our consumer demands still cause resources to be exploited in other countries that do not have the strong environmental laws that we have.

Our forests are a good example of a resource that we once exploited but now manage quite well for sustained yield. Wildlife, soil and water are also given consideration in our forest management plans. The rain forests in other countries are still being exploited, partially as a result of our demands for consumer goods.

Materials:

a copy of **The Lorax** by Dr. Seuss

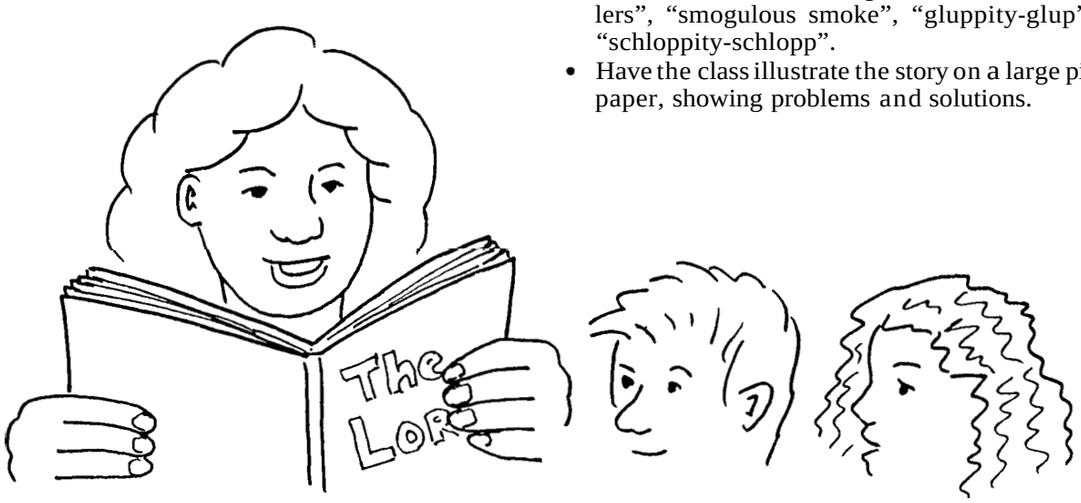
Procedure:

1. Read **The Lorax** to your group.
2. Discuss the following questions:
   - What happened to the "truffula trees"?
   - What happened to the "brown bar-ba-loots"?
   - What was made from the "truffula trees"?
   - A "thneed" is defined as a fine thing that everyone thinks they need. What are examples of "thneeds" — things that we think we need?
   - How could the "once-lers" have made "thneeds" without destroying all of the "truffula trees"?
   - If you were the "once-ler", what would you have done differently to protect the environment?
   - What can we do today to protect the environment?

3. Make sure that the children leave with the knowledge that we must harvest resources in order to keep on living. The key is to manage and harvest our resources wisely and to get the most use out of any resource that we utilize. Reducing consumption, reusing materials and recycling resources are some of the ways that each of us can help.

Going Beyond:

- Identify real-life examples of the following items in the story: "swomee-swans", "truffula-trees", "brown-bar-ba-loots", "humming fish", "thneeds", "once-lers", "smogulous smoke", "gluppity-glup", and "schloppity-schlopp".
- Have the class illustrate the story on a large piece of paper, showing problems and solutions.



* Adapted from: **Project Learning Tree,** American Forest Council, 1250 Connecticut Ave., N.W., Washington D.C. 20036 and **AVR Teacher's Resource Guide,** Association of Vermont Recyclers, P.O. Box 1244, Montpelier, VT 05602

Dead Tree and Rotting Log Study

Age: 8-adult

Goals: To help people develop an understanding of the decomposition process and the role nature's recyclers play in recycling nutrients.

Materials:

magnifying glasses or hand lenses
clear plastic
dark plastic or heavy fabric
saw
hammer and chisel
staple gun and staples

Background:

The death and decay of a tree is a very dynamic process that provides us with one of the best teaching examples of recycling in nature. Standing dead trees and downed, rotting logs can be found in most forest communities in various stages of decomposition. They serve as excellent habitats for a variety of organisms known as decomposers or nature's recyclers. By observing and comparing these various stages of decay, you can virtually watch a tree return to the soil.

Procedure:

1. Early in the season, locate the following in close proximity to each other: small live tree, large live tree, standing dead tree, freshly fallen tree, log in initial stages of decay, log well along in decay, and punky remains of a log.

2. If possible, make a "window" in the standing dead tree by cutting out a 10 inch square section of bark at a good viewing height. Cut "windows" into the rotting logs by making two cross cuts approximately 10 inches apart and one inch deep in each log. Chisel out the section between the cuts to a depth of one half to one inch. Staple a thin sheet of clear plastic over each window, leaving a gap underneath. Punch a few air holes in the plastic. Finally, cover each window with a "shutter" made from a piece of dark plastic or heavy fabric. Staple just the top edge of the material and weight the bottom so that it will not blow around. These "windows" will enable you and your class to view nature's recyclers without continually disturbing them and destroying their homes. The "shutter" keeps the space underneath dark and more inviting to nature's recyclers.

3. Take your class on a discovery hike in search of nature's recyclers. You may want to develop a worksheet for older students to record their observations, or just arm them with magnifying glasses and guide them through the discovery process. If possible, let your students work in small groups of three to five.

4. Start with the two live trees and ask: What makes them grow? Where do they get their nutrients from? Will they live forever?

5. Next go to the standing dead tree and ask: What happened to the tree? What caused it to die? What will happen to it now? Direct your students to look for evidence of nature's recyclers at the tree. Open the "window", examine crevices (cautiously), and search the ground around the tree. Look for plants (mushrooms and lichens), birds (woodpeckers and sapsuckers), mammals (squirrels and chipmunks), amphibians (salamanders), insects (ants and termites), and other members of nature's recycling crew (millipedes, sow bugs, mites, earthworms, etc.). Ask your students what role each recycler plays in the decomposition process. Have your students close their eyes and feel the texture of the tree. Ask them for descriptive words (adjectives) about what the feel. Have them smell the tree and describe its odor.

6. Visit the freshly fallen tree and the rest of the logs in decreasing stages of decay. Ask similar questions and have your students make the same observations as they did for the standing dead tree.

7. After your students study the punky remains of a log ask: What is left from the tree/log? (minerals and some organic matter) Where did the rest of the tree go? (some back into the air and water, some into nature's recyclers) Dig up some soil nearby (first horizon) and compare the way it looks, feels and smells with the log remains. Are they similar? Review what you have found and learned.

8. Finally, go back to the small live tree and ask your students where it gets its minerals to grow. Talk about completing the cycle and how the same resources have been used over and over again.

Going Beyond:

- Discuss what happens to organic materials that we landfill. Why don't they get recycled? (no air, no sun light, limited moisture)
- Discuss what we can do to be more like nature's recyclers.
- Study nature's recyclers in the wintertime by collecting some forest floor litter and warming it with a lamp. Dormant "recyclers" will come to life under the heat from the lamp.
- Collect sow bugs, several fallen leaves and other decaying plant material. Place them in a closed container with a few drops of water. Remember to punch a few air holes in the lid. Observe the sow bugs for a few days, and then let them go.

Nutrient Recycling in Trees

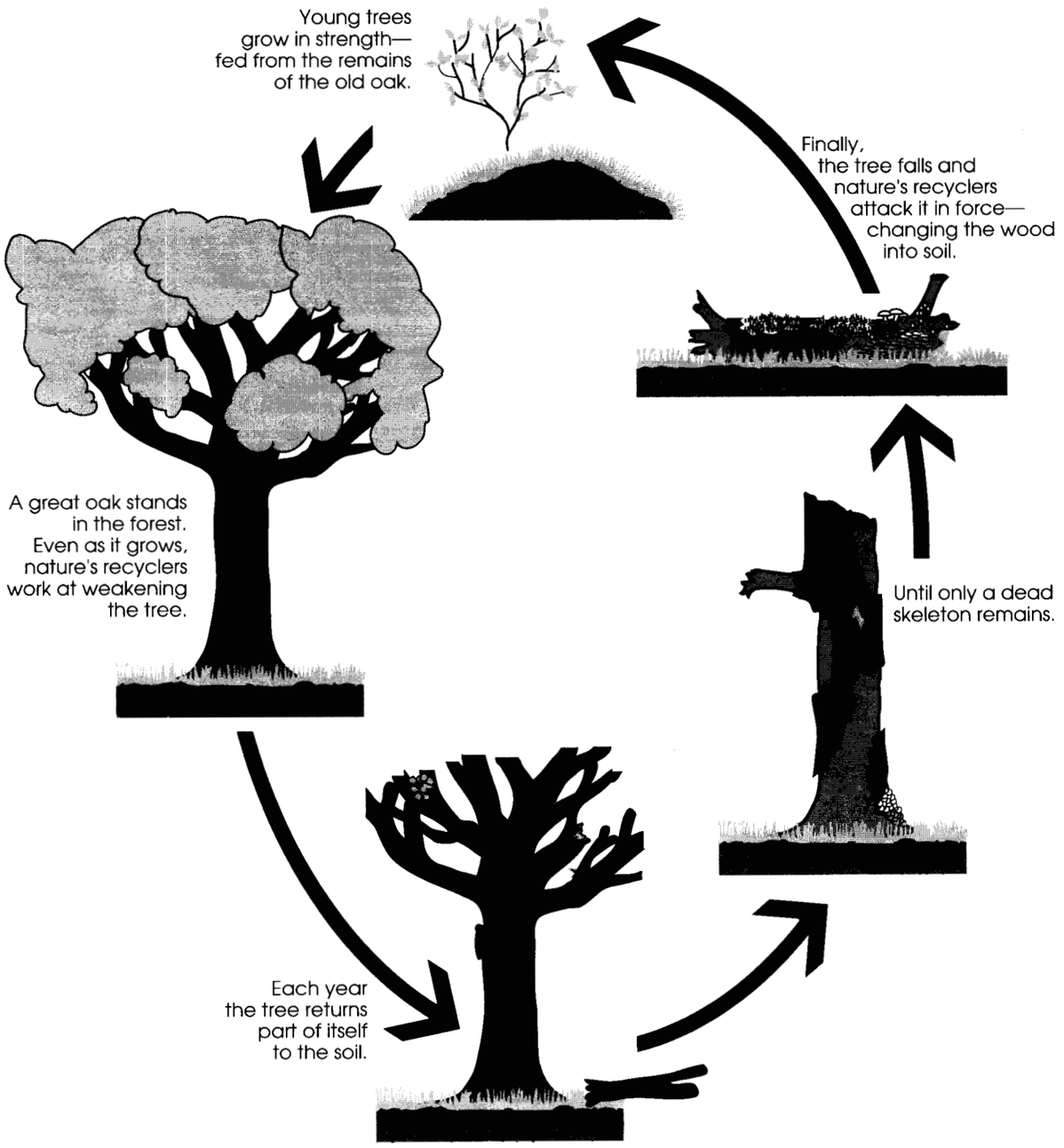


Illustration by Jeanne Gomoll

Mushroom Adventure

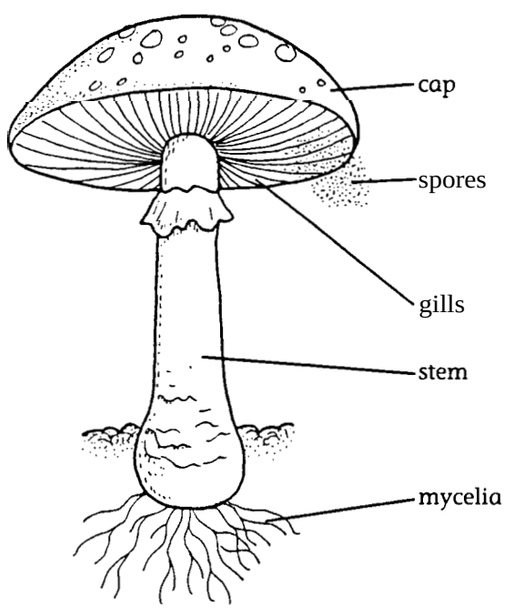
Age: 10 - adult

Goals: To teach people about mushrooms and their important role in nature's recycling system.

Background:

Mushrooms are an important part of nature's recycling team. Some mushrooms are parasites on living trees, but most mushrooms are saprophytic, using only dead materials for food. They cause decay of dead leaves, animals, and wood in the forests. Where forest soils are too acidic for bacteria to grow well, mushrooms are the main decay producers.

Mushrooms have an interesting life cycle. Tiny seed-like spores are released into the air from the fruiting body of mushrooms. When a spore lands in a fertile location, it sends out many root-like threads called hyphae. These tiny threads grow into a tangled mass called a mycelium. The mycelium is the underground part of the mushroom that chemically breaks down the material on which it eats and grows. When the mycelia are strong, and conditions are good, small mushroom "buttons" begin to form beneath the soil. The buttons take in water, swell and push up out of the soil. Gradually the mushroom's stem emerges and the cap opens like an umbrella. The cap is lined with gills that hang next to each other. Each gill contains many cells that make spores. After spores are mature, they can be dispersed by wind, water, animals and insects.



Not all mushrooms are umbrella shaped. Some grow on the side of trees like shelves. Others are globe-shaped and are called puff balls.

Prior to the hike it may be beneficial to learn the specifics about species which grow in your area. It will also help to have a mushroom identification book along on the adventure. The hike is most successful from July to September when the greatest number of species and the heaviest densities of mushrooms may be found after drenching rains.

Procedure:

1. Assemble the group. Depending on the group size, your facility, and visual aids, you may want to teach several points before going out in the field.

- Stress the importance of a detailed study of mushrooms before **anyone** attempts to gather them for food. Advise people to **look** at them, photograph them, and to **enjoy** their many colors and pleasing forms, and **forget** about eating them. Many people die each year because of mistakes in mushroom identification.
- Emphasize the lack of chlorophyll in mushrooms and the habitats of various mushrooms. Explain their extensive "root" systems, tremendous spore production and rapid growth rates under favorable conditions.
- Discuss the specific habitat requirements of mushrooms you may see on the hike.
- Stress that mushrooms are the fruiting bodies of their extensive, hidden "root" systems (mycelia) and that most mushrooms grow, ripen, disperse spores and die in just a few days. Their important roles in the nutrient cycle should also be brought out during the hike.

2. Go on the Mushroom Adventure. Look for mushrooms. Practice identifying them. Note key characteristics such as stem length and width, color, habitat, texture, spore color and gill pattern.

Going Beyond:

- Do the Spore Print activity from this booklet.
- Further study spores and molds. The spores that create mushrooms are similar to those that create molds. To see how airborne spores grow hyphae and fruiting bodies, do the following:

Place a slice of damp bread in a glass dish. Leave it uncovered for several minutes. Then cover the dish with a glass plate. Set the dish aside for several days in a warm, dark place and see if any mold grows on the food. Observe the molds with a magnifying glass. Can you see the center point from which the hyphae grow? How did the molds start at these points? The air we breath is filled with spores that produce molds and mushrooms. Like mushroom spores, mold spores can only grow when they land in favorable conditions such as the damp bread.

Earthworm Castles

Age: 5-15 years old

Goal: To help people observe and learn about one of nature's important recyclers — the earthworms.

Background:

Earthworms help make good soil. They dig tunnels that let in air and keep the soil loose. Earthworms are important recyclers because they eat bits of decayed plants and animals that are in the soil.

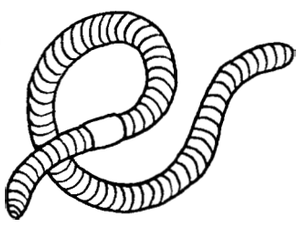
Earthworms' bodies are simple structures composed of two tubes, one within the other. The inner tube is the digestive system. The black color is the food in the digestive tract.

Earthworms belong to a group of animals having segmented bodies. Each segment is the same except for the head and the clitellum. The head, the end which moves forward, has a mouth, but no eyes. Worms do not need eyes underground. The clitellum is the swollen ring around the body. It contains many glands which secrete mucus to form the walls of a cocoon. The eggs in the cocoon are fertilized, and left to hatch in the soil. Earthworms are bisexual — each individual contains both male and female parts.

Earthworms do not have any legs. They move by extending their front half forward and anchoring it with hair-like structures called setae. Then their back half is pulled forward. Earthworms dig their tunnels by eating soil in front of them. The soil is then excreted with mucus to form the burrow walls. Castings, which are excreted wastes and dirt clumps, may be found on the surface of the ground. They look like tiny bunches of grapes. Castings have a high lime content and help fertilize the ground.

Materials: (per castle)

magnifying glass
large jar (ex. = a used mayonnaise jar)
rocks
soil
peat moss
worm food (Grass cuttings, tiny table scraps, egg shells, coffee grounds, etc.)
black paper
shovel(s) or spoon(s)



Procedure:

1. Introduce a group of children to live worms and have them watch the worms move. Using magnifying glasses, observe the setae. Locate the clitellum. Show them how to tell the front part from the rear. Put some "worm food" near the worms' mouths and see if they will eat.

2. Lead the children on a worm dig. Talk about where worms live and how they help nature cycle its nutrients. Using the spoons or shovels, have the children hunt for worms to put in the castles they will build.

3. Create the castles. Place a few rocks in the bottom of each jar. Add a mixture of soil and peat moss to a depth of about 10 cm **(4** inches). Invite the worms into their new homes by carefully placing them in the jars.

4. Place some worm food on top of the soil. Foods that work well are: apple and banana peels, cantaloupe, watermelon, celery, coffee grounds, eggshells, onion peels, pizza crusts and tea bags. (To avoid fruit flies, completely cover the food with a layer of dirt.)

5. Keep the castle moist, but not wet.

6. Cover the jar with black paper. Explain that worms are sensitive to light.

7. Let them take their earthworm castles home. Have them observe the worm tunnels, the worm castings and the worm eating habits. Remind them to keep the soil moist, to keep the jar covered with the dark paper when they aren't watching the worms, and to add new "worm food" every few days. Suggest that they feed the worms table scraps. This way some of nature's recyclers are helping recycle some of the childrens' waste. Have the children return the worms to their natural habitat after they are done observing them.

Going Beyond:

- Make an "earthworm-trackobservation spot". Pour water over some soil outdoors to make it muddy. Come back the next day and look for worm tracks. Discuss that worms need air to breathe. They come out of the ground so they do not drown.
- Have young children pretend to be worms. Encourage them to close their eyes and move on the ground like earthworms.
- Make worm pictures by having a muddy worm crawl across a white piece of paper.
- Make an Earthworm Castle to have on display to show those people/groups who are unable to make their own castles.
- To observe another recycler, do the Mushroom Hike in this booklet.

Microbe Garden

Age: 8-17 years old

Goals: To show decomposers at work and to have people understand the role molds play in the decomposition process.

Background:

Microbes are plants and animals that help decompose materials. These molds, bacteria, yeasts, and protozoa are responsible for turning decomposing matter into nutrient pieces that are small enough for plants to absorb. Microbes are better at this task than earthworms because of the amount of materials they consume. Under favorable conditions, an earthworm eats its own weight in food daily. A microbe digests its weight in food in just a few seconds. Gram for gram there are more microbes in a compost pile than earthworms. Not only are microbes responsible for more decomposition, but they can digest many things earthworms cannot, including dead earthworms.

While microbes are small, many can be observed without a microscope. The molds that develop in mold gardens may be any color, size, or shape. The colors of molds are usually due to spores. Like airborne seeds of higher plants, spores help to propagate their species by blowing to new locations.

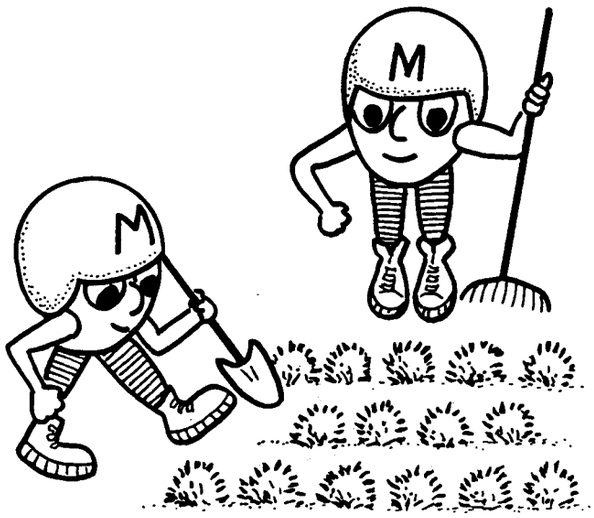
Some common molds that grow on bread include:
Rhizopus stolonifer (shiny black bread mold)
Aspergillus niger (fuzzy, black bread mold)
Penicillium (fuzzy, blue-green mold).

Each mold is really a colony consisting of millions of cells of one particular species. Many different molds may grow at the same time, or there may be sequential changes when some molds replace others.

Your mold garden is a model for what microbes do in well-aerated compost piles. Nature's recyclers, including the microbes, digest and oxidize garbage. The end product is good rich humus that enhances the fertility of soils.

Materials:

metal can or plastic jar (6-8" wide and **3-4**" deep)
soil from garden or near shrubs
water
mold food (kitchen refuse - nut shells, potato peels, banana skins, old cereal, stale bread, apple cores, etc.) (No protein materials - meat, cheese or gelatin)
rubber band
clear plastic (cellophane)



Procedure:

1. Firmly pack about **1**" of soil in the can or jar. Soil should be moist, but not water-logged.

2. Prepare ***5*** pieces of mold food, approximately half inch square and 1/8 to **1/4**" thick.

3. Place the pieces of food on the soil, not touching one another.

4. Let the garden stand in the open air for about 15 minutes to catch spores.

5. Cover the container with plastic to prevent the garden from drying out. Use a rubber band to hold it in place.

6. Either use this microbe garden as a display, or let members of the group take it with them to observe and nurture.

7. Remove plastic for a few minutes each day to give the molds a good supply of oxygen. Add water to the soil when it dries out.

Going Beyond:

- Explain that mushrooms are the fruiting bodies of some molds. Go on a Mushroom Adventure hike as found in this booklet.
- Suggest that the group build Earthworm Castles to watch how earthworms help decompose materials.
- Make a mold garden using manufactured, less-degradable materials (cellophane, brown paper, rubber etc.) Compare the rates of decomposition between the two gardens. Record your observations.
- Explain the life cycle of a mold.

Mini-Composts*

Age: 9-17 years old

Goal: To help people learn about recycling in nature by watching nature's process at work in a miniature compost pile.

Background:

When we mention "recycling," we often think of recycling glass bottles, aluminum cans and newspapers. But another 20% of the household garbage we throw out could also be recycled. Food scraps, leaves, grass clippings and other biodegradable organic wastes can be recycled by composting. Simply stated, composting creates optimal conditions for decomposition to occur. Decomposition is the biochemical process by which bacteria, fungi and other microscopic organisms break organic "wastes" into nutrients that can be used by plants and animals. Decomposition occurs in nature whenever a leaf falls to the ground or an animal dies. It is essential for the continuation of life on earth. In order for decomposition to occur in a compost pile, several components must be present: soil, organic wastes, nitrogen, worms, water, air, time, heat and mass. Decomposition does not occur very rapidly in a landfill. Two necessary components, air and nature's recyclers, are not there. The result of decomposition in a compost pile is a nutrient-rich humus that is excellent for improving soil quality and plant growth.

Materials:

aquarium
organic wastes
soil (not potting soil)
thermometer
trowel or large spoon
1-2 dozen red earthworms

Procedure:

1. Introduce the ideas of decomposition and natural recycling. Ask the group what the verb to "compose" means. (To make. For example, musicians make songs by putting words together.) Explain that decompose means to take things apart. Decomposers help nature recycle by breaking materials down so they can be cycled over and over again. This process can be accelerated in a compost pile. Ask: What is composting? What are the necessary ingredients for a good compost pile? How is composting related to the concept of recycling? How can composting reduce waste?

2. Assemble a variety of organic wastes in the aquarium, including leaves, needles, grass clippings, sawdust, hair, kitchen scraps, etc. Avoid meat scraps, dairy products, fats and oils which inhibit decomposition, cause odors and can attract pests. Chop wastes into small pieces. Leave some large pieces of the same materials to compare rates of decomposition between large and small items. Why might there be a difference?

3. Alternate layers of the materials as follows (amounts are approximate): one inch of soil, two inches of organic waste, a sprinkle of manure or green grass clippings and a sprinkle of water. Repeat.

4. Cover with an inch of soil. Water the pile enough to make it moist but not soggy. It should feel like a damp sponge.

5. Add earthworms.

6. Allow a school group to take the mini-compost home with them, or use it as a display piece on site. Place the compost pile where it will be at room temperature, but not in direct sun. Gently mix the compost once a week to aerate it. Use a thermometer to test the temperature of the pile. Graph the results.

7. Discuss: How composting reduces the amount of waste that is thrown out, what happens to organic wastes that end up in the landfill, whether or not the landfill is a gigantic natural compost pile, and the problems with placing large amounts of organic material in landfills.

Going Beyond:

- Suggest that everyone build a real compost pile, either as a group at school, or individually at home. For directions, write to: Education Programs, Bureau of Information and Education, Dept. of Natural Resources, P.O.Box 7921, Madison, WI 53707. Ask for the Home Composting brochure.
- Make a second compost pile with non-biodegradable materials in it. (pop can, glass bottle, comb, can opener etc.) Every week compare and contrast the rates of decay of the two boxes.
- Compare a sanitary landfill with an open dump. Half fill two clear containers with soil. Put examples of solid waste in each container. Leave the open dump uncovered and occasionally water it lightly. For the sanitary landfill, cover the waste with several inches of soil. Observe for six months. What differences are there? What types of solid waste rotted?
- Just before the ground freezes in the fall, bury identical materials outside and in containers inside. Keep the indoor container moist and warm. In the spring compare the materials. Why is temperature an important factor in decomposition?
- Try building a Compost Column using "Bottle Biology'' directions. See Resources.
- Go on a hike to observe nature decomposing.

* Adapted with permission from: AVR Teacher's Resource Guide, Association of Vermont Recyclers, P.0.Box 1244, Montpelier, **VT** 05602

Log Tag*

Age: 5-10 years old

Goal: To give children the opportunity to use what they learned about nature's recyclers and decaying logs.

Background:

Fallen trees and rotting logs are suitable habitats for many organisms, both plants and animals. As the log or tree decomposes, it becomes a host to different plants and animals. Insects bore into a tree's protective bark, allowing air, moisture and spores of fungi to enter the tree. The fungi grow, consuming the tree's starches and dissolving the wood structure. The fruiting bodies of the fungi are food to many insect larvae, bacteria, slugs and snails.

Gradually the log is covered with mosses and grasses. Earthworms, microscopic organisms and fungi continue the decaying process underground. It takes an average of ten years for a dead tree to turn to soil. Weather, temperature and moisture as well as tree type all affect the rate of decomposition, and thus, the type of organism found. The following organisms could be described, discussed, and used in the game: raccoon, squirrel, owl, ant, beetle, earthworm, salamander, spider, chipmunk, lichen, bacterium, mushroom, butterfly, insect larva, moss, termite, microbe, millipede, and centipede.

Materials:

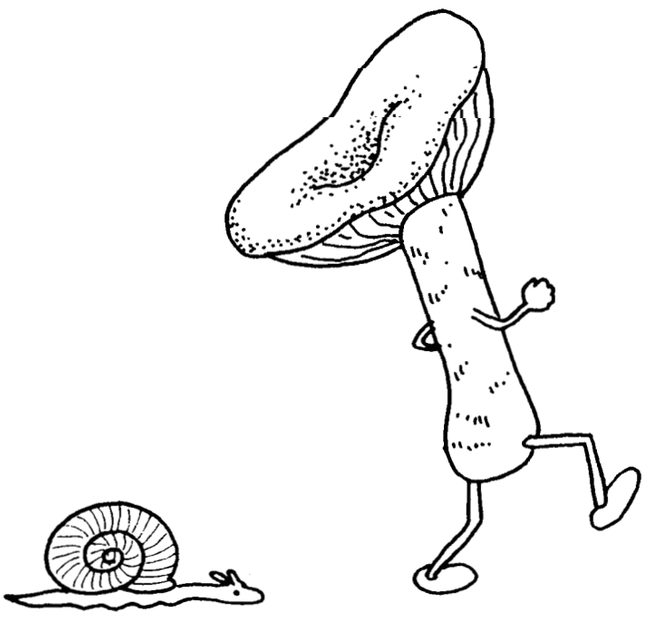
a group of people
a large open space such as a field or large campsite.

Procedure:

1. Go to an open space with the group.
2. Explain the rules to the children and choose one person to be "it". That person tries to tag other players. Other players can save themselves by crouching down before being tagged and naming a plant or animal that lives on or in a rotting log. **As** long as the same person is it, there can be no repeating of plant or animal names.
3. If a player is tagged before he/she can think of an animal or plant name, then that player becomes "it".
4. Whenever a new player becomes "it," all plant and animal names can be used again.

Going Beyond:

- The Mushroom Hike or Observe a Log activities are good backgrounds for this game.
- Discuss which animal and plant names the children used. Did they forget any? Which ones?



* Adapted from: **Hands-on Nature: Information and Activities for Exploring the Environment with Children,** by Jenepher Lingelbach. Vermont Institute of Natural Science, Woodstock, VT. 05091.

Tree To Turf Time Machine*

Age: 5-10 yearsold

Goal: To introduce the decomposition process to younger audiences.

Background:

A rotting log serves as a habitat for many plants and animals, which vary according to the log's stages of decomposition.

Materials:

4 logs in various stages of decay ranging from freshly cut to nearly soil. The logs in the later stages of decomposition can be mounted on plywood to help protect them.
Time Machine — large cardboard box painted with a seasons clock that has a movable dial; other numbers, gadgets, and dials; and closable front and back flaps.
costume for leader.

Procedure:

1. Divide the children into 3 groups: one to whistle like the wind, one to tap their fingers like the rain, and the third to chant the passing seasons "spring, summer, fall, winter."

2. As a costumed professor, explain that you have invented a remarkable time machine that will show what happens to a tree when it dies. Open the flap of the Time Machine to reveal a recently cut piece of wood, then close it.

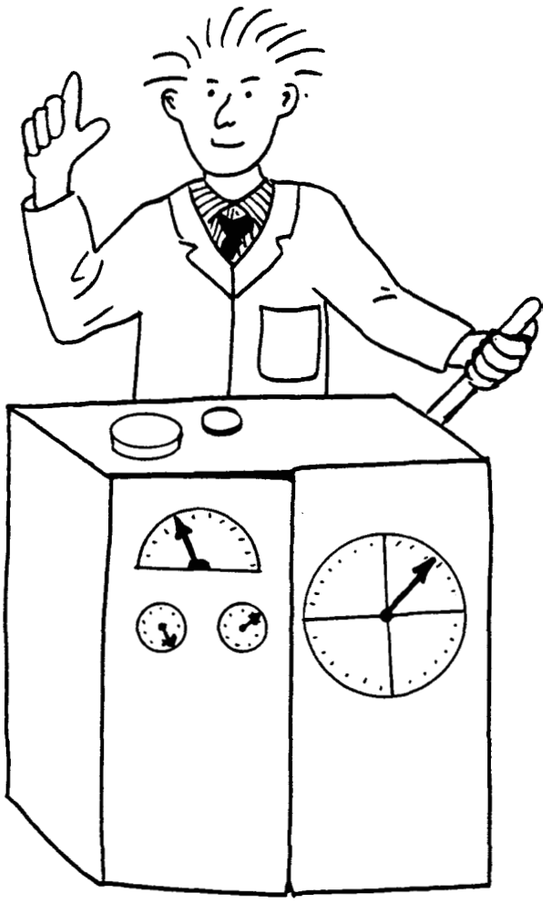
3. Progress through the first 4 years, moving the seasons dial as group 3 chants and the other groups make their sound effects. Then open the Time Machine (in which your hidden operator has switched logs) to see a log in initial stages of decay.

4. Repeat this process for the passage of 4 more years, after which the secretly replaced log will look punky and soft, and then again for the last four years (total of twelve years), when the Time Machine log will be chunks of dirt.

5. Afterwards, inspect and compare the 4 logs.

Going Beyond:

- Observe the different stages of decay outside. Talk about how different "nature's recyclers" help the tree decay at different stages. Observe the different recyclers.
- The Rotten Log Puppet Show, and Log Tag found in this booklet are related activities.



* Adapted from: **Hands On Nature**, The Vermont Institute of Natural Science. Church Hill, Road, Woodstock, VT. 05091.

Where Do Things Come From?

Age: 8-12 years old

Goals: To help children learn where our products come from and the difference between renewable and nonrenewable resources.

Background:

In order for people to understand the need for recycling, they must have an understanding of the source of the products they use and that the earth has a limited supply of resources. All of the materials that make up our goods and products are derived from the earth's natural resources. Some of our resources are quite abundant like sand and grass, but some are scarce like oil and diamonds. Some of our resources are renewable (can be replaced in a relatively short period of time) and some are nonrenewable (once taken out of the earth no more will take their place for a long, long time). For this activity all of earth's resources (excluding water and air) can be lumped into five categories—Rocks, Minerals, Petroleum/Oil, Plants, and Animals.

Materials:

copies of **Resources Scavenger Hunt Worksheet** (page **15)**
clipboards
pencils
examples from each of the five resource categories listed above

Procedure:

1. Ask the children, "Where do things come from?" Discuss the earth's resources and identify the five categories. Show specific examples of products derived from each category and ask the children for other examples. Talk about renewable and nonrenewable resources. Ask the children for specific examples of each.

2. Pass out the scavenger hunt sheets, clipboards and pencils. Give them the following directions:

- Find **15** of the **30** items on the list. These should include at least three items from each of the five categories.
- Indicate items found with a check in front of the item.

Do not collect the items and bring them back!

- Identify which resource category the item belongs in by putting an **R** for rocks, **M** for mineral, ***O*** for oil, **P** for plant, and **A** for animal on the line behind it.
- Finally, circle the renewable resources.
- Extra points will be given for the special items listed and found. Explain that "nature's" packaging means a shell, cone or pod casing.

3. Give the children 15 minutes to hunt for items outside.

4. Call them together and go over the answers. Discuss recycling, reusing, and reducing and how these practices help conserve our resources.

Items by Category — Answers

Rocks	Minerals	Oil	Plant	Animal
glass	penny	plastic bag	charcoal	hamburger
stone wall	pop can	frisbee	bread	ice cream
pottery	diamond ring	nylon sock	lettuce	butter
cement	nail	plastic bottle	firewood	egg
stone building	pencil lead	polyester pants	paper	leather shoes

All items in plant and animal categories are renewable resources.

Resources Scavenger Hunt Worksheet

Find **15** of the 30 items listed below. These should include at least three items from each of these categories: Rocks, Minerals, Oil, Plants and Animals.

Indicate items found with a check in front of the item.

Do not try to collect the items and bring them back!

Identify which resource category the item belongs in by putting an **R** for rocks, **M** for mineral, ***O*** for oil, **P** for plant, and **A** for animal on the line behind it.

Circle the renewable resources.

- ❒ glass ____
- ❒ frisbee ____
- ❒ bread ____
- ❒ pottery ____
- ❒ butter ____
- ❒ penny ____
- ❒ egg ____
- ❒ nail ____
- ❒ hamburger ____
- ❒ ice cream ____
- ❒ pop can ____
- ❒ stone wall ____
- ❒ firewood ____
- ❒ nylon sock ____
- ❒ pencil lead ____
- ❒ lettuce ____
- ❒ cement ____
- ❒ plastic bag ____
- ❒ charcoal ____
- ❒ paper ____
- ❒ diamond ring ____
- ❒ stone building ____
- ❒ plastic bottle ____
- ❒ leather shoes ____
- ❒ polyester pants ____

Extra Credit

- ❒ returnable bottle ____
- ❒ "nature's" packaging ____
- ❒ manufactured packaging ____
- ❒ an item that can be used for something else ____
- ❒ an item made from more than one material ____

Recycling Games

Age: 10-adult

Goals: To make people more aware of our consumptive habits and the need to recycle, and to help people learn about some commonly recycled items.

Background:

These games could be good rainy day activities or time fillers.

Everything on earth, both natural and manufactured, has the potential to be recycled. However, our current knowledge, technology, facilities and economics prevent many items from being recycled. Most recycling programs are profit oriented. They tend to concentrate on "easy to recycle" and "big-$- back" materials. We must develop more markets to handle a greater diversity and a greater quantity of materials.

GLASS is made from soda ash, sand, and lime. Glass is able to hold many items that other materials cannot. However, it is heavy, breaks easily, and remains in landfills for a long time. To be recycled, it must first be sorted by color and crushed into small pieces called "cullet." The cullet is melted down into a solution and then made into glass containers again. Other products can also be made from recycled glass bottles such as insulation, and road-patching material.

ALUMINUM is made from bauxite, which is a non-renewable resource. Aluminum is light weight, and corrosion resistent. When recycled, it is melted and then shaped again into new cans and other items. For every aluminum can recycled, **95%** of the energy needed to create a new can is saved.

TIN-PLATED STEEL cans are made of iron ore and tin, neither of which are renewable resources. The cans will eventually rust and break down. However, throwing them away is a waste of valuable metals. When recycled, the cans are put into a huge container with holes in the bottom. This container is immersed into a caustic solution which takes the tin off the cans. Then the steel cans are washed and sold as Number 1 Grade Steel. The tin is removed from the caustic solution by electrolysis and made into ingots which are sold to companies requiring tin.

PAPER is made from a renewable resource — trees. Paper is shredded into small pieces and mixed with water. This mixture is beaten into a mush-like pulp which flows onto a moving screen through which most of the water passes. The wood or paper fibers remain. The fibers are pressed through heavy rollers that remove more water and then are sent through steam-heated dryers.

PLASTICS are made from petroleum, coal, air, water, and industrial organic chemicals. By varying the type of chemicals added to plastic resins, the finished product may be flexible or rigid; transparent, opaque, or colored; or easy to tear or rigid. While plastics are convenient and useful, they contain many toxins which can pollute our land, water and air. Throw-away plastic packages also constitute much of our litter. Plastics of similar type are melted down and molded into new products. Because of US FDA regulations, plastic is not recycled into food containers.

Materials:

copies of **Recycling Games Worksheet** (page 17)
pencils for each person.

Procedure:

1. Distribute copies of the games. Instruct the group to complete the matching games and break the code for the coded recyclables. Tell them the coded words are a list of 10 recyclable materials. In this code, one letter is substituted for another. The object of the game is to decipher the 10 recyclables. Get them started by giving them the first answer, "newspaper".
2. If you wish, divide the group into teams.
3. Check their answers. Discuss each answer and its implications.

   Number Match: 1-g, 2-c, **3-j,** 4-e, 5-a, 6-i, 7-b, 8-f, 9-h, 10-d.

   Word Match: l-h, 2-e, 3-a, 4-i, 5-c, 6-d, 7-f, 8-b, 9-j, **10-k,** 11-9.

   Coded Recyclables: 1. Newspaper, 2. Glass, 3. Motor Oil, 4. Tires, **5.** Aluminum Cans, 6. Cardboard, 7. Asphalt, 8. Metal, 9. Leaves, 10. Cars
4. Let the winners do something special, such as getting to be first in line on a hike or not having to help clean up after an activity.

Going Beyond:

- Use these word games as a pre-program activity to find out what members of your group already know about recycling. Use the background information to let people know where materials come from and how they are recycled. Have examples of the different materials to show the group. Stress how important it is to imitate nature by giving new life to materials that are decay resistant or in short supply.
- Invite the group to share their recycling adventures. Ask what they do at home, at school, at work. What can they recycle in their community?
- Further research the cycles of natural resources.
- Do other related activities from this booklet — Musical Instruments, Make Your Own Paper, Fire Place Logs From Newspapers, Sing Along, and Where Do Things Come From?

Recycling Games Work Sheet

Recycling Number Match

1.	Number of buyers of recyclable materials in Wisconsin.	____ a. 1000
2.	Percent of all paper that is recycled in U.S.	____ b. 350
3.	Percent of all paper recycled by Japan.	____ c. 26
4.	Number of metal cans used each year by a family of five.	____ d. 12
5.	Number of glass jars and bottles used each year by a family of five.	____ e. 2000
6.	Pounds of solid waste thrown away by a family of five in a year.	____ f. 17
7.	Number of plastic containers used by a five person family in a year.	____ g. 600
8.	Number of trees it takes to make a ton of paper.	____ h. 400
9.	Gallons of oil saved by recycling a ton of paper.	____ i. 4000
10.	The energy saved by recycling an aluminum can could keep a light bulb on for this many hours.	____ j. 50

Recycling Word Match

1.	Recyclable, ground-up glass	____ a. Paper
2.	Changes organic materials into usable nutrients	____ b. Motor Oil
3.	Half of all land-filled waste	____ c. Cellulose insulation
4.	A use for shredded newspapers	____ d. Aluminum
5.	A use for finely ground newspapers	____ e. Composting
6.	Recycling _____ saves 95% of the energy to process it	____ f. Plastics
7.	Made from petroleum and natural gas; recycling is still in infancy	____ g. Natural Resources
8.	Wisconsin law requires communities to set up collection centers for this	____ h. Cullet
9.	Our largest portion of household waste	____ i. Animal bedding
10.	If materials aren't recycled, they go here	____ j. Newspaper
11.	If materials aren't recycled, they use up	____ k. Landfills

Coded Recyclables

1. Z B E V N J N B P
2. O W J V V
3. I D A D P D T W
4. A T P B V
5. J W Y I T Z Y I L J Z V
6. L J P F R D J P F
7. J V N C J W A
8. I B A J W
9. W B J S B V
10. L J P V

Crafts from Trash

Age: 5-12 years old

Goals: To help children learn that many items can have more than one use, and that the longer you keep an item out of the waste stream, the better it is for the environment.

Background:

Many containers can have their "lives" and usefulness extended by finding creative ways to reuse them. In this activity, children will learn to make toys, musical instruments, piggy banks and bird feeders from common household trash.

Materials:

clean household containers:
- milk, detergent and bleach bottles
- milk cartons
- coffee cans
- pie tins
- onion sacks

mustard jar lid (for tracing circles)
sticks or dowels (for perches)
knife
hammer
nails
wire cutters
pencils
ruler
light wire
coat hangers

Procedure:

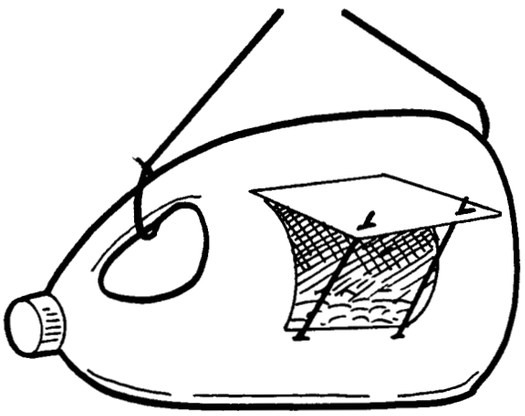
1. Create bird feeders out of clean household containers using the drawings for models. Assist younger children with the cutting. Remember to punch small drain holes in the bottom of the containers to let rain water out.

2. Discuss the proper locations for installing the feeders with your group and the types of bird feed to put in each container. Inform them of their responsibility for maintaining a continuous supply of food once feeding is started and the importance of keeping the feeders clean.

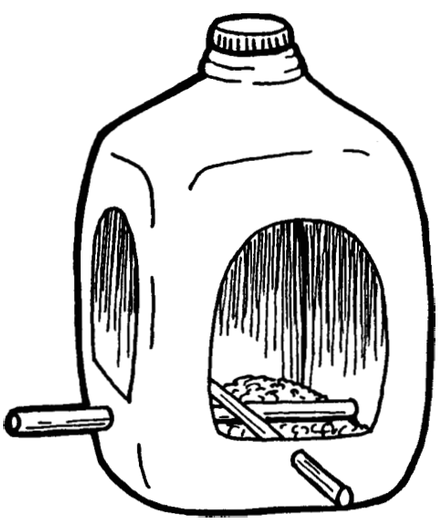
3. Discuss the importance of reusing materials and develop a list of common items that can be reused and the new uses for each.

Going Beyond:

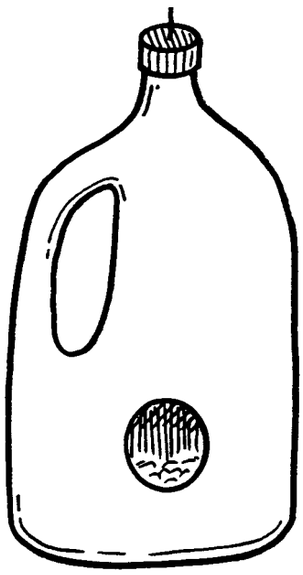
- Design and create bird houses out of natural or manufactured containers.
- Provide string, old yarn, baler twine, cloth strips, etc. for nesting materials. Wind these through an onion sack and hang the sack on a coat hanger.
- Donate feeders to nursing homes and maintain them.



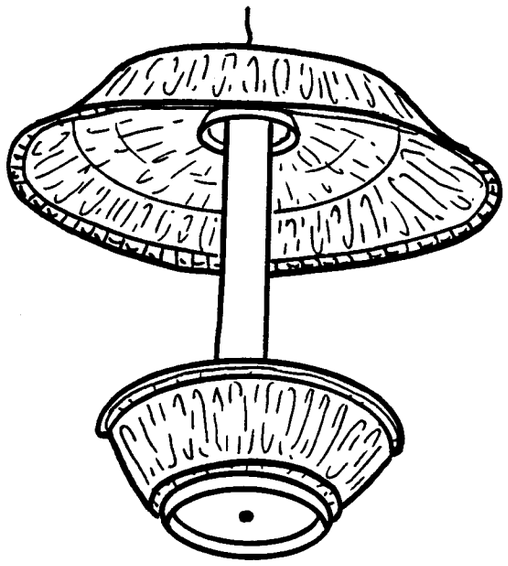
Bleach bottle feeder



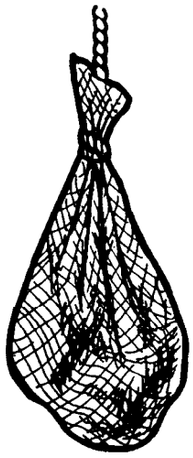
Milk jug feeder



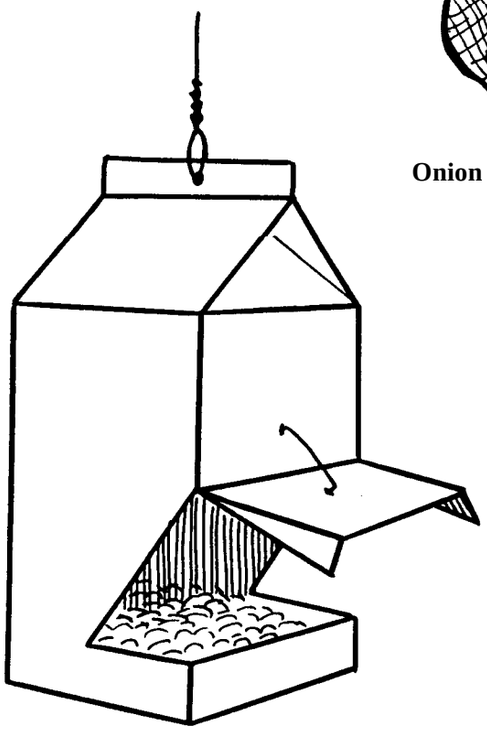
Detergent bottle feeder



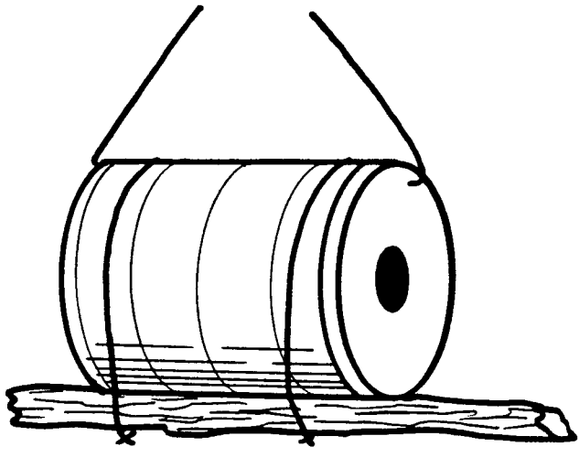
Pie plate feeder



Onion sack suet feeder



Milk carton feeder



Coffee can feeder

Plastic Bottle Pig Bank*

Materials:

plastic bleach bottle
4 corks per bottle
1 pipe cleaner
construction paper
glue
scissors
red marker

Procedure:

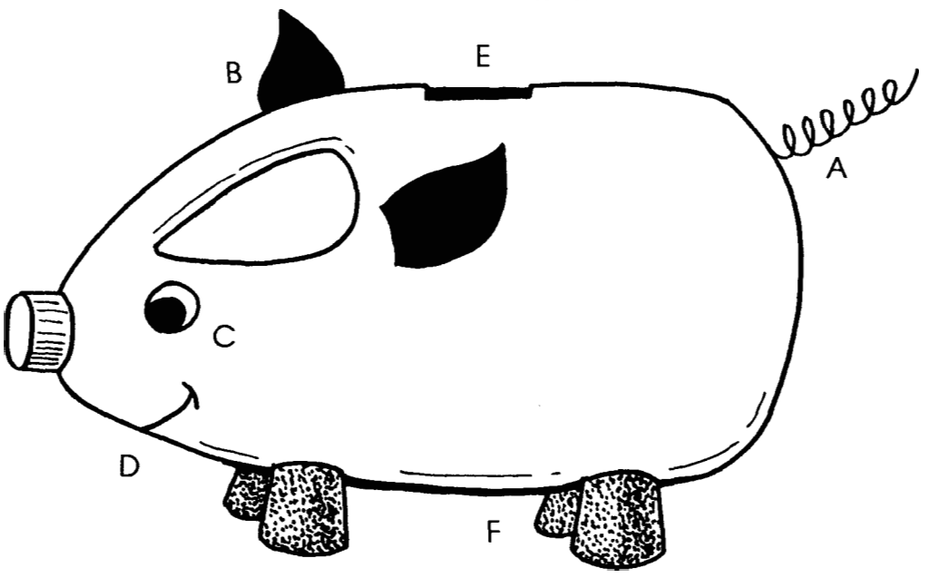
1. Encourage children to bring plastic bottles and corks with them. These could be their "entrance tickets" to your craft room. Save plastic bottles yourself for the occasional "I forgot my bott1e"ers. Friends Groups could also be asked to save plastic bottles.

2. Guide your class through the process of "pig construction" using demonstrations and the following directions:

- Rinse bottle out thoroughly.
- Make the pig's tail by twisting a pipe cleaner around a pencil and then slide it off.
- Lay bottle on its side with handle facing up and with neck of the bottle representing the pig's snout. With tip of scissors poke a hole for pipe cleaner "tail" at the base. Stick pipe cleaner "tail" into the hole and affix with glue. (See **"A"** on drawing). Younger children will need help puncturing and cutting the bottles.
- Draw two ears on the construction paper and cut them out. Glue them on each side of the bottle. (See "B" on drawing).
- Draw and cut out two eyes and glue them on each side of the bottle just above the snout. (See "C" on drawing).
- With red marker, draw a mouth below the snout. (See "D" on drawing).
- Cut out a slot, large enough to fit a fifty cent piece in, on top of the bottle between the ears. (See "E" on drawing).
- Glue four corks on the bottom of the bottle for legs. (See "F" on drawing).

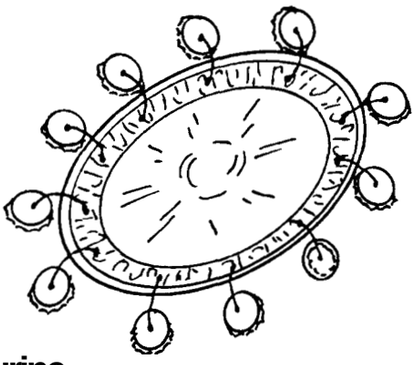
Going Beyond:

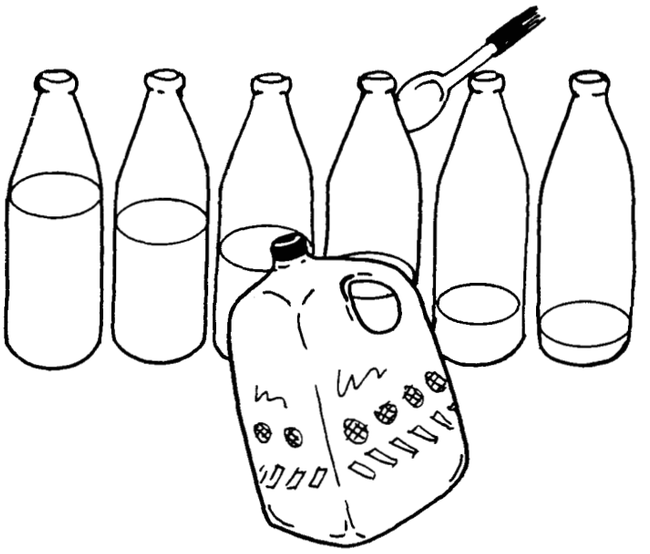
- Point out to the children that they just took a piece of trash and made it into a treasure. **Ask** them to think of other objects that can be reused in ways different from their original purpose. Ask them how they are helping the environment by reusing items.



* Adapted from: **Everything Goes Somewhere,** a Recycling Study Guide. University of WI-Ext. ***(1989)***, UW Stevens Point.

Musical Instruments"





Tambourine

Materials:

pie tin
bottle caps
string or yarn in **3**" pieces

Procedure:

1. Punch holes around pie tin with hammer and nail.
2. Punch one hole in each bottle cap.
3. Put a string through one hole in pie tin and one bottle cap and tie a knot in each end of the string.
4. Continue stringing each hole with a bottle cap.

Bottle Xylophone

Materials:

8 used glass bottles of uniform size
water
wooden and metal spoons

Procedure:

1. Put bottles in a line without touching each other.
2. Leave the first bottle empty.
3. Put a small amount of water in the 2nd.
4. Put more water in each bottle until the last one is full.
5. Hit each bottle with a wooden spoon and listen to the tones. Try using a metal spoon and hear the difference.

Milk Carton Shaker

Materials:

gallon plastic milk carton with top
dried beans or sand
crayons

Procedure:

1. Design the outside of the container with crayons.
2. Put dried beans or sand in bottom of container (only small amount needed)
3. Screw on lid.

Going Beyond:

- Use these instruments with the Sing Along found in this booklet.
- Discuss how the instruments were made from items that normally would have been trash.
- Use your imagination to think of other instruments that can be made from trash.

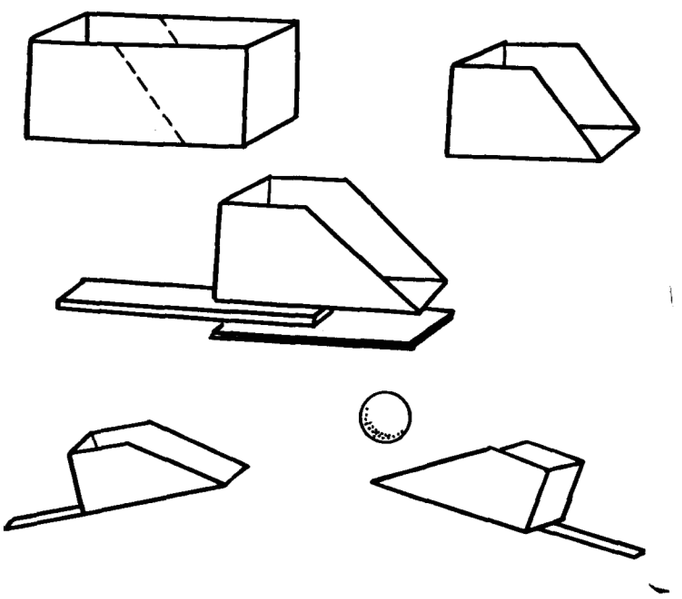
* Adapted from: **Project Pride,** Quality Forward. P.O. Box 22, Asheville, NC 28802

Recycled Toys

Scoop Ball

Materials: (per set of Scoop Balls)

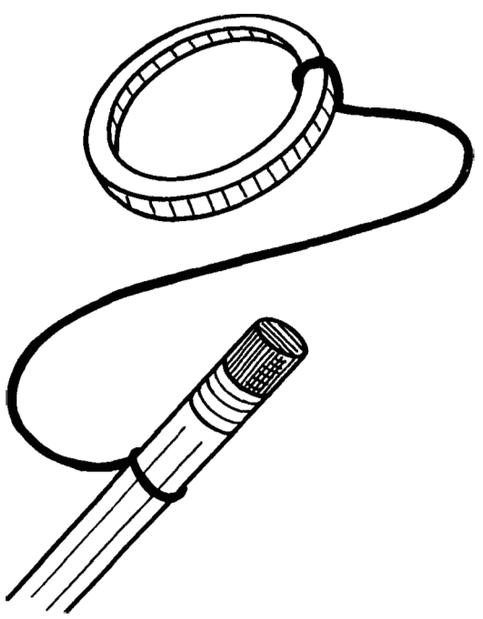
2 shoe boxes
glue
2 thin strips of wood (approx. 7" x 1") (used paint stirring sticks work well)
2 cardboard strips
ball (tennis, whiffle or racquet ball would work, or be resourceful and use a ball of used tin foil)



Procedure:

1. Children should be told in advance to bring a shoe box and plastic or cardboard lid with them.
2. Cut two shoe boxes into scoops as shown in the diagram.
3. Glue a thin strip of wood to each scoop for a handle.
4. Reinforce the handle by gluing an extra piece of cardboard to the bottom of each scoop.
5. Allow the glue to dry.
6. Play ball! Players stand opposite one another and toss the ball back and forth with their scoops. No hands can touch the ball. Pairs can compete against other pairs by seeing who can make the most consecutive catches.

Ring Catch



Materials:

1 pencil per person
1 lid from an ice cream, margarine, or sherbet container
scissors
string

Procedure:

1. Cut out the center of the lid.
2. Tie the string from the lid to the pencil.
3. Swing the pencil back and forth and try to catch the ring on it.

Going Beyond:

- Discuss with the children how they just turned a piece of trash into a fun toy! What else could they make with their trash? Discuss how using the lids over again saves our landfill space. It also saves natural resources by not having to use virgin materials to build new toys.
- Bring in a commercial set of scoop balls. Discuss the difference in price, the difference in materials (degradable versus non-degradable), and the similarity of performance for the two styles of scoops.

Make Your Own Paper

Age: 5-12 years old

Goals: To show children that used paper can be recycled into new paper.

Background:

What happens to used paper? Most paper is thrown away in landfills or is burned. If we recycle paper we save landfill space and utilize valuable wood fibers over again.

Making your own paper from old paper is similar to what happens in a paper recycling mill. At a mill the pulp is put into a machine with a long moving screen. The water drips through the screen. Then the screen moves through parts of the machine that press and dry the pulp. The final product is new paper.

The paper you make will be much thicker and rougher than recycled paper made in a mill. Paper mills have many kinds of machines to make the paper smooth and flat.

If time is limited, most of the pulp can be prepared the night before. If you make it much in advance it should be refrigerated to prevent fermentation.

To make special occasion paper, add colored threads or dried flowers and leaves to the completed pulp.

Materials:

a blender or egg beater and bowl
a flat dish or pan, a little larger than the screen
a round jar or rolling pin
per child:
10 pieces of tissue or newsprint
a piece of non-rusting screen
4 pieces of blotting paper or felt the size of the screen
newspaper and blotting paper
2 cups of hot water
2 teaspoons of instant starch

Procedure:

1. Tear the newspaper into very small bits. Add 2 cups of hot water to 1/2 cup of shredded paper.

2. Beat the paper and water in the blender, or with the egg beater, to make pulp. Mix in the starch. Completed pulp should be the consistency of split pea soup.

3. Pour the pulp into the flat pan.

4. Slide the screen into the bottom of the pan and move it around until it is evenly covered with pulp.

5. Lift the screen out carefully. Hold it level and let it drain for a minute.

6. Put the screen, pulp-side up, on a blotter on some newspaper. Put another blotter over the pulp, and more newspaper over that.

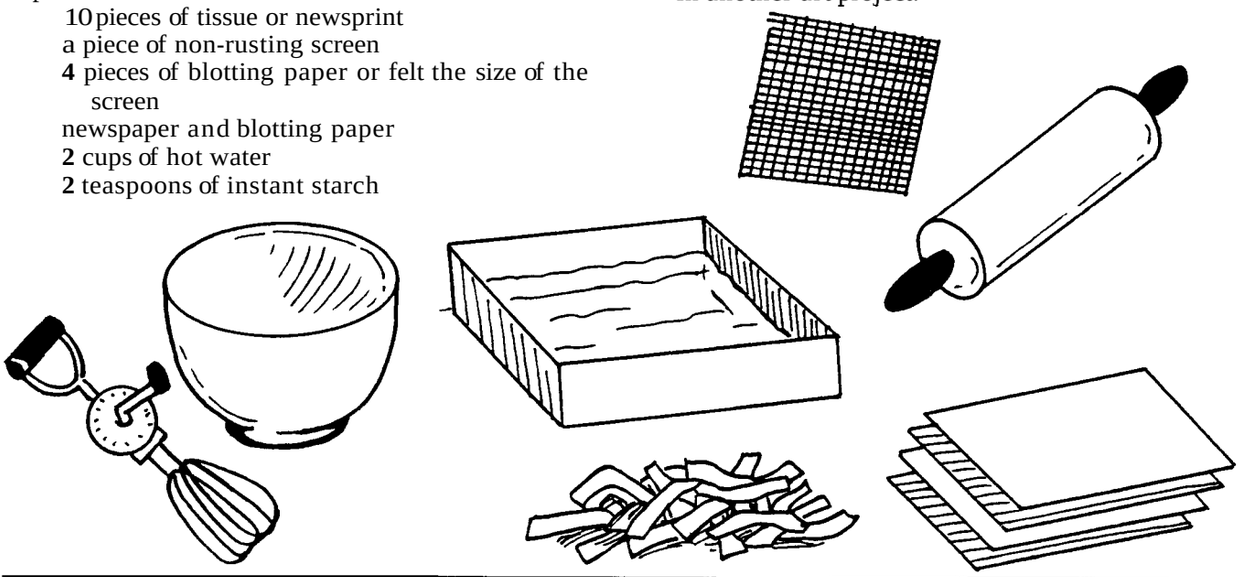
7. Roll a jar or rolling pin over the "sandwich" to squeeze out the rest of the water.

8. Take off the top newspaper. Turn the blotter sandwich over. Then take off the blotter and the screen very carefully. Do not move the pulp. Voila! There is your paper!

9. Put a dry blotter on the pulp and let the paper dry for 24 hours.

Going Beyond:

- Ask the children to speculate how much paper they use in one day (napkins, lunch bags, school work, paper cups, newspaper, etc.) What would life be like without all of these products?
- Encourage the children to use the paper they made in another art project.



Exhibits

Many simple exhibits can be created to give examples of natural and human recycling. Here are a few ideas:

Cycles — Make posters or bulletin board displays showing natural cycles like water, nutrient, C02/ 02, and rock cycle or human recycling showing paper, aluminum, plastic, etc.

Nature's Recyclers — Make posters or bulletin board display showing nature's recyclers and the roles that they play.

Nature's Litter — Make a poster or display that shows nature's litter on the forest floor and the various stages of its decomposition. This could be done as part of a soil profile.

Packaging — Gather examples of the following packages for a "hands on" table:

Natural — acorn, cones, milkweed pods, egg shell, orange peel, coconut

Old — returnable bottle, pottery, birch bark container, paper egg carton, basket

New — plastic bags and bottles, aluminum can, bimetal can, "blister pack", polystyrene egg carton

Deadly Litter — Create a display or collage using plastic 6-pack holders, balloons, fishing line, aluminum flip or tab tops, polystyrene particles, nylon netting, broken glass, open cans and appropriate magazine pictures or photographs showing their deadly impact on wildlife.

Renewable/Nonrenewable Resources — Collect and display the following examples:
cereal box—paper—pulp—wood—tree—soil—earth
pop bottle—glass—sand—rock—earth
Al can—sheet Al—Al ingot—AlO2—bauxite—earth
plastic bottle—melted plastic—oil—earth
apple—tree—soil—earth

Natural Reuse — Collect and display examples of natural objects being reused in nature such as: grass, leaves, mud and hair for nesting material, shells for invertebrate homes, etc. Show human reuses too — reed chairs, grass mats, etc.

Composting — Set up a compost bin (or examples of several types of bins) and use it! Create a display comparing leaf litter decomposition with composting.

Community Recycling — Find out what is recyclable in your community and set up a display showing recyclable items and their preparation for recycling.

Your Daily Waste — Assemble examples of an individual's daily and weekly accumulation of trash. Use photos for monthly and yearly trash.

Why Waste? — Set up a display using pictures, products, and narrative information to explain the magnitude of the resources that we use and dispose of each year.

Hazardous Household Products — Set up a display of these products and environmentally safe alternatives.

Environmentally Safe Shopping — Set up a display or pictures showing shopping alternatives to our disposable/throw-away society (i.e., buying in bulk, buying returnable bottles, etc.)

Resourceful vs Wasteful Picnic — Set up a display that compares a picnic using a picnic basket with its reusable plates, cups, utensils, napkins and food containers with a picnic using all disposable plates, cups, utensils, napkins and food containers. Show the amount of trash that each one generates.

Fireplace Logs from Newspapers*

Age: 8-adult

Goal: To help people learn that energy can be recovered from trash.

Background:

Reducing consumption, reusing materials, recycling resources, composting food and yard wastes, recovering energy through incineration and landfilling are the alternatives that we have for handling our trash. Incineration may be as controversial as landfilling, but when done as part of an energy recovery system with good environmental controls, it is a viable alternative. In Wisconsin we annually landfill enough energy in our trash to heat 300,000 homes; this is a tremendous waste of resources. Many communities are now looking at waste-to-energy plants as a sound way to help solve their trash problems. They are doing it as a fifth step after reducing, reusing, recycling and composting. If there is not a market for newspaper in your area, turn your newspaper into fireplace logs for energy.

Materials:

container(s) large enough to hold several soaking newspaper logs
newspapers
used twine or string
broomsticks
scissors
water

Procedure:

1. Take eight pages of newspaper and lay them unfolded on a table or floor lengthwise. Lay the broomstick at the top of the paper.

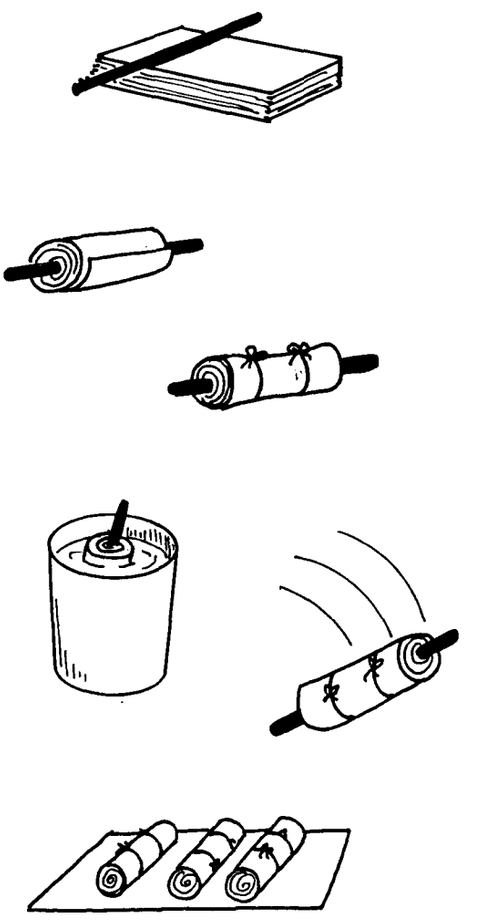
2. Tightly roll the newspaper around the broomstick to about 8 inches from the end. Overlap another 8 pages and continue rolling until you have a good size log.

3. Tie *3* inches from each end with used string or twine.

4. Soak overnight in water. The water will break down the papers' fibers and reduce the amount of fly ash when the logs are burned.

5. Take logs out of the water and bang them on the ground to pack the paper.

6. Remove the broomstick and dry thoroughly (on racks if possible).



Going Beyond:

- Discuss where the energy that is stored in the newspaper comes from.
- Sell logs as a fund raiser.
- Use old continuous fold computer paper instead of newspaper.

* Adapted from **Recycle Alaska Activities Handbook,** State of Alaska, Department of Environmental Conservation, Pouch **O,** Juneau, Alaska 9981**1**

Natural Dyes*

Age: 5-10 years old

Goal: To show children that natural products can be substituted for manufactured products.

Background:

Many of the products that we purchase are colored or printed with manufactured dyes and inks. Some of these dyes and inks have a petroleum base and quite a few of the brighter colors are derived from heavy metals like cadmium and lead. These elements move through food chains and accumulate in the tissues of higher organisms. Even trace amounts may impair body functions or cause death. Extraction of these harmful elements is difficult, and the remaining residues are toxic and persistent in our environment. As we become more concerned about our impact on the environment, we will be looking at natural dyes and inks for coloring and printing.

Materials:

chilled, hard-boiled eggs
containers for heating, storing and dyeing
dyes as indicated below:

Dye Base	Colors Produced
Walnut shells	Buff or adobe
Red cabbage leaves	Robin blue
Orange peels	Light yellow
Carrot tops	Smokey yellow/green
Fresh cranberries	Dark green
Onion skins	Orange
Spinach	Light gold

Procedure:

1. Prepare dyes ahead of time by placing a small amount of the items mentioned above in individual pans and add two cups of cold water. Place over heat and bring rapidly to a boil, simmer for 10 minutes, turn off heat, cover and steep for **30** minutes. Remove residues, place in containers and refrigerate.

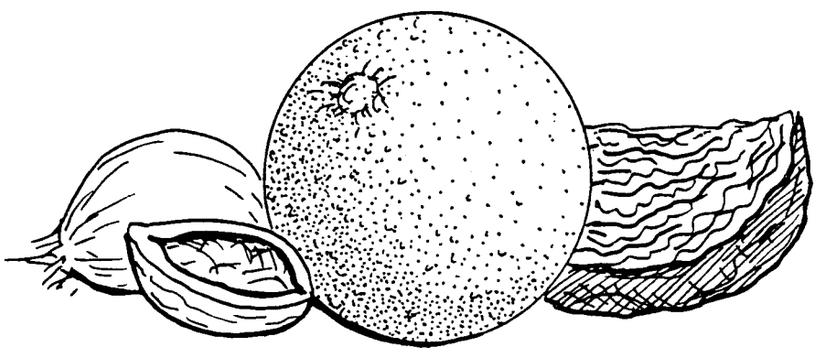
2. Discuss with your class where colors come from. Ask them if they know of any "sources" for colors. Discuss how things were colored in the past and what we might have used for inks. Explain to older students that many of our colors today are derived from heavy metals and the impact these metals have on the environment.

3. Show children the dyes that you made and their source materials. Ask them if they have any other ideas for natural dyes.

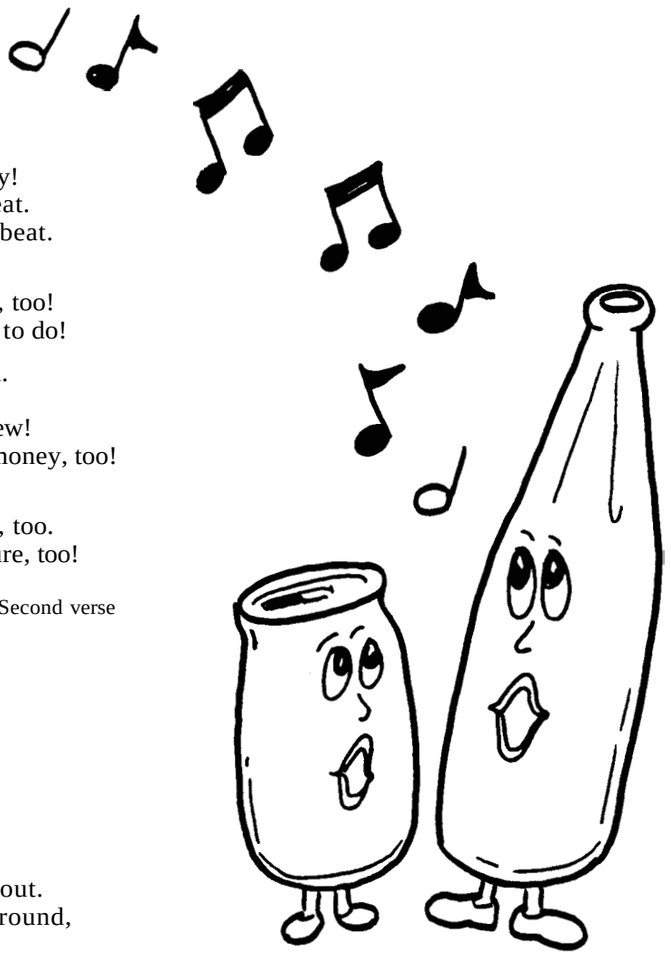
4. Assemble dyes, eggs, and containers (recycled, of course) and have children select dyes for coloring their eggs. Coloring time varies with dyes and the intensity of color desired. Leaving the eggs in the dyes in a refrigerator overnight will give the deepest colors. Remove from dye and dry on metal cake racks. Refrigerate eggs as soon as possible. Refrigerated hard-boiled eggs can be kept for a week.

Going Beyond:

- Have children experiment with making other natural dyes.
- Use dyes for water coloring.
- Use dyes for tinting while making paper from recycled paper.



* Adapted from: **Recycle Alaska Activity Handbook,** State of Alaska, Department of Environmental Conservation, Pouch O, Juneau, Alaska 99811



"Recycling is the Way"

(Sing to the tune of "JingleBells".)

Recycling is the way...to handle trash today.
No more giant landfills here... there is a better way!
Just separate your trash — at your home oh, so neat.
'Cuz curbside pickup is a treat. Recycling can't be beat.

Chorus:
Save your glass, save your paper, save your metal, too!
Show your neighbors that you care. It is the thing to do!

Disposable just won't do. Carry your cup with you.
Styrofoam's not smart. And costs you money, too.
Disposable just won't do. Diapers of plastic — whew!
Babies love diapers made of cloth. And they save money, too!

Chorus:
Reuse your cups. Reuse your plates. Reuse utensils, too.
When you toss your plastic out, you toss your future, too!

First verse written **by** Mary Snudden, Eau Claire Schools. Second verse written by Rosemary Thielke, Milwaukee, WI.

"Cleaning Up All the Litter?"*

(Sing to the tune of "HokeyPokey".)

Put your litter bag in. Take your litter bag out.
Put your litter bag in and then you shake it all about.
You clean up all the litter and you turn yourself around,
That's what its all about!

Put your paper in. Take your paper out.
Put you paper in and you shake it all about.
You clean up all the litter and you turn yourself around.
That's what it's all about!

Procedure:

Sing and act out the song using litter. Every child will need **1** litter bag, and 4 pieces of litter, similar to the other children's (can, a piece of paper, milk carton, straw, etc.)

- Ask the group to form a circle, children facing one another.
- Start with the 4 pieces of litter on the floor at everyone's feet and the litter bags in everyone's hands.
- Sing "Clean Up All the Litter" and perform appropriate motions. The children will have fun singing and dancing while becoming aware of litter.
- Proceed with the other litter pieces.
- Repeat the original verse and you're finished.

* Adapted from: **Project Pride,** Quality Forward. P.O. Box 22, Asheville, N.C. 28802.

Sing Along

Age: All Ages

Goal: To have these catchy tunes stick in peoples' minds so that they will think about recycling in everyday life.

Background:

Singing songs related to the theme of your activity or hike is a great way to wrap up a session. Hand out music sheets so people can sing along with you. Encourage children to play the recycled musical instruments they can create in the craft section.

"Dr. Recycle"

(Sing to the tune of the "Dr. Pepper Song".)

I'm a successful recycler and I'm proud —
I used to be alone in a crowd —
But if you look around these days,
There seems to be a "Recycling Craze"!

Chorus
Oh — You can reuse, she can reuse,
he can reuse, I can reuse —
Recycling is really **up** to you!

Repeat chorus.

Be a cycler — Be a recycler!
(Repeat this line six times getting softer each time.)

"Five Little Bottles"

(Sing with hand movements.)

5 little bottles sitting in a row,
1 was recycled, then there were **4.**
4 little bottles sitting in a row,
1 was recycled, then there were **3.**
3 little bottles ...
2 little bottles ...
1 little bottle sitting in a row,
it was recycled and then there were none to be thrown away.

"The Recycling Song""

(Sing to the tune of "A Yellow Submarine".)

Chorus:
We all live in a world that could be clean
a world that could be green
a world that could be clean.

If our friends down at the store
used less Styrofoam,
recycled more,
cans of blue, and red and green,
all would vanish in a crunching machine.

(Sing Chorus)

If our trash cans all had names
mixing cans with paper is a shame,
we could sort
the glass and then
all our trash would be used again.

(Sing Chorus)

* Adapted from **Recycle For Reuse,** by The Wisconsin Extension Service.

Benji: I've got the perfect place for you, Charlotte. This home will help protect you from predators and will be a great place for you to find food. These directions will show you how to get there.

(hands her same paper and Charlotte walks off Wendy Worm appears)

Wendy: Oh Benji, can you help me? I'm having a terrible time finding a home.

Benji: Sure, Wendy Worm. What kind of home do you want?

Wendy: "Us" worms go for damp soil. It offers all the comforts and conveniences of ground life. I'd like a soft place with lots of rotting things so I can find good food.

Benji: Well, it just so happens I know of a place with nice, rich, damp soil. Here are the direction to get there.

(hands her same paper)

Wendy: Thank you, Benji. I knew I could count on you.

(log comes up: Rocky and Wendy each approach it from opposite sides)

Rocky: This rotting log over here must be my new home.

Wendy: Your home! Benji Bear told me it would be my new home.

Charlotte: *(creeping up over the log)* Hey, you guys, quit the joking. This is my new home.

Rocky and Wendy: **Your** Home!

Rocky: We can't all live in the same place. I'm a raccoon and I need solid walls and nice dry leaves.

Charlotte: I'm a spider, and I like small spaces to hide in and places to catch my food.

Wendy: And I'm a worm. I'm a prisoner inside solid walls, and dry leaves are rough on my skin. I like dirt, myself, where I can move around easily.

Charlotte: I don't know. What do you think, audience? Could we all use the same rotting log for our homes?

(wait for answer)

Rocky: There's a nice big hollow space at this end for me.

Charlotte: The middle of the log has great places for me to crawl around in and plenty of juicy insects to eat.

Wendy: Well, I can live over at this end where the rotting wood has almost turned to soil.

Rocky: So, I guess we all can live together. *(yawns)* I better go test my new bed. *(leaves)*

Charlotte: This rotting log provides a nice home for each of us. I think I'll hide behind here and wait for dinner. *(leaves)*

Wendy: So it doesn't matter that I'm a worm, and he's a raccoon and she's a spider. Life in this log is good for all of us. I better go burrow in that damp soil; this dry air is too much for me. Bye-bye everyone. *(leaves)*

Going Beyond:

- Play Log Tag, go on a Mushroom Adventure, build an Earthworm Castle, or study a Dead and Rotting Log. (All activities found in this book.)

Rotting Logs Puppet Show

Age: 5-12 years old

Goal: To show children that many of nature's recyclers utilize dead, decaying logs.

Background:

Rotting logs are homes for many animals. As logs rot, different animals inhabit each stage of decay. Raccoons, squirrels, owls and woodpeckers like trees that are in the beginning stages of decomposition. They use the big holes as homes. Spiders like decomposing logs during the intermediate stages of decomposition because many other bugs are there to capture and eat. Earthworms, slugs, and snails like trees in the final stages of decay when the trees are changing to soil. The new forming ground is moist, loose and rich in nutrients.

The following puppet show/play can either be done with puppets, or with actors. The actors/puppeteers can be park staff, volunteers, or children. Create puppets with paper lunch bags and construction paper or old socks and yarn scraps. Because of the reading involved, it is recommended that older children play the parts.

Materials:

a real or constructed rotting log
3 pieces of paper with "Directions",taped to a stick
4 costumes or **4** puppets (bear, spider, raccoon and a worm)

Procedure:

1. Either choose **4** children to be actors/puppeteers or have staff people participate. Encourage the actors to really act out the role of their animals. For example, the worm should wiggle on the ground, and the spider should walk daintily. Tell everyone else it is their job to be a good audience.
2. Perform the Rotting Logs Show.

Rotting Logs Show*

Characters: Rocky Raccoon
Benji Bear
Charlotte Spider
Wendy Worm

Rocky: Benji Bear, I've been looking for you. As king of the forest you must have a list of all the individual homes around here.

Benji: I sure do. Are you in need of a home, Rocky Raccoon?

Rocky: Yes, I am. Nothing too fancy, no moss to moss carpeting or anything, just a fairly dry place with a roomy hole for me to stay in.

Benji: I know just the home for you Rocky. It has a soft, comfortable floor and thick, well-insulated walls. I'm sure you'll find it a perfect, snug home for the winter. Just follow these simple directions and you'll have no trouble finding it.

(Hands him a piece of paper)

Rocky: Thanks a lot, Benji.

(Walks off? Charlotte Spider appears)

Charlotte: Hey, Benji, I'm in need of a home too. Do you have anything for me?

Benji: What kind of place are you looking for, Charlotte Spider?

Charlotte: The older the better, with a lot of little cracks and crevices for me to crawl under and through. I need a safe place for my sac of eggs and a spot where I will be protected and warm enough to spend the winter.

* Reprinted with permission from: **Hands-on Nature,** The Vermont Institute of Natural Science, Church Hill Rd, Woodstock, VT. 05091

Glossary

Bauxite: The principle source of aluminum, containing alumina and impurities.

Biodegradables: Materials that will decay over a short period of time. They can be broken down by microorganisms into simple, stable compounds such as carbon dioxide and water.

Chlorophyll: A green material in leaves and in other green parts of plants that is used to carry on photosynthesis.

Composting: Mixing food scraps, grass clippings, and leaves in an optimal environment for decomposition to form a rich soil conditioner.

Cycle: To circle, occur again, over and over.

Decay: The destruction or decomposition of organic matter as a result of bacterial or fungal action.

Decompose: To break down into basic elements; to rot.

Decomposer: A plant or animal that feeds on dead material and causes it to break down. Examples include fungi, earthworms, and bacteria. These are nature's recyclers.

Dump: An open and unmanaged disposal site used prior to sanitary landfills.

Fungi: (singular = fungus) Simple plants that cannot use the sun's energy to make food because they do not have chlorophyll.

Habitat: The area where an animal or plant lives and finds nutrients, water, shelter, and living space.

Incinerator: A facility designed to reduce waste volume by burning. It can be equipped to generate energy.

Ingots: A mass of metal shaped for convenience in storage or transportation.

Leaf litter: Slightly decayed leaves lying on the forest floor.

Lichen: A plant composed of fungi and algae living together in a partnership.

Litter: Waste material discarded in an inappropriate place. Littering is illegal in Wisconsin.

Microbe: Very small plants and animals that aid in decomposition.

Mold: A type of fungus that grows on decaying materials.

Natural resources: Valuable, naturally occurring materials such as soil, wood, air, water or minerals.

Non-biodegradables: Materials that will not decay and cannot be recycled.

Non-recyclables: Items which are made of materials that cannot be recycled.

Nonrenewable resource: A natural resource that is considered finite in amount because of its scarcity, the great length of time it takes to form, or its rapid depletion (e.g., coal, copper, petroleum).

Nutrients: A substance with nutritive value that is necessary for growth.

Photosynthesis: The process by which green plants use the sun to change carbon dioxide and water into sugar.

Recyclables: Items made of materials which can be reused either in the same form or as part of a different product.

Recycle: To collect and reprocess manufactured materials for reuse either in the same form or as part of a different product.

Reduce: To lessen in extent, amount, number or other quantity.

Renewable resource: A natural resource derived from an endless or cyclical source. With proper management and wise use, replacement of these resources by natural or human assisted systems can be approximately equal to their consumption.

Reuse: To extend the life of an item by using it again, repairing it, modifying it, or creating new uses for it.

Sanitary landfill: A specially engineered site for the disposing of solid waste on land.

Trash: Materials considered worthless, unnecessary, or offensive that are usually thrown away.

Virgin material: Any basic material for industrial processes which has not previously been used (e.g., wood/pulp trees, iron ore, silica, crude oil, bauxite.)

Yard waste: Organic wastes generated in the yard including leaves, grass clippings, sticks, etc.

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