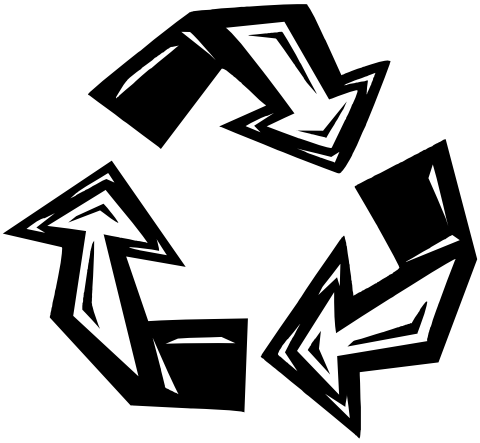
Recycling



"We have been educated to use; we shall now have to be reeducated to reuse, restore, renew and conserve."
—Sam Levinson
New York Sunday News
28 November 1971

Introduction

Recycling is the best way for us to take care of our waste. By recycling, we not only reduce our waste disposal problems, but we also keep from depleting our natural resources. Recycling is everyone's job, and we all need to learn the right way to do it.

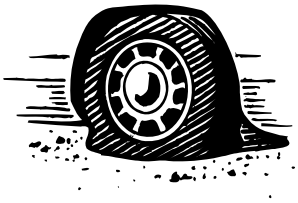
The natural world teaches us a great deal about recycling; nature uses its materials over and over, utilizing them in new and different ways. An important goal in teaching about recycling is to develop in children an awareness and appreciation for natural places. If they value a place for its natural beauty, they will be outraged at finding it filled with waste; they will want to protect it. In some ways natural areas are the perfect sites for learning about recycling. Children simultaneously see nature at work and learn how they can live more cooperatively with it. The answer to the question of "why recycle?" becomes clear.

This unit strives to teach children not only about how they can recycle, but also that the natural world utilizes its energy and materials in a variety of ways. We learn to reuse what we have not just to reduce our waste, but to embrace a cycle that reaches well beyond the human scale.

Interesting Facts about Trash and Recycling

- Eighty-four percent of a typical American household's waste can be recycled.
- The San Francisco Zoo once recycled animal manure and sold it as fertilizer. They called it "Zoo Doo!"
- The United States has only five percent of the world's people, yet produces 30 percent of the world's garbage.

- Americans throw away about 40 billion soft drink cans and bottles every year. That's enough to reach the moon and back almost 20 times.
- Seals and sea lions often eat plastic bags floating around in the ocean, thinking that they are jellyfish.
- One recycled aluminum can saves enough electricity to power a TV for three hours.
- For every $10 spent on fast food sales, we generate 2 pounds of trash.



- Putting old tires around tomato plants can help them grow faster.
- One discarded tire can produce enough electricity for one home for one day.
- In 1868 John Wesley Hyatt invented the first plastic (celluloid) to make billiard balls.
- Only about one-fourth of the world's paper, aluminum, iron, and steel is recycled.
- The average baby generates a ton of garbage every year.
- Americans throw away about 10 percent of the food they buy at the supermarket. That's the same as 21 million shopping bags filled with food.
- Japan and the Netherlands collect more than half of their aluminum, paper, and glass for recycling. Every other year these two countries require no extra materials to manufacture paper and glass.
- The average American uses 465 trees' worth of paper in his or her lifetime.

- 6.4 million tons of litter enter the world's oceans every year.

- Marine debris is known to have affected at least 267 species worldwide, including 86 percent of all sea turtle species, 44 percent of all seabird species, and 43 percent of marine mammal species, primarily through ingestion, starvation, suffocation, infection, drowning and entanglement.

Sample Program: Recycling

I. Introduction
Introduce yourself to the group.
Introduce the Junior Ranger Program.

II. Focus
A. We hear about recycling all the time. Who can tell me what it means?
To turn something old into something new.
B. Has anyone heard of the three "R's"? Who can tell me what they are?
Reduce, Reuse, Recycle.
C. How are "reduce" and "reuse" different from recycling?
Reuse means to adapt something for another purpose. Reduce means to minimize the amount of waste we make (before we make it!).

II. Objectives
Today we will learn about recycling. We'll talk about how we can recycle and reuse our waste, and also how nature recycles.

III. Inquiry/ Discussion
A. How Can We Recycle?
1. Who can give me examples of how we can reduce, reuse, and recycle?
a. Reduce:
Take a 10-minute shower instead of a 20-minute shower.
Walk or ride your bike instead of drive.
When you go to the grocery store with your parents, try to pick out food with little or no packaging. Packaging creates a great deal of waste.
When you're in the outdoors or on a picnic, use a water bottle instead of plastic cups, etc.
b. Reuse
Take a lunch box to school instead of a paper bag.
Reuse your plastic bags.
Turn your trash into something new Yogurt containers can become pencil holders, shoeboxes can be filled with treasures, etc.

c. Recycle
Cans, newspaper, bottles and glass, plastics.
(See chart in "Information" for further discussion here.)

2. Who can tell me the difference between recycling and littering?
Littering means leaving our trash out in a place where it shouldn't be. By recycling, we don't have any waste to leave out.
3. What happens when we throw trash away instead of recycling?
It goes into a landfill, just moving our waste to another place. There isn't really any "away."

B. How Does Nature Recycle?
1. We've talked about how we can recycle, but today we're in a natural place. How does nature reuse and recycle? Everyone close their eyes for a couple of minutes and see if you can think of ways that nature reuses and recycles.
a. Water cycle: Water falls from the sky into rivers, streams, lakes and oceans; it evaporates into the sky, turns to clouds and falls again.
b. Most animals' homes are reused natural material. Birds use twigs and sticks to make their nest, hermit crabs use discarded shells for their protection, many animals use dead logs for food and home, etc.
c. Natural materials are always cycling in wilderness areas.

C. Activity: Treecycle Charades (see activity section below)

IV. Guided Discovery
A. Let's see if we can find some examples of material cycling.
(Lead children to a down log, decaying material, etc.)
B. How does this happen? How does a dead tree break down into soil and nutrients?
1. Organisms called bacteria and fungi (mushrooms) feed on dying or dead material and break it down.
2. Insects such as termites, beetles, and carpenter ants help them out.
3. Worms bring air to the soil with their burrows; they also eat nature's "litter," and when they excrete, this material adds richness and nutrients to the soil.

C. What is it called when dead material like this is broken down?
Decomposition
D. What are good and bad conditions for decomposition? What kind of environment is good for decomposers?
Moisture, little wind, not too hot or too cold
E. Activity: Natural Beauty, Big and Small (see activity section below)

V. Application
A. Review with me ways we can recycle at home.
- Recycle aluminum, glass, plastic, newspapers
- Reuse our things and reduce our waste

B. What are some important things that contribute to recycling in nature?
- Dead material, bacteria, fungi, insects, earthworms

- A moist, temperate environment

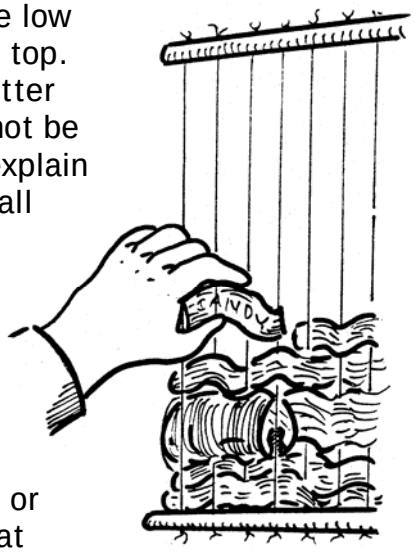
VI. Conclusion
   A. Announce when and where the next Junior Ranger session will be, and what the topic will be.
   B. Stamp logbooks.

Activities

Weave of Waste

Number of Children: Five or more
Environment: Along a trail, or in a site where children will be able to find litter
Equipment Needed: Two dowels or sturdy, straight sticks, approx. 2 to 3 feet long, string, scissors, litter bags, latex gloves, and a place to hang the waste loom (from a tree, pole, wall, etc.)
Purpose of Activity: To illustrate the volume of litter people leave in natural places
Activity:

1. In this activity, the Junior Rangers will construct a "weave of waste." You can save time by setting up the loom beforehand if you'd like; otherwise the children can help you with it. To build the loom, cut 20-30 pieces of string the same length, anywhere from 2 to 4 feet long, depending on how big you want the loom to be. For each piece, tie one end to one stick or dowel, and the other end to the second stick or dowel. The strings should be about an inch apart.
2. Hang the loom from a tree, wall, or pole. It should be low enough for the Junior Rangers to be able to reach the top.
3. Explain that the Junior Rangers are going to go on a litter hunt. Designate boundaries and objects that should not be picked up. Hand out the litter bags and gloves, and explain that the Junior Rangers will have ten minutes to find all the litter they can.
4. When their time is up, call the Junior Rangers back. Now it's time to weave their trash into the loom. Almost all litter except extremely small objects can become a part of the weaving. Have children take turns weaving their trash in and out of the pieces of string. Then look back at the waste weave. Does it seem like there's a lot of trash? Leaving one wrapper or can on the trail doesn't seem like a big deal…but what would happen if everyone did it?



Time Capsule

Number of Children: Five or more

Environment: Along a trail, or a place where children will be able to find litter
Equipment Needed: Litter bags, piece of butcher paper, and marker
Purpose of Activity: To learn cultural values and characteristics by searching for "artifacts"
Activity:

1. Explain that the Junior Rangers are going to go on a litter hunt. Designate boundaries and objects that should not be picked up. Hand out the litter bags, and explain that the Junior Rangers will have ten minutes to find all the litter they can.
2. When their time is up, call the Junior Rangers back. Have them sit in a circle and empty the contents of their bags in the middle. What kinds of things did they find?
3. Take an inventory of the litter. How many plastic bags, plastic containers, aluminum cans, cigarette butts, etc., are there? Make a list of the things they found. Beside each item, write the number of things in that category that the Junior Rangers retrieved. What item was found the most? What kind of litter did we NOT find?
4. Tell the Junior Rangers you are going to imagine that this pile of litter is a time capsule. It will be opened by human beings in 100 years…about the year 2100. The Junior Rangers can pretend that they are people living 100 years in the future. What could they learn about people living now? What does the litter reveal about our culture and lifestyle?

Who Am I? (a good ice-breaker!)

Number of Children: 10 or fewer
Environment: Any
Equipment Needed: Pre-made tags for children and safety pins
Purpose of Activity: To learn about how nature recycles and the roles of individual decomposers
Activity:

Before the program: make ten tags, each of which has the name of one of the following decomposers on it. (The information in parentheses should not go on tags, but should be used in the discussion following this activity):

Carpenter ant (a soil mixer)	Dead tree (home for many decomposers)
Beetle (burrows in dead trees)	Mole (aerates the soil with burrows)
Snail (eats plant debris)	Termites (eat dead wood)
Earthworm (aerates and fertilizes the soil)	Turkey vulture (eats carrion)
Mushroom (scavenges on dead material)	Crayfish (scavenge along the creek bottom)

1. Bring the Junior Rangers together and explain that their job for the next few minutes will be to guess what "nature's recycler" is on their back. Before they begin, brainstorm what it means to be a "nature's recycler." (An animal/fungus that eats dead material, dead plant material where critters can live, any organism that helps with decay.) Make sure you don't show the Junior Rangers the tags yet.
2. Using the safety pins, attach a tag to the back of each child.

3. Explain that the children can only ask "yes and no" questions. Remind them that not all nature's recyclers are animals.
4. If there are only a few Junior Rangers left who haven't "discovered themselves," you may want to suggest that they ask questions that aren't only yes/no. Other Junior Rangers can even give them hints.
5. When all have been discovered, sit down in a circle. Going around the circle, ask the children individually how they think their decomposer helps to recycle natural materials.

The Un-Nature Trail

(See "Ecology: Activities")

Although this activity fits in the Ecology unit, it's a great addition to learning about litter recycling and caring for natural places.

Scavenger Hunt

Number of Children: Two or more
Environment: A site with an abundance of down trees or other dead material
Equipment Needed: Pens and paper (hand lenses, clipboards, and crayons if possible)
Purpose of Activity: To learn about natural recyclers and the roles of individual decomposers
Activity:

1. Brainstorm the best places to find nature's recyclers at work. Explain to them that not all recyclers are animals—many are fungi. Send the Junior Rangers out in pairs to find ten critters or fungi feeding on dead material. Remind them that to see many recyclers, they'll have to use a bug's eye view.
2. Junior Rangers should not remove the recyclers, but instead draw them just as they see them. The children can take turns drawing recyclers with their partner. Encourage them to be as detailed as possible. How many legs? What colors? Junior Rangers can even draw a quick background for their recyclers, showing what kind of habitat they were in.
3. When all the pairs have found their ten, regroup and talk about their results. Try to name as many recyclers as possible. Which recycler was found most?

Variation: For younger children or larger groups, Junior Rangers could look for just five specimens instead of ten.

Build a Compost Pile!

Number of Children: Five or more
Environment: A site with an abundance of down trees, etc.
Equipment Needed: Two large bins or crates, or six stakes and some wire, a bag of trash (you should have examples of things that can and cannot go in the compost pile in the trash bag), a pail of water, and newspaper

Purpose of Activity: To learn how and why composting is a good alternative to throwing organic wastes away
Activity:

1. Gather the children together and introduce the concept of composting. Composting is a way of keeping organic wastes out of landfills, an alternative to throwing them away. It conditions soil, adding nutrients that people would otherwise have to obtain from fertilizers that use up fossil fuels. Composting is easy, and it can be done at home.
2. If you don't have crates or bins, make a two-sided compost bin by putting the stakes in the ground to form a rectangular shape, three stakes long and two stakes wide. Wrap the wire around the stakes so that it closes off the entire rectangle. Then wrap it through the middle of the rectangle, dividing it into two squares, each two stakes long and two wide. The Junior Rangers can help you. Line one side of the bin with damp scraps of newspaper.
3. Have the Junior Rangers add organic wastes to that same side of the bin. This waste can include dead leaves, grass clippings (they'd have this at home), and the organic pieces of trash you've brought. See if they can guess which trash is organic and what is not. Paper products as well as vegetable and fruit scraps can go in; dairy and meat products should be left out. Break up the organic wastes into small pieces before adding them to the pile.
4. Add soil until it equals the amount of organic wastes in the bin. Pour water on top.
5. Discuss with the Junior Rangers how they would maintain the compost pile. They would need to keep it moist, and mix the pile a little bit every day. Mixing the material around will bring oxygen to the microbes essential for the decay process. Ask the Junior Rangers what would happen to the organic wastes in the bin.
6. Ask the children why they think the other side of the bin is still empty. Explain that the empty side will hold the material when it begins to turn to rich soil. As the decay process proceeds, they can move the rich soil to the other side. That way, they can keep adding compost to the bin without mixing it up with the nutrient-rich soil they've created. The new soil can be put in their garden or flower pots!

Natural Beauty, Big and Small

Number of Children: One or more
Environment: Large natural area
Equipment Needed: Pens or pencils, paper, and clipboards if possible
Purpose of Activity: To gain an appreciation for natural places; to understand the value of areas uncluttered by human litter
Activity:

1. In this activity, the Junior Rangers will each find a place that is special to them. They must find a spot on their own, with no one else around them. Preferably, they won't be able to see anyone from their spot.

2. Once at their spot, the Junior Rangers will spend ten minutes just observing. They picked their spot because it was attractive to them aesthetically. What makes this spot beautiful? Remind the children that beauty comes in all shapes and sizes. Each child should find at least three things that make their spot beautiful. One should be smaller than a penny, one smaller than themselves, and one bigger than themselves. They should observe every small detail of these treasures.
3. When their time is up, have the children share with each other what made their spot beautiful.
4. Have the children close their eyes, and imagine that someone threw a soda can in their spot. Then another person came along and tossed their lunch leftovers into the special spot. Someone else threw a cigarette butt down. (Try to give them a visual image of all the trash you can think of...candy wrappers, tin cans, scraps of metal and plastic, chewing gum, etc.) Pretty soon their special spot is piled high with trash. Does that place still have any value to them? Would they want to go back there if they were asked to do this activity again?
5. Have the children open their eyes again. Now, they can think back to the way the spot was before people littered in it. They can remember the three things that were the reason they thought the spot was beautiful.

6. Pass out paper and pencils. Explain to the Junior Rangers that they will each write a "Long-Skinny" about their special place. A "Long-Skinny" is a special kind of poem. Each line can only have two words. They can write as many lines as they have time for, creating a long and skinny poem. They can even make the poem curve and twist if they'd like. To make the poem beautiful, they should write about their spot just as they saw it, in its natural state. They can think about the three things they observed to get them started.
7. If time permits, have the Junior Rangers share their poems with each other (only if they want to). You can share your "Long-Skinny," too.

Treecycle Charades

Number of Children: One or more
Environment: Open space
Equipment: None
Purpose of Activity: To give children a sense of how natural recycling works
Activity:

1. Ask Junior Rangers if they think that nature knows how to recycle. Can they think of any examples?
2. The Junior Rangers can now act out the cycle of a tree. The first time through, they can follow your lead. The second time, you can do it all together.
3. What does a tree look like when it's really small, before it has even begun to grow? It's a seed!
   Crouch down into a ball; become as tiny as possible.

4. Then it gets a little rain, a little sun, and some soil. What does it look like now?
   Children can slowly, slowly stand up and begin to stretch out their arms.
5. It keeps getting bigger, let's see those branches!
   Children can stretch as high as they can reach, fingers spread as far apart as possible.
6. Now we're full-grown trees. What happens if there's a big storm, with wind and rain? What happens if we're hit by lightning? Or if a forest fire comes rushing at us?
   Arms begin to drop, heads start to droop.
7. And finally we die!
   Children can "crash" onto the ground and spread themselves out into a "log."
8. Now we're just a dead log, lying on the ground. Do you think people should take us away? No! We're still going. Now we begin to decompose. Tiny insects, bacteria, and fungi come invade us, breaking down the material inside of us.
   Leader can now walk around the children on the ground, crawling his/her fingers over their backs and heads.
9. And finally, after a long time, we turn into rich new soil—soil that new seeds can grow in!
   Once again, children crouch down as small as they can, like little seeds.
10. Congratulations! What an amazing "tree-cycle!"

Background Information: Recycling

The Three "R"s

Knowing the three "R"s is the first step toward solving the garbage and trash problem in our parks and worldwide:

Reduce—to minimize our waste by buying fewer things (or using fewer things) that have to be thrown away. We would cut down on a lot of trash by simply being careful consumers. If we think about what kinds of things we can reuse or recycle before we buy them, we won't purchase as many things that will eventually turn into waste.

Reuse—to adapt something for another purpose. Reusing includes giving things away to friends or selling things at a garage sale.

Recycle—to turn what we call "trash" into useful, new products. These are things that may or may not be able to be reused in their original state, but are made of materials that can be used over again.

RECYCLABLE	WHAT *CAN* BE RECYCLED	WHAT *CANNOT* BE RECYCLED	THE NEW PRODUCT
GLASS	Jars and bottles with plastic or paper labels on.	Lids, mirrors, vases, drinking glasses, windows, and lightbulbs.	New jars and bottles
ALUMINUM	Cans, pie pans, and aluminum foil.	Most everything *can* be recycled.	More cans
STEEL	"Tin" cans, cans that a magnet attracts.	Most everything *can* be recycled.	More tin cans
NEWSPAPER	Newsprint and advertisements that come with the paper.	Most everything *can* be recycled.	Newsprint to make more newspapers.
PHONE BOOKS	Old telephone books.	Most everything *can* be recycled.	Groundwood to make tiles, bookcovers, and home insulation.
CORRUGATED CARDBOARD	Boxes made of corrugated cardboard and sometimes brown bags.	Cracker, cereal, or shoeboxes (not with the corrugated cardboard at least.)	More boxes.
WHITE PAPER	Notebook paper, white stationery and envelopes, and index cards.	Unbleached paper, stickers, plastic, paper clips.	More white paper.
MISC. PAPER	Cereal boxes, shoeboxes, toilet paper rolls, junk mail, and wrapping paper.	Tissues, paper towels, paper plates and cups, wax paper.	Cereal boxes, cracker boxes, and shoeboxes.

Where Does Our Trash Go?

There really isn't anyplace that's "away" when it comes to our trash. Most of it is taken to landfills. Modern landfills are big holes in the ground that are lined with plastic or clay that keeps the garbage from coming into contact with the soil. The trash is compacted with a bulldozer and put in the holes, the holes are covered with dirt, and oftentimes grass is planted on top...the landfill may even become a public park. There are about 5,200 landfills in the U.S. today; unfortunately, these modern-day dumps aren't the ideal solution to the garbage dilemma. First of all, we don't have enough space to accommodate all of our trash. Many of the landfills are already full, and the others are filling up fast. In fact, if no one in California recycled, all of the landfills in our state would be full within a year!

The area that landfills occupy takes away from the amount of space we have for schools, parks, or protected wilderness areas. Even if space weren't an issue, not many people want to live near a landfill. Sanitation, while it has improved significantly, continues to be a worry as well. When rain falls on a heap of trash, the mixture of water and decomposing garbage forms *leachate*, a toxic, soup-like substance. The leachate is a health hazard if it seeps into the ground water that we drink.

About one-tenth of Americans' trash goes to an incinerator to be burned. Unfortunately, incinerators are expensive. Also, they certainly don't make trash just disappear. At least one-third of what is burned remains as ashes. These ashes have to be disposed of somewhere, and once again end up in landfills. The rest of the burned trash is a source of air pollution.

Some of our trash is being washed through storm drains into streams, rivers and the ocean. The National Academy of Sciences estimates that 6.4 million tons of litter enters the world's oceans each year. Sixty to 80 percent of this marine debris is plastic materials. Made of synthetic materials, much of this debris does not degrade quickly and presents a major health hazard to marine life and even to humans.

Some people have even suggested shooting our trash out into space; but, aside from the expense, that means merely displacing the refuse that we've made. Minimizing our trash by reusing and recycling seems to be the best solution to the garbage problem thus far.

Reasons for Recycling

Besides minimizing our trash problem, recycling also saves our natural resources, prevents pollution, saves energy, and helps communities.

Recycling saves both renewable and nonrenewable resources. Renewable resources are those that can be replaced by natural or human processes. Plants and animals,

forests, and water are all renewable resources, and yet require careful management to ensure their usefulness. Human interference often depletes these assets to the point where they are unable to replenish themselves. For instance, the number one cause of species extinction is habitat destruction by human beings. We can overgraze grasslands and meadows until they can no longer sustain themselves. We can pump groundwater out faster than precipitation can replenish the supply. The optimum rate at which a resource can be used without diminishing its long term availability or obstructing its ability to renew itself is called the sustainable yield. Also included in the category of renewable resources are sunlight, wind, geothermal heat, tides, and flowing water. More specifically, these are referred to as "perpetual resources" because they last forever in the context of the human time frame. Non-renewable resources include minerals such as iron, copper, phosphates, and bauxite, as well as fossil fuels like coal, oil, and natural gas. (For more on fossil fuels, see "Energy: Information.")

We get items that we use every day from natural resources; when we recycle, we take less raw material from the earth. The animal habitats we destroy when we drill into the earth's crust, clear-cut a forested area, or dump our trash into a natural environment won't be lost when we reuse the materials we've already used. Recycling also creates less pollution, which in turn protects plants and animals. Of course, any manufacturing of new products makes some pollution, but using virgin materials to make new goods creates the most. For instance, manufacturing soda cans from recycled materials creates 95 percent less pollution than the production of those made from new aluminum. And for every two pounds of paper we recycle, we prevent seven gallons of water from being treated with chemicals.

Recycling can save us energy in two different ways. First, we save energy because we don't have to obtain as many materials from the earth. We don't expend energy digging, drilling, clearing, and cutting. Aluminum, for instance, is difficult to obtain from the ground. It is most abundantly found in the mineral bauxite, but for every ton of alumina ore in bauxite, there is an equal amount of leftover material called red mud. The red mud has not yet been classified as a hazardous waste, but has the potential to contaminate water supplies. People have yet to find an effective way to use this refuse. Second, we save the energy it takes to convert these raw materials into products in factories. Recycled materials are made into new products more easily and more efficiently than raw materials.

Recycling is also a good way for communities to save money. Making and running landfills is costly, as is paying people to pick up trash. Communities could be putting this money toward schools, parks, and other worthwhile uses.

Some Recyclables

Glass
Glass can be recycled over and over again. Recycling just one bottle saves enough energy to light a hundred-watt bulb for four hours And for every ton of glass recycled, we save a ton of raw materials needed to make glass from scratch. New glass is made when sand, soda, feldspar, and limestone are mixed together and heated in a furnace. Glass can also be made by just melting down old glass. However, since old glass melts at a lower temperature, it saves heat energy.

Jars and bottles can be recycled together. Plastic or paper labels can be on, but lids should be removed. Dirt and sand should be washed out carefully. Recycling centers differ and some request that glass be sorted by color (clear, brown, or green). Mirrors, vases, drinking glasses, windows, and light bulbs can't be recycled.

Aluminum
Recycled aluminum is melted like glass, and made into large aluminum sheets. In addition to aluminum soda and beer cans, pie pans and aluminum foil can also be recycled. Some recycling centers require separating this "other" aluminum from the cans. Some also ask that cans not be crushed.

Steel
Not all recycling centers take steel cans (or what we usually call "tin cans"), but if they do, these cans are easy to recycle. As with glass, labels can usually be left on. Magnetism is a good way to distinguish between aluminum and steel. If the magnet sticks to the can, then it's steel.

Paper
Recycling paper can be a little more challenging. As far as recycling goes, paper comes in five categories: newspaper, phone books, corrugated cardboard, white paper, and mixed paper.

1. Newspaper—Americans throw away more than two-thirds of their newspapers, or 500,000 trees' worth every week. Newsprint can be recycled and used for newspapers again. Nearly all recycling centers take newspaper. Some require that it be tied in stacks.

2. Phone books—Unlike newspaper, phone books are made with a very thin kind of paper called groundwood which isn't strong enough to be remade into paper. It can, however, still be recycled. Instead of becoming paper, recycled groundwood is used to make book covers, tiles, and home insulation. Some recycling centers will take phone books with miscellaneous paper; if not, sometimes the phone company will take old books.

3. Corrugated cardboard—This cardboard must be separated from cereal or shoe boxes. Some recycling centers will take brown bags with corrugated cardboard since they're made of the same kind of paper.

4. White paper—This includes notebook paper, writing paper, white stationery and envelopes, computer paper, and index cards. White paper is especially important to recycle for two reasons. First, it's made with tightly woven fibers that make it stronger than most other paper so that when it's recycled it can still be made into high-quality paper. Also, white paper is already bleached. When it is recycled, it doesn't need to be bleached like other paper and saves added chemicals and water pollution. Stickers, plastic, and paper clips attached to white paper must be removed before recycling, but staples don't need to be undone.

5. Mixed paper—This includes paper egg cartons, shoe boxes, cracker and cereal boxes, toilet paper and paper towel rolls, junk mail, wrapping paper, and envelopes. Papers that can't be recycled include tissues, paper towels, paper plates and cups, and wax paper. Not all recycling centers take miscellaneous paper.

Plastic

A great deal of recyclable plastic is made from a product called polyethylene terepthalate. Commonly this category of recyclables is referred to as "PET" or "PETE." PET bottles include plastic soda bottles, some detergent bottles, plastic peanut butter jars, and many other containers. If a product has a recyclable symbol with a #1 in the middle, then the plastic is PET. In fact, all six kinds of plastic are marked with numbers. (See the next page to learn which number corresponds to the different types of plastic.) PET, when recycled, is used to make park benches, carpets, pillows, paintbrushes, and clothing (polyester is made from PET). Plastic caps must be taken off the bottles before they can be recycled.

High-density polyethylene or HDPE is another kind of plastic that is used to make milk jugs, butter tubs, and other containers. (HDPE is symbolized by a #2 inside the recycling symbol. See the following page.) HDPE is recycled by melting down the plastic into tiny flakes, which are cleaned and then sold to plastic companies. They are then melted again and shaped to make new products. An old milk container may turn into a flower pot, plastic pail, or any number of recycled plastic goods. Plastic lids and rings must be taken off HDPE milk containers before the container is recycled.

For information on other kinds of recyclable plastic, see the chart below.

1	# 1 PET Polyethylene Terephthalate	Plastic soda bottles, plastic peanut butter jars, and other containers made of plastic.
2	#2 HDPE High-Density Polyethylene	Milk jugs and some other containers.
3	#3 PVC Polyvinyl Chloride	Garden hoses, credit cards, polyvinyl shower curtains, some plastic bottles.
4	#4 LDPE Low-Density Polyethylene	Clear plastic used to cover CDs or tapes, sandwich bags, and plastic grocery bags.
5	#5 Polypropylene	Plastic lids, bottle caps, straws. Usually these items cannot be recycled.
6	#6 Polystyrene	Styrofoam and clear hard plastic food containers.
7	Mixed Plastic	Try not to buy this kind. Most places do not recycle it.

Nature's Recycling

Unlike our trash, nature's "litter" doesn't do any harm. In fact, reusing and recycling is absolutely essential for the maintenance of individual ecosystems and a healthy world environment in general. Nature recycles every minute of every day, through a process called decomposition.

When plants and animals die, this organic matter is broken down by organisms called decomposers. Most decomposers are in the fungi, bacteria, or protozoa kingdoms, but many animals also contribute to breaking down dead matter. Bacteria dominate fungi in agricultural and grassland environments, whereas fungi outdo bacteria in forest biomes. It is because of these decomposers that the "litter" on the forest floor doesn't keep piling up. As dead matter is broken down, nutrients are added to the soil, making it richer and allowing plants to grow and thrive. The decomposers, then, act as the last link in a food web, and allow a new food web to begin. The following provides some examples of organisms you may find in a "soil food web":

The Soil Food Web

Tertiary Consumers

Centipedes Rove beetles Ants/Mites

Secondary Consumers

Springtails Mites Nematodes Protozoa Rotifers Flatworms

Primary Consumers

Bacteria Fungi Nematodes Mites Snails/Slugs
Earthworms Sowbugs Millipedes

Organic Residues

Leaves/Plant debris Food scraps Fecal matter Animal bodies

Most decomposers are microscopic. Bacteria are probably the most important. Their numbers are astounding. In fact, human beings do not know enough about bacteria to estimate the number of bacteria species to an order of magnitude. Twenty-five thousand bacteria can fit end-to-end in one inch, and a pinch of soil the size of a pea holds one billion. Bacteria are the most nutritionally diverse of all organisms; they can eat almost anything, making them fantastic decomposers. They also survive in all kinds of environments…everywhere on earth. The Monera (bacteria) kingdom is the only one whose members are prokaryotes, meaning their cells lack a membrane-enclosed nucleus.

Fungi take over the decomposition process that bacteria have begun. Like bacteria, fungi are neither animals nor plants, but are classified in a kingdom of their own. Unlike plants, they cannot make their own food. Most obtain their energy by breaking down dead organic material.

Earthworms contribute to decomposition by aerating the soil, as do small mammals such as gophers and moles. Millipedes, centipedes, and beetles all contribute by feeding on forest litter. Termites help in the disintegration of wood. Mites are tiny arthropods that attack dead vegetation and fungal strands.

The "water wheel" is another example of how nature recycles. Snow and rainwater drain into rivers, which carry water to lakes and eventually the ocean. Water evaporates from ocean and lake surfaces, then condenses in the sky to become clouds. The sun provides the energy needed for evaporation. Snow and rain again fall onto the earth, and the water cycle begins anew.

The carbon cycle and nitrogen cycle are both examples of how nature recycles crucial elements. These elements are used in various ways as they cycle through the environment.

Suggested Resources: Recycling

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Other Sources of Information

California Integrated Waste Management Board. www.ciwmb.ca.gov.

California Department of Conservation, Division of Recycling. www.consrv.ca.gov/DOR/index.htm.

INSERT *SAFETY* TAB HERE