Introduction

To Educators

Is it your turn to take out the trash? Pile your trash with all the food scraps, paper, old chairs, pop bottles and other solid waste thrown away in Wisconsin every year, and you get 6.5 million tons of stuff. Why are we making all this trash, and where does it end up?

This study guide is intended to help you and your students understand what solid waste is, where it comes from, why it's a problem and what can be done about it. The guide includes an overview of solid waste and recycling, a glossary, suggested activities and a list of resource publications, audio-visual materials and organizations. It is designed to stand alone, yet complements the Wisconsin Department of Natural Resources (DNR) free publication, Special Recycling Edition (see Resources).

You are encouraged to use the information and activities in this guide and the Special Recycling Edition with your students in all disciplines. The Department of Public Instruction's Guide to Curriculum Planning in Environmental Education has suggestions for infusing subjects like solid waste and recycling into your social studies, art, English/language arts, health, mathematics, science, environmental education and other classes. You also may want to consult other resources listed in this guide and check newspapers and magazines for current articles that address solid waste and recycling issues. Many excellent curriculum materials exist and we hope that you will send for and use them.

Consider talking with your students about solid waste and recycling before beginning your lessons to learn what they already know and think about it. Why is trash collected? Where is their trash taken? Have they ever visited a landfill? What did people do before there were plastic bags or aluminum cans or trash removal services? Do people in other countries make as much trash as Americans do? By finding out your students' thoughts and opinions, you can help them connect new concepts with what they already know.

The activities in this guide are designed for use in grades 4-12. With modifications, they should be useful in other grade levels. We encourage you to tailor the activities to meet your students' needs. You are welcome to revise and/or reproduce any part of this guide for distribution to students and other educators.

NOTE:
- Words that appear in italics are defined in the glossary.
- Sections marked with * are based on materials from the A-Way With Waste curriculum guide, a program of the Washington State Department of Ecology (see Resources).
The purpose of Department of Natural Resources study guides is to help increase Wisconsin citizens' knowledge about and understanding of our state's environment. We hope to provide information about important environmental issues, encourage respect for the environment and help citizens become active stewards of our natural resources.

Credits and Acknowledgements
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Production of this study guide was partially funded by individual contributions from Wisconsin educators. If you would like to make a donation, please make your check payable to: Education Programs, Dept. of Natural Resources, and mail to the address below. Thank you.

Your comments and suggestions about this study guide are welcome. Address your comments to:

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Sizing Up Solid Waste

Every day we throw out everything from toothpaste tubes to old TV sets, grass clippings to plastic milk jugs, jelly jars to paper. You may not personally stuff 7.5 pounds of solid waste into the trash bag every day, but if you add up all the waste from your house, classroom and school cafeteria, from the restaurant where you eat, from the factories that made your clothes or paper, from the utility that generated your electricity and from the stores where you shopped, it amounts to about 7.5 pounds a day per person. Multiply that by 365 days per year, then by 4.8 million Wisconsin citizens, and your results show that Wisconsin throws away more than 6.5 million tons of stuff each year!

But where is “away?” Is there such a place?

Six and one half million tons of waste is enough to pile a typical city street six-feet deep, curb to curb, for 500 miles — more than the distance from Superior to Chicago! Or if compressed, the way it is in landfills, that much waste would bury a 200-acre farm under 30 feet of trash each year. So...

<table>
<thead>
<tr>
<th>Wisconsin’s Annual Trash Tally</th>
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<tr>
<td>Total Waste</td>
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<td>Municipal Waste</td>
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<td>Food &amp; yard waste</td>
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<td>Glass bottles</td>
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<td>Metal cans</td>
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<td>Tires</td>
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<td>Motor oil</td>
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<td>Plastic containers</td>
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<tr>
<td>Other waste</td>
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<td>Non-municipal waste</td>
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Where Does It All End Up?

Most of Wisconsin’s solid waste ends up in the state’s 1,100 licensed landfills. A landfill is a place where waste is dumped, compacted and covered with dirt. Covering the trash controls blowing paper, odors, insects and rodents.

Of the 1,100 licensed landfills in Wisconsin, only 90 are sanitary landfills — designed, built and operated according to state-of-the-art problems to prevent pollution. These engineered or “approved” landfills are constructed only after the Wisconsin DNR approves the site and the operating plan. The DNR checks the site for soil type, potential for contaminating groundwater and surface water, proximity to buildings and future land use. It reviews plans for landfill construction, operation, leachate and gas control, closure and long-term care. Approved landfills must be maintained by the owner for 20-30 years after the site is closed. When the owner’s responsibility ends, the state takes over maintenance duties. The owner, however, remains liable for any damage that his landfill does to other people or property.

The remaining licensed landfills are unengineered or “nonapproved.” They were built before we realized the importance of strict environmental standards. Most of these facilities are scheduled to be closed by 1999. A closed landfill, however, can continue to affect the environment many years after it’s sealed up and forgotten. Owners of unapproved landfills must take care of them as long as they own the land and are liable for any resulting damage.

In addition to licensed, operating landfills, Wisconsin has more than 2,700 closed landfills. The same long-term liability and care described above for approved and nonapproved landfills apply to these closed landfills.

Unfortunately, waste sometimes is dumped along roadsides, on the “back forty” or in other nonapproved locations. Except for household wastes discarded on the homeowner’s property, it’s illegal to discard or incinerate garbage, trash, industrial waste, farm chemicals and other waste in places that aren’t approved by the state. Discarding waste in unsafe ways and in nonapproved places can endanger the environment upon which we depend. Thus, each of us becomes responsible for what we throw away and the impacts this waste may have on our environment.
So What's The Problem?

Water Pollution
What happens when rainwater or melting snow seep through buried trash? A liquid called leachate forms that can flow out of the landfill. Leachate contains concentrated contaminants that can be harmful, especially if they seep into surface water and groundwater supplies. Groundwater quality is a major concern, since two out of every three people in Wisconsin drink groundwater. The hazardous wastes in leachate come from many sources, including items we commonly throw out at home, like motor oil, paint, garden pesticides and household cleaners.

Land Use
In 1985, 14,000 acres of Wisconsin land — the equivalent of 70 typical Wisconsin farms — were being used for landfills. Some people question whether this is a wise use of our land. As we continue to make waste, the landfills are filling up, creating what has been called a "garbage crisis" in many states. The DNR estimates that most existing landfills in Wisconsin will be full within 10 years. In some areas, landfills will reach capacity even sooner. Thus, the need for developing new recycling systems and landfills in Wisconsin is increasing and urgent.

Economics
Wisconsin citizens pay $50-$75 million a year to construct and manage sanitary landfills. Collecting and transporting garbage to the landfills adds an estimated $150-$200 million more. Costs have risen rapidly in the past 5-10 years, primarily due to the expense of handling and burying wastes in ways that protect the environment.

The NIMBY Phenomenon
Finding places to put landfills isn’t easy. Few people are eager to live near a landfill, an attitude sometimes called the NIMBY phenomenon: “Not In My Back Yard!” Many people believe landfill construction and operation result in traffic, noise, dust, aesthetic loss, declining property values, groundwater contamination and other hazardous waste pollution. While fears often have been justified, modern landfill design, construction and management can minimize most of these problems.

Hazardous Gases
Methane gas can form in landfills as a result of decomposition of organic materials like grass clippings and food wastes. Methane is flammable and toxic, and can move through the soil into the air or into nearby basements. Recently, researchers have discovered that when some plastics and other human-made chemicals decompose, they liberate small amounts of even more hazardous gases, like vinyl chloride and hydrogen sulfide.
What Can You Do?

You can start by looking at what you throw away at home. Each person’s “drop in the bucket” adds to the trash problem. If each drop becomes smaller, the problem will be reduced.

Everyone produces some waste, but you don’t have to be a “super-consumer.” Think about the goods, services and activities you buy or support. In what ways do they contribute to the solid waste problem? How could you purchase and dispose of items in ways that generate less trash? What can you do to voice your opinion about solid waste issues in your community? For example, consider:

- buying goods in returnable and recyclable containers.
- learning where you can take items to be recycled and showing your support by recycling.
- composting food wastes, leaves and grass clippings.
- finding people in your town who are interested in reducing waste, promoting recycling, inventing new uses for old materials, fighting litter or encouraging local merchants to sell goods in returnable containers. How can they help you? How can you assist them?
- taking an active interest in how your solid waste management tax dollars are spent. Compare your community’s hauling and disposal costs with those of neighboring towns. Investigate the quality of your local landfill and measures being taken to make it as safe and long-lasting as possible.
- learning how nature recycles materials. Is much wasted?

Wisconsin’s solid waste management goal is to find the best political, economic, social and personal ways to reduce waste and keep our environment healthy. Our most creative solutions are those that imitate the natural systems that have successfully recycled waste products for millions of years.

Each of us contributes to the solid waste problem. Each of us can help solve it.

What Else Can We Do With The Trash?

Wisconsin already reuses, recycles, composts or recovers energy from more than 20 million tons of waste each year. This reduces the need for landfill space, saves the cost of disposal and uses valuable natural resources. Under state law (SS 144.792), Wisconsin has adopted policies to encourage waste reduction and recovery as alternatives to landfilling. The law requires that Wisconsin (in order of priority):

1. **Reduce** the quantity of waste produced. For example, packaging can be designed to use less material, to be recyclable and to contain fewer hazardous chemicals. We can encourage redesign of packaging by selective shopping and by expressing our views about packaging to retailers, industry and government.

2. **Reuse** items. Soda bottles, old furniture, clothes, tires, appliances and automobiles or their parts, industrial shipping containers (barrels, pallets, cardboard boxes) and many more items can be reused.

3. **Recycle**. Recycled newspaper can be made into newsprint, paper bags, cellulose insulation, egg cartons, animal bedding or cardboard. A state beverage container deposit law (sometimes called a bottle bill) could provide us with the incentive to return beverage containers for a deposit. Glass and aluminum from beverage containers can be made into new containers. Cooking oils and

meat fats can be made into chemicals and cosmetics, coal ash into shingles and concrete and plastic bottles into artificial lumber and winter jackets. The DNR’s goal is to recycle at least 10% of the waste now landfilled.

4. **Compost** organic wastes. Gardeners know both the ease and the value of composting food and yard wastes to create rich humus that improves soil fertility and texture. Some businesses also can compost their organic wastes. For example, cheese whey, organic sludges from paper mills and sewage treatment plants and remains from cleaning fish can be composted. The DNR’s goal is to compost 10% of the municipal waste now landfilled.

5. **Recover** energy from waste. Each ton of solid waste has the energy equivalent of 70 gallons of gasoline — enough energy to drive a small car from coast to coast. Wisconsin’s goal is to recover energy from 55% of the state’s municipal waste.

6. **Landfill** nonrecoverable items. We may always need landfills, but Wisconsin is working to reduce this need. Using the techniques described above, Wisconsin aims to cut the need for landfills in half by 1990. The long-term goal is a 75% reduction.

None of these options is the sole solution to our waste disposal problem. Each option has side effects that must be considered when we’re selecting the best solution to each solid waste problem.
biodegradable: the property of a substance that permits it to be broken down by microorganisms into simple, stable compounds such as carbon dioxide and water. (See “decompose.”)

bottle bill: a law requiring deposits on beverage containers, like aluminum cans and plastic bottles. Encourages recycling and discourages littering and landfilling. More accurately called a beverage container deposit law.

composting: waste management process that creates an optimal environment for decomposition by layering organic wastes like food scraps and grass clippings so they’ll decay into fertile humus.

conserve: to protect from loss or depletion. Conservation is the wise use of natural resources to minimize loss and waste.

decompose: to break down into component parts or basic elements; to rot. Decomposition is imperative for the continuation of life since it makes essential nutrients available for use by plants and animals.

dump: open, unsanitary disposal site used before existence of licensed, controlled burial sanitary landfills. Now illegal in Wisconsin.

energy recovery: the generation of energy by burning solid waste.

garbage: spoiled or waste food that is thrown away. Generally defined as wet food waste; excludes dry material (trash). The term is often used interchangeably with the word “trash.”

groundwater: water beneath the earth’s surface that fills the spaces and moves between soil particles and rock. Supplies wells and springs. Two out of every three Wisconsin citizens drink groundwater.

hazardous waste: waste that causes special problems for living organisms or the environment because it is poisonous, explosive, burns or dissolves flesh or metal, ignites easily with or without a flame or carries disease. Some hazardous wastes cause only one problem, others cause several.

humus: organic material consisting of decayed vegetable matter that provides nutrients for plants and increases the ability of the soil to retain water.

landfill: a site for the controlled burial of solid waste.

leachate: liquid that has percolated through solid waste and/or been generated by solid waste decomposition and contains extracted, dissolved or suspended materials. May contaminate groundwater or surface water.

litter: waste materials discarded in an inappropriate place. Littering is illegal in Wisconsin.

methane: a colorless, odorless, flammable, potentially dangerous gaseous hydrocarbon (CH₄) present in natural gas and formed by the decomposition of organic matter. Can be used as a fuel.

natural resource: valuable, naturally occurring material such as soil, wood, air, water or minerals.

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

organic: derived from living organisms.

pollution: harmful substances deposited in the environment, leading to a state of dirtiness, impurity or unhealthiness.

raw material: unprocessed natural resource or product used in manufacturing.

recovery: see “energy recovery.”

recycle: the collection and reprocessing of manufactured materials for reuse either in the same form or as part of a different product.

renewable resource: a natural resource derived from an endless or cyclical source (e.g., sun, wind, water, wood, fish). 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 disposing of solid waste on land. Constructed in a way that reduces hazards to health and safety.

solid waste: all solid and semi-solid wastes, including trash, garbage, yard waste, ashes, industrial waste, swill, demolition and construction waste and household discards such as appliances, furniture and equipment.

solid waste management: the controlling, handling and disposal of all solid waste. One goal of solid waste management is to reduce waste to a minimum.

trash: material considered worthless, unnecessary or offensive that is usually thrown away. Generally defined as dry waste material; excludes food waste (garbage) and ashes. The term is often used interchangeably with the word “garbage.”
Activities

Out of Sight, Out of Mind

Part 1 — My Ton of Trash

Goal: To help students visualize how much waste is generated for each person in Wisconsin and understand how the number of people living in our state and country affects this amount.

Subjects: Mathematics, social studies, science, environmental education, health.

Grades: 6-12

Materials:
- 7.5 pound bag of miscellaneous trash (wash containers, avoid items with sharp edges)

Procedure:
1. Describe trash and list some examples. Discuss:
   - What qualities does an item have that makes you decide it's trash?
   - What different kinds of trash are there?
2. Dump the 7.5 pound bag of trash on the floor. Discuss:
   - Does this seem like a lot of trash? This much trash is thrown out each day for every person in Wisconsin.
   - How do you think the number "7.5 pounds" was calculated? Who figured out this number? Will the number ever change? Why?
   - How do you feel about the fact that you're responsible for 7.5 pounds of trash that is thrown out each day?
3. Calculate:
   - If you generate 7.5 pounds of trash each day, how many pounds do you make every week, month and year?
   - Convert these numbers from pounds into tons. How many tons of trash do you make every week, month and year?
   - To help you visualize how much a ton weighs, add the weights of students in the class until you reach one ton. How many students does it take to make a ton? How many "students-worth" of trash do you make every week, month and year?
   - How many people are in your family? If 7.5 pounds of trash is generated each day for every person, how many pounds or tons of trash does your family make every week, month and year?
   - How many people live in Wisconsin? How many pounds or tons of trash is generated each day in Wisconsin?
   - Discuss:
     - What happens to all the trash you throw away?
     - Where is "away"? Is there such a place?
     - What do you think happens to waste at the landfill? (See activity: Where Has All the Garbage Gone?)
   - What are possible problems with piling waste in landfills?
   - What would you do with your family's trash if there was no truck that came to take it away? How might this affect the amount of trash your family makes?
4. Research the rate of human population growth in Wisconsin and the U.S. since 1650. Discuss:
   - What relationship might there be between an increasing human population and the amount of solid waste generated?
   - How might the amount of solid waste generated be influenced by changes in lifestyles since 1650? (See activity: How Times Have Changed.)
   - How might the amount of solid waste generated be influenced by family income?
   - How have increases in numbers of people and amounts of solid waste affected the environment?
   - What are the predictions for future human population growth?
   - What predictions might you make for the amounts of solid waste we'll produce in the future?
   - What impacts might an increasing population have on our use of natural resources?
5. Calculate:
   - If every person in Wisconsin threw away one less pound of trash per day, how much less trash would end up in our state's landfills?
   - Discuss:
     - What could you do to reduce the amount of waste you make?

Pre- and Post-Activity Questions:
- How many pounds of trash do you think are thrown out each day for every person in Wisconsin?
- What relationship, if any, is there between the number of people and the amount of trash?
Goal: To have students calculate the amount and types of trash thrown out by their class at school and investigate where it's taken.

Subjects: Mathematics, social studies, science, environmental education, health.

Grades: 7-12

Materials:

- trash generated by your class on a typical day (save for use with Part 3)

Note to Teacher: Students will need to be familiar with the concepts of weight, volume and number in order to do the following activity and understand its implications. Consider using this activity as part of a mathematics lesson that addresses these concepts.

Procedure:

1. List the items you throw in the classroom and lunchroom wastebaskets on a typical day. Now categorize them according to what material they're made of (e.g., food, paper, plastic, aluminum, glass). Predict what four types of materials make up the greatest portion of the waste by: weight, volume, number of items. Record your predictions.

2. Collect and save the trash your class generates (in the classroom, artroom, shop, lunchroom, etc.) on a typical day (wash jars and cans, place food trash in a sealed container). You can save trash for more than one day, if you wish. This will enable you to calculate the average amount generated by your class each day.

3. Dump the trash on the floor. Sort items into piles according to the type of material of which the items are made.

4. Count the number of different items of each type (e.g., 47 pieces of paper, 3 aluminum soda cans, 8 juice boxes, 11 plastic bags, 1 broken pencil). What types of items comprise most of the trash by number? Draw a bar graph to illustrate this. Place the trash types in separate bags.

5. Select the four types of items you estimate make up most of the trash by weight. Use one of the following methods to determine the exact or approximate weight of each type:
   a) If you have a grocery scale in your classroom, weigh the items.
   b) If you have a bathroom scale:
      - Stand on the scale. example: What is your weight? ... 100 lbs.
      - Pick up a bag.
      - Now what is your weight? ... 102 lbs.
      - How much does the bag weigh? ... 2 lbs.
   c) If you don't have a scale, find objects in the classroom that are of a known weight. Compare the weights of your object and the trash (use a balance if you have one). Estimate the weight of the trash.

6. Calculate the volume of each bag by measuring the width, length and depth of items in it. How might volume differ if the glass, cans or boxes are crushed? Does weight change if volume changes?

7. How do your calculations compare with the predictions you made in step 1?

8. How much trash does your class throw out in a day, week, month and school year by weight, volume and number? Calculate the average amount each student throws out in one day.

9. How much space will one school year's-worth of your class's garbage fill if the garbage is not compressed? Calculate the volume of your classroom. If you didn't remove any of your class's trash from the classroom, how much of the room would be filled with trash by the end of the year? How much room would be left for you?

10. If the number of students in your class is average for your school, calculate how much trash your school generates each school year. Discuss:
    - Do you think your class makes a lot of trash? Not so much? Explain reasons for your response.
    - When the trash from each class in your school is added together, do you end up with a lot of trash? Explain reasons for your response.

11. Investigate where your school’s trash is taken. (See activity: Where Has All the Garbage Gone?)

Pre- and Post-Activity Questions:

- How much trash do you think your class throws away each day?
- What types of trash do you think your class throws away on a typical day?
- What happens to your school’s trash?
Part 3 — Trash or Treasure?

Goal: To have students find out why, how and where they should recycle or reuse what they typically throw away.

Subjects: Science, social studies, language arts, environmental education, home economics, marketing.

Grades: 4-12

Materials:
• same as Part 2

Procedure:
1. Is there anything else you can do with what you throw away? List your ideas. Most of them will fit into one of the following four categories: reuse, recycle, recover energy, landfill. Write these four categories on the board. What trash items might fit best into each category? List them under the proper category heading.

2. Do a) and/or b), then answer the discussion questions:
a) To the teacher: Give each student a copy of the following checklist to fill out, or put the list on the board and work through it as a group. For younger students, you may want to use pictures of the items listed below. Feel free to add your own items.

Directions:
Put an X next to items you threw in the wastebasket this week.

- paper bag
- newspaper
- book
- magazine
- paper milk carton
- other paper
- napkin
- aluminum can
- apple core
- old clothes
- plastic milk carton
- tin can
- glass jar
- gum wrapper
- orange peel
- plastic bag
- broken toy
- grass clippings
- other

Now circle all the items you think could have been reused or recycled.

Discuss:
• What items did you circle?
• How could you have reused items?
• Did you wonder whether the napkin was paper or cloth? What difference might this make?
• What could you have done with the recyclable items?
• What could you have done with apple cores and orange peels?
• Which items are difficult to reuse or recycle? Why?
• Should we as a society be making products that aren’t reusable or recyclable?
• Should items that are wrapped in difficult-to-dispose-of packaging cost more?
• Did any of your classmates reuse or recycle any of the items you circled?
• How did they reuse or recycle the items?
• Was reusing or recycling them easy to do? Why or why not?
• What do you think happens to the items you didn’t circle?

b) Sort the items that your class threw out in one day (see Part 2) into the following categories: reusable, recyclable, other. Discuss:
• Why did you place each item in the category you chose?
• Does your class recycle any of the items?
• Should your class recycle them? Why?
• Are there items your class could recycle but doesn’t? Why doesn’t your class recycle them?
• Are there places in the school aside from the classroom where you discard trash during the day? Think about how much food and how many food wrappers, cans and bottles you discard at lunch, how many paper towels you use to dry your hands, etc.
• What happens to the items that aren’t reusable or recyclable?

3. Investigate where in your community you can take items to be reused or recycled.
• How can you find out about local recycling programs? (Contact: local natural resources and environmental protection agencies, glass manufacturers, recycling businesses, municipal public works departments, used furniture and clothing stores and environmental organizations.)
• Make a list with the following information about the businesses or organizations that recycle: name, address, telephone number, materials recycled, hours of operation, whether the organization will pay you for materials, any other useful information. This information is available in: Wisconsin’s Community Recycling Collection Programs Directory and Markets for Wisconsin’s Recycled Materials (see Resources).

4. Investigate and discuss:
• What are some advantages of recycling? (Conserves natural resources, saves energy, protects the environment, can make money, creates jobs for people involved in recycling and reduces our dependence on imported materials.)
• What are some disadvantages of recycling? (May cost money, takes time, takes space for storage, takes away jobs from people who make new products and depends on recycling markets.) (See activity: The Cost of the Toss.)
• What are the pros and cons of energy recovery and landfilling?

5. Brainstorm the steps your class might take to design and implement a recycling project for your classroom or school. (See activity: Time for Action.) Select a project that is feasible. For example, collect and recycle paper from the school’s copy machine and classrooms. Who can you contact to help you with your project?

6. Consider doing your project!

Pre- and Post-Activity Questions:
• What is recycling? What are reuse, energy recovery and landfilling?
• What types of solid waste can be recycled, reused, recovered or landfilled?
• What can you do in your school to recycle solid waste?
Part 4 — Cutting Class Trash

Goal: To have students realize that reuse and recycling of materials aren’t the only or main solutions to the solid waste problem. A key step is to cut down on the use of materials that become solid waste.

Subjects: Home economics, social studies, mathematics, science, environmental education.

Grades: 5-12

Procedure:

1. In what ways can you reduce the amount of trash you throw out at school? Don’t forget to consider waste from the art room, shop, lunchroom, etc. Write your ideas on the blackboard and request that it not be erased for one week.

2. For one week, cut down on your use of paper, food packaging and other materials. Refer to the suggestions on the blackboard. Note: It isn’t fair to “cut down” by throwing things out in other trashcans in the school.

3. At the end of each day, calculate the amount of trash and list what individual items make up most of the trash. (See Part 2 for instructions.)

4. Compare your findings with the amounts calculated in Part 2.
   - Did you throw out less trash when you tried to cut down? How much less?
   - If your class cut down on use of materials for the school year, how much less trash (in pounds) would you send to the landfill?
   - Discuss:
     - How easy is it to cut down on how much you use?
     - Do you feel that it is worth doing? Why?
     - Will you continue to cut down on your use of materials, or is this class activity a one-shot deal?

Pre- and Post-Activity Questions:

- How can you reduce the amount of trash you generate in your class/school each day?

Going Beyond:

- Take home a copy of the checklist and questions from Part 3 and fill it out. Note to teacher: Include a cover letter to parents explaining that the class is studying solid waste and recycling, and that you would like them to help their children see what kind of solid waste is generated at home. Discuss:
  - What did you find out about what your family throws away?
  - How do you feel about your findings?
  - What ideas do you have for what you could do with the trash generated at home?
  - Trace the “afterlife” of one of the items on the checklist from Part 3. For example, what happens to the plastic bag or paper milk carton after it’s taken to the landfill? Does it decompose? Does its decomposition create harmful byproducts? What impacts might its decomposition have on air, soil, water and health?
  - Create a reusable item from something you’re going to throw away.

- Investigate what used materials organizations like the Salvation Army and Goodwill Industries need and what they do with the materials they receive.
- Discuss the role of yard sales, garage sales or tag sales in recycling and reusing materials.
- Investigate how the amounts and types of wastes generated by a bank, grocery store, clothing store and hospital differ. How does each business dispose of its waste? Do any recycle materials?
- Americans generate more trash per person and more trash in total than the people of any other country in the world. How do you feel about this?
- Research and report on waste disposal habits of other countries. How do they deal with solid waste? Why don’t they make as much trash as Americans?
Right in My Hometown

Part 1 — Natural Resources: Handle With Care

Goal: To have students examine their own use of renewable and nonrenewable natural resources, determine which are essential for their survival and suggest ways they might change their lifestyles to make more careful use of natural resources.

Subjects: Language arts, science, social studies, environmental education, industrial education.

Grades: 6-12

Procedure:
1. What is a natural resource? List several examples.

2. Define the terms “renewable” and “nonrenewable” resource. (Some renewable resources are: solar energy, water, food and wood. Some nonrenewable resources are: petroleum, tin, bauxite, coal, copper and lead.)

3. Do a, b or c below:
a) List the products you used or consumed during a specific time period, e.g., between the time you got home from school yesterday and the time you went to bed; between the time you got up this morning and the time you left for school.
b) Describe a scenario or event and as a group, list what products were used.
c) Have the teacher select and read a story in which people use a variety of products. As a class, list what products were used.

Discuss:
• Which products are made of: renewable resources, nonrenewable resources?

4. Classify each product as: essential to survival, necessary for maintaining my present lifestyle, a luxury. Discuss:
  • What criteria did you use to define what is essential, is necessary for maintaining your present lifestyle or is a luxury?
  • Which, if any, items listed in the “essential” category are really not essential for survival? Explain your response.
  • Do you think your parents or grandparents would place the products in different categories? Why or why not?

5. After discussing the lists, suggest alternatives for each item, making an effort to replace items that you think are inefficient or wasteful with items that are less wasteful. Discuss:
  • Would using alternatives increase your use of renewable resources? (e.g., switching from aluminum foil to wax paper.)
  • Would using alternatives increase your use of nonrenewable resources? (e.g., switching from paper cups to most plastic cups.)
  • How might changes in the production and consumption of these products influence the economy and the environment?

6. Look at the list of items you listed as luxuries. Which items could you give up without a major change in your lifestyle?

7. Make a list, beginning with the easiest item to give up and ending with the most difficult. Could you give up the top three items on this list for a day, week or month? Try it. How do you feel?

8. Think of several ways to reuse or recycle items you decide you can’t give up.

9. Identify some of the economic, cultural and environmental impacts of any changes you make or recommend. Consider the implications if your entire family, school, community and country made such changes.

Pre- and Post-Activity Questions:
• Define and give examples of: natural resource, renewable resource, nonrenewable resource.
• List four items you use that aren’t essential for your survival. What impact does their production or disposal have on the environment? Would you be willing to give them up if you discovered that the impact is adverse?
Goal: To have students investigate the natural resources required to make a product that is manufactured in their community, determine whether the resources are renewable or nonrenewable and consider the impacts production has on the environment (locally and elsewhere).

Subjects: Social studies, science, health, language arts, environmental education.

Grades: 6-12

Procedure:
1. Select one product that's made in your community. For example, bicycles are made in Waterloo, batteries and bologna in Madison, pens in Janesville, soy sauce in Walworth, shoes in LaCrosse, computers in Chippewa Falls, tires in Eau Claire, ships in Sturgeon Bay, beer in Milwaukee, glass in Burlington and cheese and paper in many towns.

2. List or draw on the blackboard the production steps and all the raw materials required to make the product. Contact or visit the manufacturer if you need more information about the materials and process used to make the product. Discuss:
   • Are more raw materials required to make your product than you expected?
   • Where did the raw materials come from? Is the source in your town, state or country?
   • What amounts of these raw materials are available?
   • What happens to the environment when the raw materials are extracted from the earth or harvested? Does the process produce pollutants or destroy land or ecosystems? How might it affect people living in the area?
   • Were the raw materials changed (refined) before they got to your town?
   • Were there any by-products made from refining the raw materials? What happened to these by-products?
   • What impacts does each step in the manufacturing process have on the environment?

3. Categorize the product as: essential to survival, necessary for maintaining my present lifestyle, a luxury. Discuss:
   • What criteria did you use to make your decision?
   • What impacts does use of the product have on the environment?

4. Describe what happens to the product after you use it. Discuss:
   • Can it be used up or will it wear out?
   • What will you do with it?
   • Will the product or its parts decompose if buried in a landfill?
   • What effects does disposing of this product have on the environment?
   • Can it be safely burned to produce energy? Does burning it release harmful chemicals?
   • Who pays for disposing of the product?
   • Who is responsible for disposing of it?

Going Beyond: Investigate answers to the following questions by checking books, articles and magazines, or writing to agencies or organizations for information.
   • What natural resources used by the U.S. come from other countries? How much of each resource is imported?
   • How does importing raw materials influence: U.S. and world economics, politics and security; the local and global environment; social systems and jobs in the U.S. and other countries?
   • What used, recyclable materials (e.g., newspaper, scrap metal) does the U.S. export to other countries? Why does the U.S. export these materials? Why do the other countries import these materials?
   • How long will known reserves of coal, wood, oil, iron, copper, water, bauxite, natural gas and zinc last if we continue to use them at present rates? Are any of these renewable resources? What might happen as we begin to use up these resources? (Investigate: offshore oil development; mineral exploration in Antarctica and world political implications; the coal economy of Kentucky and West Virginia; U.S. oil interests in the Middle East.)
Where Has All The Garbage Gone?

Part 1 — Making a Mini-Landfill *

Goal: To have students examine the materials that comprise the products they use, describe whether these materials are renewable or nonrenewable resources, observe what happens to materials when placed in a landfill and decide whether they should be disposed of in a different way.

Subjects: Science, social studies, environmental education.

Grades: 4-6

Materials:
- four large clear glass jars
- soil
- miscellaneous solid waste
- crayons
- masking tape

Procedure:
A) 1. Choose one item you threw away today. What is your item made of? Into which of the following four categories of solid waste does your item fit?
   a) organic (e.g., potato peels)
   b) renewable resource/recyclable (e.g., newspaper)
   c) nonrenewable resource/recyclable (e.g., aluminum cans)
   d) nonrenewable resource/hard to recycle (e.g., plastic toothpaste tube)

   2. What happens to the item you threw away? Discuss:
      • Where is away?
      • What is a landfill?
      • How might the material that a piece of trash is made of determine how you should dispose of it?

   3. List ways you can avoid disposing of your item in a landfill.

   4. If your goal is to save natural resources and reduce solid waste, from which category (a-d) would you buy products? Which category would you avoid?

   B) 1. With crayons and masking tape, label each glass jar with one of the four category headings above.

   2. Fill each jar about half full with soil.

   3. Sort each miscellaneous solid waste item into its proper category (a-d). Put a small sample of each into the jar with the corresponding label. Cover with soil and keep damp with water. Leave the lid off and place the jar on a shelf away from people and out of direct sun. Stir occasionally.

   4. Predict what you think will happen to the solid waste in each jar. Record your predictions.

   5. Observe and record what changes occur during a 2-3 week period, if any. Discuss:
      • What happened to the items made of organic and renewable resources?
      • What happened to the items made of nonrenewable resources?
      • How did what happened compare with your predictions?
      • What comparisons can you make between your mini-landfill and a real landfill?

   C) 1. Keep a record of your family’s purchases from two trips to the grocery store. Divide the items into the four solid waste categories listed above. Discuss:
      • What does your family do with the waste from its store purchases?
      • Is there anything else your family could do with this waste?
      • Could you substitute items from “d” with items from “a-c”? Is this a worthy goal? Why?
      • If your goal is to reduce solid waste, which items would you eliminate from your shopping list?

Pre- and Post-Activity Questions:
- Define and give examples of: organic material, renewable resource, nonrenewable resource.
- What do you think will happen to items made of renewable or nonrenewable resources when they’re dumped in a landfill?
- List four items you use everyday that you could recycle.
Part 2 — Follow That Garbage!

**Goal:** To have students see where their garbage goes and investigate their community’s solid waste disposal issues.

**Subjects:** Social studies, science, health, environmental education.

**Grades:** 4-12

**Procedure:**
1. **a)** Contact your municipal landfill and obtain permission for your class to visit it. Arrange for the site manager, owner or other resource person to guide your trip and be available to answer questions. A list of local waste disposal sites can be obtained by contacting your DNR district solid waste management specialist. (Be sure to follow all safety precautions while visiting the site.)
   
   **b)** If you’re unable to take a field trip, ask a guest speaker to come and discuss local solid waste management with your class. Resource people you might contact are: waste disposal site operators, private waste haulers, extension agents, environmental health officers, government officials, environmental organization representatives, DNR and local solid waste managers and public works personnel.

2. Before visiting the municipal landfill or having a guest speaker, develop a list of questions you would like answered. Investigate possible answers to your questions. Then send the questions to the guide or guest speaker in advance so they can prepare responses. Questions to consider include:
   - Where is the garbage from your school or home taken?
   - How does it get there?
   - Why was the landfill located on this site? What factors must be considered when a site is selected? What tests were done at the site before it was opened? What were the results?
   - What laws govern solid waste disposal in your community?
   - Is the landfill an engineered or unengineered site?
   - Who owns the landfill? When did it open? What was the cost of constructing it?
   - Who does the site serve? Who can bring wastes to the landfill?
   - What is the fee for using the landfill?
   - How much does your family pay for trash collection?
   - How much does it cost to take care of trash once it's in the landfill?
   - How much solid waste is disposed of at this site daily, weekly and yearly?
   - Who works at the site? Do they monitor what is dumped?
   - What happens to the trash once it’s dumped in the landfill?
   - Are any of the materials hazardous? Are there regulations or procedures for dealing with hazardous wastes?
   - What is the land adjacent to the landfill used for? Is the landfill a problem for nearby landowners? If so, in what ways?
   - How is the site managed for control of blowing trash, odors, noise, animals, erosion, surface runoff and leachate?
   - Are tests performed regularly at the site (groundwater, soil, methane gas)? What are the results?
   - Is there a resource recovery program at the site? If so, what is recovered? How?
   - What impacts does resource recovery have on the economy and environment?
   - How many years is the landfill expected to last? How much time does the community have to find a new site?

3. Now that you know more about landfills:
   - How do you feel about them?
   - Are they the best way to dispose of trash? What are possible alternatives?
   - What can you do to help reduce solid waste?

**Pre- and Post-Activity Questions:**
- Where is the trash you throw away taken?
- What eventually happens to your trash there?
- What is the difference between a dump and a sanitary landfill?

**Going Beyond: For older students...**
- If your community has a solid waste incinerator designed for energy recovery, visit it. What are the pros and cons of incineration?
- Investigate waste disposal techniques, problems and laws in other parts of Wisconsin, the U.S. (e.g., New Jersey, California) and the world. Consult individuals, books, newspapers, magazines and state agencies.
- Survey your parents’ knowledge and attitudes about solid waste.
- Conduct a hearing to decide where to locate a landfill in your community. Take on the roles of people involved in the decision: local landowners, politicians, industry representatives, environmentalists, waste managers and others.
- Landfills often have been developed in wetlands, although this is now illegal in Wisconsin. Consider the following questions:
  - Why were landfills often located in wetlands?
  - What problems might exist with placing landfills in wetlands?
  - Are wetlands an important ecosystem? Why?
Composting: A Great, Rotten Idea

Part 1 — Is It Rotten?

Background: When we mention "recycling," we often think of recycling glass bottles, aluminum cans and newspapers. But another 30% of the household garbage we throw out also can be recycled. These recyclables are food scraps, leaves, grass clippings and other biodegradable organic wastes.

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. The result of decomposition in a compost pile is a nutrient-rich humus that is excellent for improving soil quality and plant growth.

Goal: To have students investigate the pros and cons of composting.

Subjects: Science, health, environmental education, vocational agriculture, home economics.

Grades: 4-12

Materials:
- rotting log, grass clippings, leaves or food scraps

Procedure:
1. Define: recyclable, biodegradable. List items that are recyclable and/or biodegradable. Discuss:
   - Are there recyclable materials that aren't biodegradable? Are there biodegradable materials that aren't recyclable?

2. Feel, smell and look at the rotting log, grass clippings, leaves or food scraps. What words would you use to describe these materials? List these words. Do the words have positive and/or negative connotations? Why?

3. Explain what is happening to the rotting material. Discuss:
   - What is the natural process that breaks biodegradable material into particles that can be used again by plants and animals? (decomposition)
   - What organisms assist in this decomposition process? (fungi, bacteria, earthworms, springtails, mites, etc.)
   - What will your rotting material finally become? (humus)

4. Imagine a world where decomposition doesn't take place. Discuss:
   - What would happen to organic materials like dead animals, leaves or sewage?
   - Could plants and animals survive if decomposition doesn't occur? Why or why not?
   - Is decomposition important? Why?

5. Now think of words to describe rot or decomposition. List them. Do the words have positive and/or negative connotations? Why?

6. List items you throw away that are biodegradable. Discuss:
   - How might you and your family recycle these materials?
   - What is composting?
   - Why do you think people compost household organic wastes?

7. What are some benefits of composting household food and yard wastes? For example:
   - Doesn't require the purchase of expensive plastic bags often used for disposing of household and yard wastes.
   - Saves the cost of transporting wastes to and from the landfill. Wisconsin discards 2.4 million tons of compostable waste every year. It costs $50 per ton to collect wastes in urban areas and $15-$25 per ton to dispose of them. How much money do Wisconsin citizens spend each year disposing of their compostable wastes?
   - Saves space in the landfill. Wisconsin's landfills are filling up fast. Within 10 years, most will be filled to capacity. Thus, Wisconsin already has a serious problem — where will we put all our waste?
   - Reduces pollution from landfills.
   - Creates nutrient-rich humus you can use to fertilize and improve the texture of your yard and garden soil; saves money you might spend on mulch or fertilizer.

8. What are some possible problems with composting? What suggestions do you have for solving the problems? For example:
   - It's too much work. Mowing the lawn and washing the car are work, too, but we choose to do these activities because they're satisfying — so is composting! And composting has a positive impact on the environment, which can make us feel good.
   - You'd have to run outside everytime you eat an apple or peel a potato. Just place scraps into a plastic container with a lid. Keep the container in or under the kitchen sink, then take the waste to the compost pile whenever the container is full.
• It's easier to use the trashbag or garbage disposal. Once you make it into a routine, composting is easy, too. It can make you feel good about doing something positive for the environment by using instead of wasting the fertilizing potential of your garbage. Also, landfilled yard wastes and food scraps take up space and may release harmful methane gas. Food waste put down the garbage disposal ends up in the sewage system, where treating it can tax the system and costs money. If you can afford a garbage disposal, perhaps you can afford a “no work” composter. Easy-to-use, compact and attractive composting bins are available commercially. Contact your garden center or the DNR Bureau of Solid Waste Management for details.
• It might smell and attract rats. If you maintain your compost pile according to basic guidelines in publications like Home Composting: Reap a Heap of Benefits (see Resources), your pile shouldn’t smell or attract rats.
• The neighbors might not like it. If you locate, build and maintain your pile properly, it shouldn’t be offensive. Take the opportunity to explain what you’re doing to your neighbors and why you feel composting is important.

9. How would/do you compost your household wastes? Where can you find information to help you? Write or call for information.

Part 2 — Readin’, Rottin’ and Rithmetic: Classroom Composting

Goal: To have students learn about recycling in nature and actually recycle organic matter by composting.

Subjects: Science, health, environmental education, mathematics, home economics, vocational agriculture.

Grades: 4-12

Materials:
• fish aquarium
• organic waste materials (be sure to add a variety of materials, not all one kind, i.e., use sawdust, hair, wood ash and leaves in addition to food scraps; avoid meat scraps, fats and oils, which inhibit decomposition and in outdoor compost piles can attract dogs, rats, raccoons and other animals)
• lawn fertilizer that contains nitrogen (but not herbicides or insecticides); manure and green grass clippings also contain large amounts of nitrogen. A ratio of 25-30 parts carbon to 1 part nitrogen is ideal.
• soil
• 1-2 dozen red earthworms (obtain from yard, garden, school grounds or local bait shop)
• thermometer
• trowel or large kitchen spoon (for turning, or aerating, the pile)
(Note: Air circulation is important to decomposition, thus the best compost bin is one with wire or screen sides. Mass also is important, since approximately one cubic yard of compost is needed to generate good decomposition temperatures (104-170°F). Thus, an aquarium, with its small size and glass sides, isn’t the best compost container. Consider constructing an outdoor compost pile with wire sides on the school grounds. Composting instructions are available from: DNR Bur. of Information and Education.)

Procedure:
1. What “ingredients” do you think are needed to construct a compost pile? Why? List ingredients. For example:
• soil: contains microorganisms that help decomposition.
• organic wastes: such as leaves, food scraps and grass clippings. Wastes should be varied, including materials with both carbon and nitrogen. By alternating layers of high-carbon and high-nitrogen materials, you can create good environmental conditions for decomposition to occur.
• nitrogen: many of the organisms responsible for decomposition need nitrogen, thus nitrogen is necessary for rapid and thorough decomposition. Nitrogen is found naturally in many organic wastes, and in many commercial fertilizers.
• worms: they eat the waste, helping to break it down; make droppings, which enrich the soil; tunnel through and aerate the waste, facilitating decomposition; and eventually die and become part of the compost.
• water: necessary for normal functioning of life. Too much water in a compost pile may make it soggy and slow decomposition by reducing needed oxygen.
• air: the biological activity of fungi, bacteria, small insects and other organisms results in decomposition. Most biological processes require adequate amounts of oxygen.
• time: decomposition takes time. To speed up decomposition, aerate your pile every few days; otherwise, just leave it and wait.
• heat: heat is produced by chemical reactions resulting from increased
biological activity that occurs during decomposition. Heat helps sanitize compost by killing certain organisms (e.g., weed seeds, pathogens, harmful insect larvae).

- **mass**: In order to generate enough heat for optimal decomposition, the pile must contain at least one cubic meter of organic material. Thus, the temperatures generated in an aquarium compost pile may be different from those generated in one that is larger.

2. Design a plan for making a mini-compost pile in the classroom. Decide which ingredients students will provide and which will be supplied by the teacher. Set a date for constructing your pile.

3. Suggestions for creating a mini-compost pile:
   a) Chop the organic wastes into small pieces. You can leave some large pieces of the same materials to compare rates of decomposition between large and small items. Why might there be a difference?
   b) Alternate layers of the materials as follows (amounts are approximate): inch of soil, two inches of organic waste, sprinkle of fertilizer, sprinkle of water, repeat.
   c) Cover with an inch of soil. Water the pile enough to make it moist but not soggy. It should feel like a damp sponge (it feels moist, but you can’t squeeze water out of it).
   d) Add the earthworms and observe their behavior.
   e) Place your compost pile where it will be at room temperature (not in direct sun).

4. Place the thermometer in the middle of the pile. Wait an hour or so, then record the temperature.

5. Record the temperature from the same location and depth, and at the same time each day. Why is it a good idea to be consistent with location, depth and time of recording? Does the temperature change? Why or why not? Make a graph to show your temperature results.

6. Gently mix the compost once a week to aerate it. A good time to turn the compost is after the temperature peaks and begins to drop. Why? Be sure to record the temperature before you turn the compost that day.

7. Be patient. Occasionally check the moisture and add water if needed.

8. Make a chart to help you keep a daily record of temperature and other observations during the next month or two. Observe:
   - Which materials break down the fastest? Slowest? Why?
   - Are there any odors? Why do you think decomposition has an odor?
   - Does the texture of the compost change? In what ways?

9. Once the materials in your compost pile have decomposed into humus, conduct the same feel, smell and look test that you did in Part 1, #2.

10. Now decide what your class should do with this rich soil. When you clean out the aquarium, should you: dump the humus in the trash; take it outside and dig it into the soil; use it for growing plants in the classroom?

11. Discuss:
   - How does composting reduce the amount of waste you would have thrown out?
   - What do you think happens to organic wastes that end up in the landfill?
   - Is the landfill a gigantic natural compost pile, or are there problems with placing large amounts of organic material in landfills?

12. Now that you have constructed and maintained a mini-compost pile in the classroom, how would you go about constructing and maintaining one at home?

**Pre- and Post-Instruction Questions:**

- 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?

**Going Beyond:**

- Create a compost pile as in Part 2, but also add manufactured items like a soda can, paper clip, bottle cap, aluminum foil, iron nail, pencil, crayon, paper, plastic bag, rubber band, etc. Predict rates of decomposition or lack of decomposition and observe actual changes, if any.
- Take a field trip to a local woods or park. Examine a rotting log or leaf litter. Place a sample of rotting humus in a white enamel pan and sort through it carefully, looking closely for “decomposers.” What decomposers (insects, mites, fungi, etc.) can you find? What do you think they’re doing? Read about their life histories. (Do activity: A Rottin’ Place to Live, in booklet Trees are Terrific. See Resources.)
- Make a Berles funnel to help you capture tiny soil animals. Examine them using a magnifying glass or binocular microscope. Make drawings of them and try to figure out what kind of animal they are. Read about their life histories. (See: Soil Animals, Living Earth and The Natural History Guide, in Resources.)
- Visit someone who maintains a compost pile. Why do they compost? What do they do with the compost?

Have they had any problems? Would they recommend composting?
- Investigate what happens to the leaves your community discards each autumn. What do you think should be done with them?
- If your community has a municipal composting center, take a field trip to it. Be sure to prepare questions to ask the guide.
- Have students design experimental compost piles. For example, make a pile that: is low in nitrogen; lacks moisture; has little air circulation; or is made of a single ingredient (e.g., just grass clippings). Also create a good compost pile for comparison. Compare rates and temperatures of decomposition between piles.
- Fill flower pots with different soil types, including one type that has your humus mixed in. Plant seeds or grow seedlings in the pots. Make 4-5 pots with each soil type so that you’re comparing more than one plant grown in each type (i.e., so that you have a large enough sample size to make a valid judgement). Do the plants in different soil types grow at different rates, with different vigor, color, etc? What are possible explanations for any differences?
Is It A Waste?

Part 1 — All Wrapped Up *

**Goal:** To have students investigate the purpose of packaging and identify wasteful packaging.

**Subjects:** Home economics, marketing, social studies, language arts, health, science, environmental education.

**Grades:** 4-12

**Procedure:**
1. Bring in an example of food packaging. Discuss:
   - Why is the product packaged? (To protect the product, protect health, prevent theft, provide advertising, provide convenience, promote purchasing, make the product look larger or more appealing?)
   - Is the packaging essential or wasteful? Why or why not? What criteria are you using to make your decision?
   - What influence do you think packaging has on the salability of the product?
2. Design a way to categorize the packaging. For example, sort it according to “natural” packaging (bananas, apples, peanuts); “older” packaging (paper bags, returnable bottles); and “modern” packaging (plastic wrap, styrofoam, plastic milk containers). Discuss:
   - What happens to the packaging once the product is used?
   - Which packaging is/isn’t recyclable, biodegradable?
   - Which packaging is/isn’t made from: recycled materials, renewable resources?
   - What are the environmental pros and cons of making and disposing of each type of packaging?
   - Which packaging would you label: most wasteful, least wasteful? Why?
3. Brainstorm ways that you could reduce the amount of packaging you purchase. For example, could you purchase products in bulk? How would this help reduce packaging? (A 3 ounce tube of toothpaste requires 50% more packaging per ounce than a 7 ounce tube.)

**Pre- and Post-Activity Questions:**
- List three examples each of recyclable and non-recyclable packaging.
- What criteria might you consider when deciding whether packaging is necessary or wasteful?
- What happens to most of the packaging you purchase? What do you think about this?

Part 2 — What’s the Appeal? *

**Goal:** To have students quantify the number of times television and radio ads try to sell products for reasons not related to product quality and list some of the techniques advertisers use to promote products.

**Subjects:** Social studies, mathematics, language arts, home economics, marketing, environmental education.

**Grades:** 7-12

**Procedure:**
1. Find samples of different advertisements for the same type of item (soda, detergent, potato chips). Select ads for different name-brands and types of packaging. Discuss:
   - Which product would you buy? Why?
   - What is advertising? What is the purpose of advertising?
   - Does advertising influence what you buy? How?
   - Which advertisement do you like best? Why?
   - Do your reasons have anything to do with the quality or function of the product?
   - Do you purchase name-brand items instead of generic items? Why?
2. Discuss ways in which products are promoted on television, radio and in print. Analyze at least 25 ads. Note the following:
   - What strategy does the advertiser use to sell the product?
4. Make a composite chart that shows the results of all the surveys done by students. Discuss:
- Which marketing strategies were used most often to promote packaged products?
- What strategies were used that were not listed on the sample form?
- What usually happens to the packaging?
- Do you think the manufacturer of the product should be responsible for what happens to the packaging once the product is used? Why or why not?

Pre- and Post-Activity Questions:
- Name three reasons you buy one type of packaged product instead of another.
- How often are your reasons based on the quality or function of the product?
- Discuss ways in which advertisements may influence what you choose to purchase.

<table>
<thead>
<tr>
<th>Name of Product</th>
<th>Television</th>
<th>Radio</th>
<th>Print (magazines, newspapers)</th>
<th>Other</th>
<th>Status</th>
<th>New and Improved</th>
<th>Convenience</th>
<th>Sex Appeal</th>
<th>Symbols</th>
<th>Self-Image</th>
<th>Famous People</th>
<th>Flashy Packaging</th>
<th>Bandwagon</th>
<th>Vague Promises</th>
<th>Keeping Up With the Joneses</th>
<th>Other</th>
</tr>
</thead>
</table>

Part 3 — How Many Ways Can You Wrap An Apple?

Goal: To have students design packaging and advertising strategies to sell a product, analyze why they decided on their strategies and consider why they buy one product instead of another.

Subjects: Social studies, language arts, art, drama, environmental education.

Grades: 6-12

Materials:
- an apple or other object (hammer, child’s toy, batteries) for each student or group of students. Each student or group should have the same item.

Procedure:
1. You have just gotten a job as an advertising agent for an apple company (you can work either individually or with a group of other students). Your first assignment is to develop a packaging design and ad campaign to sell apples. Keep track of the reasons why you chose your particular design and sales pitch. Your campaign can consist of skits, poems, songs, posters or whatever you believe will sell the product.

2. Present your ad campaign to the class.

3. Display the “products” (numbered in some way). Vote for the apple you would buy (each classmember should vote anonymously on slips of scrap paper). Tally the results. Discuss:
- Why did you choose the product you did?
- How much packaging was involved in the “winning apple”? Was the packaging necessary? Why or why not?
- What influence does the packaging have on the quality of the product?
- Why was the product packaged?
- Who pays for the packaging?
- Who should pay for disposal of the packaging?
- Was the manufacturer of the product concerned about disposal of the packaging?
- If the manufacturer is primarily interested in selling the product, is it more important to package the item to sell than to package it to have low environmental impact? Are these two concepts mutually exclusive? Could you design a package that sells but doesn’t use a lot of energy or resources to produce or dispose of?
- Who should pay for the disposal costs of packaging that isn’t recyclable or reusable?
- Do you have any choices about how much packaging you purchase?

Pre- and Post-Activity Questions:
- Who do you think makes decisions about what packaging to use on a product?
- What main factors do you think they consider when deciding how to make their product sell?
- Why do you think people buy products that have a lot of packaging?
- How often do you think manufacturers consider the impacts of packaging on the environment?
- Do you have to purchase highly packaged items?
Part 4 — Packaging: Is It A Waste?*

Background: In 1974, the Environmental Action Foundation published research showing that the energy used to produce the packaging used annually by McDonald’s fastfood restaurants was equal to the amount of energy required to supply the people of Boston, Washington, San Francisco and Pittsburgh for a year.

Goal: To have students consider solutions to the problems of energy and resources wasted due to excessive packaging and become aware of how complex and energy-intensive food processing has become.

Subjects: Home economics, social studies, language arts, marketing, mathematics, environmental education.

Grades: 7-12

Procedure: 1. Examine the following chart. Discuss:

This Spud’s For You

<table>
<thead>
<tr>
<th>Product</th>
<th>Package Size</th>
<th>Price</th>
<th>Price per Pound</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh Idaho Potatoes</td>
<td>10 lb.</td>
<td>$2.99</td>
<td>$.30</td>
</tr>
<tr>
<td>Fresh Idaho Potatoes</td>
<td>5 lb.</td>
<td>1.98</td>
<td>.40</td>
</tr>
<tr>
<td>Fresh Idaho Potatoes</td>
<td>loose</td>
<td>.59</td>
<td>.59</td>
</tr>
<tr>
<td>Kohl’s Canned Sliced Potatoes</td>
<td>8.5 oz.</td>
<td>.33</td>
<td>.62</td>
</tr>
<tr>
<td>Orelda Tater Tots</td>
<td>4 lb.</td>
<td>2.99</td>
<td>.75</td>
</tr>
<tr>
<td>Orelda Tater Tots</td>
<td>2 lb.</td>
<td>1.69</td>
<td>.85</td>
</tr>
<tr>
<td>Orelda Tater Tots</td>
<td>1 lb.</td>
<td>.99</td>
<td>.99</td>
</tr>
<tr>
<td>Kohl’s Crinkle Cut French Fries</td>
<td>5 lb.</td>
<td>2.99</td>
<td>.59</td>
</tr>
<tr>
<td>Kohl’s Crinkle Cut French Fries</td>
<td>2 lb.</td>
<td>1.33</td>
<td>.67</td>
</tr>
<tr>
<td>MicroMagic Microwave French Fries</td>
<td>15 oz.</td>
<td>1.69</td>
<td>1.80</td>
</tr>
<tr>
<td>MicroMagic Microwave French Fries</td>
<td>9 oz.</td>
<td>1.25</td>
<td>2.22</td>
</tr>
<tr>
<td>Small Order McDonald’s French Fries</td>
<td>2.5 oz.</td>
<td>.59</td>
<td>3.78</td>
</tr>
<tr>
<td>Betty Crocker Potato Buds</td>
<td>28 oz.</td>
<td>2.59</td>
<td>1.48</td>
</tr>
<tr>
<td>Betty Crocker Potato Buds</td>
<td>13.75 oz.</td>
<td>1.49</td>
<td>1.73</td>
</tr>
<tr>
<td>Betty Crocker Potato Buds</td>
<td>5.5 oz.</td>
<td>.65</td>
<td>2.08</td>
</tr>
<tr>
<td>Planter’s Potato Crunchies</td>
<td>6.5 oz.</td>
<td>1.19</td>
<td>2.54</td>
</tr>
<tr>
<td>Durkee Potato Sticks</td>
<td>7 oz.</td>
<td>1.49</td>
<td>3.41</td>
</tr>
<tr>
<td>Durkee Potato Chips (8-9/16 oz. pkgs.)</td>
<td>4.5 oz.</td>
<td>1.29</td>
<td>4.59</td>
</tr>
<tr>
<td>Pringle’s Potato Chips (reg.)</td>
<td>7.5 oz.</td>
<td>1.49</td>
<td>3.18</td>
</tr>
<tr>
<td>Jay’s Potato Chips (twin pack)</td>
<td>8 oz.</td>
<td>1.39</td>
<td>2.78</td>
</tr>
<tr>
<td>Jay’s Potato Chips (12-0.5 oz. pkgs.)</td>
<td>6 oz.</td>
<td>1.89</td>
<td>5.04</td>
</tr>
</tbody>
</table>

*All items priced on June 22, 1987, at Kohl’s II Food Stores and McDonald’s in Madison, WI.

- Which forms of the potato are most highly processed and packaged?
- Which are most expensive per pound?
- Which form of potato would you purchase if you were interested in reducing solid waste or saving money?

2. Working with a partner, choose a fresh food item to investigate, such as a potato, tomato or corn. If possible, go as a class to the grocery store (or go independently after school). Calculate and/or record the price per pound of the fresh product as well as 5-10 items that are processed forms of the product. Discuss:
- Which form of your food item is most expensive per pound? Why?
- Which do you think uses the most energy to produce?
- What relationships are there among cost and amount of processing and packaging?

3. Make a chart like the one above for the product you are investigating. Discuss:
- What conclusions can you make about the relationships among cost, processing and packaging?
- Which packaging do you think is least wasteful of energy and raw materials? Which is most wasteful?
- Does the product need the packaging?
- What do people do with the packaging?
- Which packaging: weighs the least per pound of product; takes up the least space in the landfill; decomposes most or least quickly; doesn’t produce toxic materials when it decomposes?

4. Which of these products will you buy in the future? What criteria will you use for making your decisions about what to buy and what not to buy?

Pre- and Post-Activity Questions:
- What percentage of the cost of packaged foods do you think is due to packaging?
- Which of your favorite foods could you buy without packaging?
- How can packaging of foods be reduced?
Goal: To have students identify steps that can be taken to affect the packaging options available in the marketplace and encourage them to act on an option (See activity: Time for Action).

Subjects: Language arts, social studies, environmental education.

Grades: 5-12

Procedure:
1. Brainstorm what you can do to encourage change in packaging procedures. List your ideas. For example:
   - Write letters encouraging retailers to carry beverage containers that can be returned or recycled.
   - Write to the manufacturers of an item with a particularly wasteful package and ask them to suggest ways you can reuse or recycle the packaging they are producing.
   - Write to legislators urging them to require standardization of materials of which containers are made. This would make possible an expanded system of returnable or recyclable containers.
   - Organize a consumer's advisory committee to recommend packaging or bagging changes in your local supermarket.
   - If you are dissatisfied with a product's packaging, write the manufacturer and send a copy to the local Consumer Protection Division of the federal government or appropriate agency.
   - Write to packaging companies urging them to use recyclable materials.
   (For all of the above, be sure to request a response to your letters.)
   - Refuse to purchase over-packaged items in stores and tell the manager why.
   - Refuse to accept bags and extra wrappings from the store cashier and bagger and tell them why.
2. Do some of the things you suggest.
3. Evaluate your results. Discuss:
   - Did you receive a response to your letter? If not, send another copy.
   - Did the response you received address your concerns and answer your questions adequately?
   - Do you feel that your action has had an influence on reducing unnecessary packaging or encouraging use of recyclable materials?
Remember, even if your influence was small, every "drop in the bucket" counts.
   - Who can you contact to assist you in your goal?
   - Would you personally be willing to do without the conveniences and appeals of packaging? Why or why not?

Going Beyond:

- Read the following true-life scenarios. Based on what you now know about how packaging creates solid waste and how consumers are influenced by advertising, convenience, etc., analyze and discuss what is going on in each scenario. How do you think people in these scenarios might behave differently to reduce the amount of trash they discard?

Scenario 1:
Mr. Jones and his young son, Sammy, are at the convenience store to buy a gallon of milk. Mr. Jones picks up the plastic jug of milk and heads for the check-out. In the meantime, Sammy has been eyeing the candy, and asks if he can have some. Mr. Jones says yes, and Sammy places his choice (individually wrapped jaw-breakers) on the counter. The clerk rings up the purchase and puts the milk jug in a paper bag. Sammy demands his own bag for his candy, and the clerk looks questioningly at Mr. Jones. Mr. Jones nods to the clerk, who gives Sammy his own bag. Once out of the store, Sammy takes his candy out of the bag and throws the bag away. Mr. Jones does the same with his bag when he gets home.

Scenario 2:
Ms. Smith has just finished mowing the lawn and asks her daughter, Kate, to help rake the grass clippings and stuff them into plastic bags. Kate also rakes up some leaves that have blown into the shrubs. Ms. Smith and Kate haul the bags to the curb for garbage collection. Their neighbor, Carol, walks by and asks why they are putting the grass and leaves in plastic bags. Kate responds that she doesn’t know how else you’re supposed to get rid of them — people always dispose of them that way (she points to the house across the street, which also has thrown out grass in plastic bags). And besides, it’s the way her mom asked her to do it. Ms. Smith explains that the ads on TV said bags were good for use for throwing away trash like grass and leaves. She buys the heavy-duty ones with the built-in tie because she had a coupon, and because the ad said they are tough to break and easy to use.

Scenario 3:
Luke and Jennifer are on their way home from school and are starving. They stop at the fast-food restaurant for a burger, fries and soda. They pay, pick up the bag with their order and go to the nearby park to eat. Luke opens the bag and takes out the sodas and paper napkins. He puts a plastic straw through the plastic spill-proof lid on his paper cup, then grabs for the cardboard container holding the fries. “You like ketchup?,” he asks Jennifer, as he opens the plastic ketchup packet. Meanwhile, Jennifer is eating her burger, having stuffed the styrofoam box, designed to keep the burger warm, back into the bag. She adds some pepper from the little paper packet, but decides she doesn’t need the salt she got, so leaves it in the bag. When they’re finished eating, Luke and Jennifer put the garbage (from two burgers, two sodas and one french fries) in the trash can and head home.

- Purchase a large box of cereal and a variety pack that contains an equal weight of cereal. Remove (or eat!) the contents. Measure the area of the cardboard, foil and/or wax paper packaging. Which item (large box or variety pack) has more packaging per unit of cereal? Which costs more per unit of cereal? Why do you think it costs more? If you want more cereal for your money, which would you buy? If you want less packaging for the same amount of cereal, which would you buy? Why is cereal packaged in variety packs? Can any of the packaging be recycled?

- Talk with an older person in your community about what grocery shopping was like 50 years ago. Were the stores the same size or arranged inside like they are today (e.g., did shoppers take their own groceries from the shelf or did the clerk do it for them)? Where did the term “supermarket” come from? Why have there been changes in the way food is marketed? Were there as many items to choose from then? Why? How were the items wrapped?

- Write down what you had for lunch and list all the containers and packaging that came with the food. Discuss the items that could be reused or recycled.

- Interview grocery shoppers to find out why they buy certain products. What do they do with the packaging? How often do they consider packaging when they make a purchase?
How Times Have Changed

Goal: To have students investigate and think about how technologies, lifestyles and values change through time and how these changes alter the production and handling of wastes. To encourage students to develop a greater understanding of history and to express themselves through language.

Subjects: Social studies, language arts, science, art, environmental education.

Part 1 — What, No Video Games?

Grades: 5-12

Materials:
• tape recorder (optional)

Procedure:
1. Imagine yourself as a reporter investigating how times have changed since your parents and grandparents were children. To help you begin thinking about how things have changed, read either Section 1 or 2, or investigate the past by consulting books, the local historical society, old magazines, antique stores, museums, etc. As you do this, think about how you’d answer the questions that follow each section. Discuss your answers in class.

2. Interview your parents, grandparents or other adults to find out what they used in their everyday lives for toys, clothing, food wrappings, trashcans, etc., how these items have changed through time and how they feel about these changes. You can either design your own interview or read Section 1 or 2 to the person(s) you are interviewing, then ask the accompanying questions. (If you have a tape recorder, tape the conversation. Be sure to ask the person being interviewed if they mind being taped.)

3. Discuss your interview results in class.

Section 1: Sayings and Slogans

You've all heard sayings like:
"A stitch in time saves nine."
"Waste not, want not."
"An ounce of prevention is worth a pound of cure."
"Built to last a lifetime."
More recently, we hear slogans like:
"Quick and easy to use."
"No mess, no bother."
"Disposable."
"Individually wrapped for your convenience."
"They sure don't make 'em like they used to."

Questions:
• What other similar sayings and slogans can you think of?
• What are these slogans saying about our lifestyles and how they’ve changed?
• Which messages point out product quality? Which emphasize product convenience?
• Are products today built to be durable, convenient to use, or both? Why? What do you think about this?

Section 2: Toys for Us

Toys have changed through the years. At one time, most were made of natural objects. Then they were made of papier-mâché, or were handmade country toys like whirligigs, bean shooters, yo-yos, limber jacks and tops. Over time, commercially manufactured toys became available, like wooden Lincoln Logs and Tinker Toys and metal Erector Sets. Then plastic toys came on the market — toy guns, frisbees, hula hoops and plastic models. Now, battery-operated and electronic toys, pinball games, video games and computers are popular.

Questions:
• What were your favorite toys when you were little? How many toys did you have?
• What were your toys made of? Who made them?
• How long did your toys last? Could they be fixed if they broke? Would it have been cheaper to fix the toy or get a new one? Why? Could you fix a broken toy at home or did someone else have to fix it?
• If broken toys could not be repaired, what did you do with them?
• How are toys sold today different from those you had?
Part 2 — The Garbage Guzzler Strikes Again

Grades: 4-7

Procedure:
1. Read the following unfinished story.

2. Write a final paragraph that describes what the Garbage Guzzler dumped in Jody's backyard. Read and discuss your concluding paragraphs in class.

3. Discuss possible answers to the questions that follow the story. Did your endings answer some of these questions?

4. For an art assignment, draw your image of the Garbage Guzzler.

Questions:
• From what dates in history did the Garbage Guzzler collect garbage?
• What items might Sam and Jody find in each garbage pile?
• What are these items made of?
• How many of the items do you think would be recyclable?
• Compare the items in the different piles. What do the differences indicate about the lifestyles of people at each location and each period in history? What might people from each period in history think about the garbage from other periods?
• What will happen to the items if they stay in Jody's backyard for a year, ten years, fifty years?
• What predictions do you have for what we will be throwing away in ten years, fifty years?
• What predictions do you have for the amount of trash we will throw away in ten or fifty years compared to how much we throw away now?
• Is there anything you can do to influence what trash will be like or how much trash there will be?

Going Beyond: Consider how other products we use in our homes have changed through time. Discuss:
• What did people do before there were products like Scotch tape, hairdryers, toilet bowl cleaner, soda cans, toothpaste tubes and pumps, plastic cups, power lawn mowers, disposable diapers, plastic wrap, vacuum cleaners, plastic shampoo bottles, microwave ovens, etc.?
• What did they do with their leaves and garden clippings before there were plastic bags?
• How do changes in technology affect our living habits, our waste habits, our opportunities for recycling and our environment?

The Garbage Guzzler Strikes Again

Sam and Jody's teacher has given their class an assignment to write about recycling and how the stuff Americans throw away has changed throughout history. Sam and Jody are having a tough time with the paper. Lucky for them, the Garbage Guzzler suddenly appears and offers to lend a hand!

The Guzz picks up the trashcan behind Jody's house and takes off in his Time Machine. Sam and Jody have no idea what the Guzz is up to. Are they surprised when he returns with a can of garbage he collected from a Pilgrim's house in Plymouth, Massachusetts! The Guzz makes three more trips in the Time Machine, returning with garbage collected from a Philadelphia house during the meeting of the first Continental Congress, from a miner's shack near Sutter's Mill during the California Gold Rush and from a Wisconsin house the day after Mount St. Helens erupted. He dumps all four cans of garbage in separate piles in Jody's backyard.

Sam and Jody are amazed by what they see in each pile. The Pilgrims had thrown out...
The Cost of the Toss

Goal: To have students develop a better understanding of what options exist for managing solid waste, and the costs and benefits of each option.

Subjects: Social studies, mathematics, environmental education, science, health.

Grades: 6-12.

Part 1 — Decisions, Decisions

Procedure:
1. Imagine yourself as the mayor of Wonderful, Wisconsin. Yours is a pleasant city of 65,000 people. Unfortunately, Wonderful is in the midst of a not-so-wonderful crisis: your landfill must be closed because it doesn't comply with present standards for protecting the environment. What's Wonderful going to do with all its garbage?

As mayor, you're responsible for investigating new options for managing Wonderful's solid waste. You begin by forming a solid waste committee to study the options. Who do you think should sit on this committee (town treasurer, public works director, citizen representative, landfill developer, etc.)? Assign fellow classmates to play these roles and decide on a name for your committee.

2. Call a meeting of the committee. Your assistant has prepared the chart, "Managing Garbage From Homes," to help members see some options and impacts of managing garbage from Wonderful's homes. Study the chart and, as a group, consider the following questions:
• At first glance, which waste disposal option seems best? Why? Do you all agree? Is there one best option?
• What criteria and values are you using to judge options? Are you pro-business, pro-taxpayer, pro-environment, pro-convenience? Discuss how your personal points of view might influence how you judge the importance of each potential impact.
• For how many years into the future are you planning? Why is this an important consideration (population growth, long-term economic and environmental impacts, etc.)?
• How big is 52,000 cubic yards? How much space will you need if you choose to landfill Wonderful's garbage for that many years?
• Compare the pros and cons of citizen convenience and environmental impacts for each option. Do you consider citizen convenience more important than environmental impacts or vice versa? Why? How does your view affect which option you think is better?
• What is the relationship between net cost and citizen convenience? Is what's convenient the least/most expensive? If saving money is your main concern, which option would you choose? Should saving money be your only concern?
• Does this chart calculate in the "costs" of each option's long-term environmental impacts or use of natural resources? What might these "costs" be? How much should your committee be concerned about these "costs" in making your decision? How easy is it to put a dollar value on environmental damage?
• If creating jobs is high on your list of priorities, which option would you choose? What do you think about the often-made statement that recycling eliminates jobs?
• You have read somewhere about composting municipal solid waste. Where can you find out more about composting? Why might your community consider composting as a valid option for waste disposal? Which wastes could be composted?

• What are the pros and cons of incineration? Do you think the benefits (landfill space saved, energy produced, convenient) outweigh the costs (landfill still necessary, toxic; air pollutants produced, expensive)? What are the experiences of other communities that already have installed incinerators? How do the pros and cons of incineration compare with those of recycling?
• Recycling newsprint sounds like a great way to save landfill space and trees. But you've heard that some newspapers use ink that contains lead, a hazardous metal. What happens to this lead when the paper is landfilled, recycled, composted, burned? What have newspaper manufacturers substituted for lead inks?

3. Investigate what is required by your local, state, and federal governments for choosing the waste management option(s) for Wonderful (e.g., public hearing, citizen referendum, DNR approval, environmental impact statement).

4. Do you feel you have enough information to make a wise decision for your town? If not, where can you find this information?

5. Now that your committee has investigated and discussed the options for Wonderful's solid waste management plan, make a decision about which option(s) the town should enact.

6. List suggestions for what you can do to ensure the success of Wonderful's new waste management plan (e.g., community education, providing containers for recycling).
<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
<th>Costs</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduce waste by composting</td>
<td>Increases nutrient resources used for plants</td>
<td>$0.50 per pound (compost)</td>
<td>Reduces need for fertilizer, improves soil quality</td>
</tr>
<tr>
<td>Reduce the amount of trash</td>
<td>Decreases the amount of trash that requires special handling</td>
<td>$0.25 per pound (trash)</td>
<td>Reduces need for landfill, decreases air pollution, improves community</td>
</tr>
<tr>
<td>Increase recycling</td>
<td>Increases recycling of materials</td>
<td>$0.10 per pound (recycling)</td>
<td>Reduces need for landfill, decreases air pollution, improves community</td>
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<td>Increase composting</td>
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<td>Reduces need for landfill, decreases air pollution, improves community</td>
</tr>
<tr>
<td>Increase composting</td>
<td>Increases composting of yard waste</td>
<td>$0.75 per pound (composting)</td>
<td>Reduces need for landfill, decreases air pollution, improves community</td>
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<td>Increase recycling</td>
<td>Increases recycling of yard waste</td>
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<td>$0.75 per pound (composting)</td>
<td>Reduces need for landfill, decreases air pollution, improves community</td>
</tr>
</tbody>
</table>
Part 2 — Paying the True Price of Pop

Procedure:
1. Bring pop containers made of different materials to class to help you focus your inquiry on real objects. Discuss:
   • What materials are your containers made of?
   • How might this determine how you should dispose of them?
   • What do you think are the best ways to manage the future of your containers? Why?
   • How much of the cost of the pop do you think is packaging, how much is the cost of the pop itself?
2. Study the information in the chart, “The True Price of Pop.” Discuss:
   • How much of the cost of the pop is packaging?
   • How do you feel about paying for the packaging?
   • Who do you think should be responsible for its disposal?
3. List possible costs and benefits of disposing of your containers. Consider waste management impacts on economics, environment, energy use, jobs, etc. For example:
   • Do the manufacturer and retailer of your containers pay for disposal, or is this cost passed on to you, the consumer? What do you think are their main concerns when they manufacture and sell your pop containers?
   • What impacts might the disposal of your containers have on the environment? Who pays for the environmental impacts of waste disposal?
   • If you are concerned about reducing solid waste in your town, then which container(s) would you buy?

<table>
<thead>
<tr>
<th>The True Price of Pop</th>
<th>(per 16 ounce serving)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Container</td>
<td>Cost to Consumer</td>
</tr>
<tr>
<td>Returnable glass bottle</td>
<td>21¢</td>
</tr>
<tr>
<td>Non-returnable glass bottle</td>
<td>35¢</td>
</tr>
<tr>
<td>Plastic bottle</td>
<td>40¢</td>
</tr>
<tr>
<td>Aluminum can</td>
<td>48¢</td>
</tr>
</tbody>
</table>

Going Beyond:
• Investigate how your town disposes of its solid waste. How much is landfilled? recycled? composted? incinerated? What plans does your town have for handling solid waste in the future? What do you think about these plans?
• Contact your trash collector to find out the total costs of collection, transportation and disposal per ton of solid waste. Discuss:
  • If your family produces two tons of trash each year (the average produced per family of five), then how much should your family pay for trash removal service?
  • How much does your family pay each year for trash service?
  • Do you think the cost for care of your solid waste is reasonable or unreasonable? Why?
  • Would you be willing to pay more to dispose of your trash? Why or why not?
• How does the amount your family pays for trash service compare with the amount it pays for water or sewage services?
• Would you be willing to recycle some household trash items if your town made it easy (e.g., curbside pickup of newspaper, glass, aluminum)?
• Investigate how society subsidizes some methods of handling waste. What do you think about such subsidies? For example:
  • Do your property taxes fully cover the cost of your local landfill?
  • Does government give tax breaks to people who grow trees to be used for making paper? Are similar tax breaks given to people who use recycled paper (instead of trees) to make new paper?
  • How many of your tax dollars are spent on educating citizens about recycling and composting?
• Examine the contents of the classroom trash can at the end of the school day. Record each piece of trash as it's removed. Can you reconstruct the day's activities from the clues in the trash can? Are any of the items recyclable?

• Investigate why archaeologists and anthropologists are interested in old garbage dumps. What can studying the contents of old dumps tell us about earlier peoples? What is an Indian midden? What do you think people in the year 3000 would think about our culture if they were to do an archaeological dig in our landfills?

• Select and analyze an article about solid waste management from your local paper. What is the headline? Who, what and where is the story about? What are the conclusions? What do you think about the article? Does it present the facts you need to understand the issue? Does it interpret the facts well? Is it well written?

• Conduct a school or neighborhood yard sale to reuse unwanted objects. What do you think about the saying, "One person's trash is another's treasure?"

• Take a field trip to a nearby woods or old field. Look for evidence of nature's recycling processes. For example, find natural objects that are decomposing (dead plants and animals, animal droppings, feathers, fur, etc.) and what "decomposers" are assisting this process (fungi, insects, molds, etc.). Investigate what you find carefully, and discuss what you see, smell and feel. Why is decomposition such an important natural process?

• Visit a paper manufacturing plant. Does the plant use only virgin materials or does it also manufacture recycled paper? What are the pros and cons of manufacturing paper from virgin materials vs. recycled materials?

• Investigate the Wisconsin tax advantages/disadvantages of using virgin materials vs. recycled materials to make paper. What do you think about these tax laws?

• Investigate how newsprint in your community is recycled. Do many people recycle their newspaper? Why or why not?

• Consider why we've shifted from glass milk bottles delivered to the door to plastic or plastic-coated paper containers purchased at the store? What are the economic, environmental and social impacts of this shift?

• Place 20 objects, both natural and human-made, on the floor. Name the objects and decide if they are natural or human-made and why. How completely do natural objects decompose compared to human-made ones? Which objects are more likely to release harmful chemicals to the environment as they decompose?

• Find out about ways in which litter harms animals. Investigate the possible impacts of: discarded fishing line and plastic six-pack holders on waterbirds (they can get tangled); old soda or beer bottles on shrews and other small mammals (they enter a tilted, slippery bottle and can't get back out); flip-tops on fish (small fish can get stuck in the rings); and cigarette butts, tin cans and other litter on deer, raccoons and other mammals (they eat the litter or can cut their tongues on sharp edges). Humans also can be hurt. Have you ever cut your foot on broken glass or a discarded nail? Think of other ways that litter can harm people and other animals. How can such problems be prevented? Contact your state legislator for an update on Wisconsin laws that address these problems.

• Contact a glass manufacturing company and ask for an estimate of the amount of energy required to produce, recycle and reuse a ton of glass bottles. What other costs should be considered when choosing which strategy for handling glass is best (e.g., costs of collection and transportation)? What do you think your family should do with its glass? How much energy would your actions use/save? Should we recycle bottles to save energy? Why? What impacts might this have on jobs, the environment, trash removal costs, etc.?

• Set up a recycling plan for your school. Determine what can be recycled, find sources for the sale of recyclable materials, establish a procedure for recycling, elicit support from school organizations (e.g., service clubs could help coordinate the plan, shop class could make or design recycling bins), discuss your plan with school administrators and present your proposal to the school board. Enact your recycling plan.

• Investigate what happens to old tires. What are the problems associated with tire disposal? Research the causes and effects of the tire fire that began in Somerset, Wisconsin, on October 18, 1986. What sources of information can you consult to find out about the fire?
Resources

General References


Composting and Decomposition References


Soil Animals. 1968. Friedrich Schaller. The Univ. of Michigan Press, P.O. Box 1104, Ann Arbor, MI 48106.


Curriculum Materials


CLASS Project: Conservation Learning Activities for Science and Social Studies. National Wildlife Federation, 1412 16th St. NW, Washington, DC 20036; Dept. of Public Instruction, P.O. Box 7841, Madison, WI 53707.


Groundwater Study Guide. 1984. Bur. of Info. and Educ., Wis. DNR.


The Importance of Being a Garbologist (4-6). 1976. GRIP, P.O. Box 4806, Pittsburgh, PA 15206.


Put Your Garbage to Work (7-12). 1979. GRIP, P.O. Box 4806, Pittsburgh, PA 15206.


Recycle for Reuse: 4-H Leader-Member-Family Guide. 1985. 4-H Programs, Univ. of Wis.-Extension, Madison, WI 53706. Publ. No. 362.


Recyculum (K-6). 1980. Eco-Alliance, P.O. Box 101, Corvallis, OR 97330.

Reduction, Reuse, Recycling (K-12). Assoc. of Oregon Recyclers, 1615 NW 23rd Ave., Suite 1, Portland, OR 97210.


Waste: An Instructional Module for the Tenth Grade. 1980. M-STS, P.O. Box 1603, Wausau, WI 54401.


Audio-Visual Materials


Dodge County Says Please Recycle. 15 min. slide-tape. Dodge Co. Library Service, 311 N. Spring St., Juneau, WI 53039.

Energy Where You Least Expect It. 28 min. film. Third Eye Films, 12 Arrow St., Cambridge, MA 02138.


Agencies and Organizations

Wisconsin

Citizens for a Better Environment, 150 W. Juneau Ave., Suite 206, Milwaukee, WI 53202; 111 King St., Madison, WI 53703; 1270 Main St., Green Bay, WI 54302.

League of Women Voters, Wisconsin Chapter, 121 S. Hancock St., Madison, WI 53703-3447.

Sierra Club, John Muir Chapter, 111 King St., Madison, WI 53703.

Waste Facility Siting Board, 132 E. Wilson St., Madison, WI 53702.

Wisconsin Counties Solid Waste Management Association, 802 W. Broadway, Suite 308, Madison, WI 53713.

Wisconsin Department of Natural Resources, P.O. Box 7921, Madison, WI 53707. (Enviro. Educ. Specialist, Bur. of Info. and Educ., 608-266-6790; Recycling Coordinator, Bur. of Solid Waste Manage., 608-267-7565)

Wisconsin Department of Public Instruction, Enviro. Educ. Supervisor, P.O. Box 7841, Madison, WI 53707-7841.

Wisconsin Recycles, P.O. Box 2842, Oshkosh, WI 54903.

Wisconsin's Environmental Decade, 14 W. Mifflin St., Madison, WI 53703; 230 W. Wells St., Suite 309, Milwaukee, WI 53203; 214½ E. College Ave., Appleton, WI 54911.

University of Wisconsin-Extension, Community Dynamics Institute, Lowell Hall, 610 Langdon St., Madison, WI 53706; also, contact your County Extension office.

United States


American Paper Institute, 260 Madison Ave., New York, NY 10016.

Environmental Defense Fund, 1616 P St. NW, Washington, DC 20036.

Environmental Action Foundation, 1525 New Hampshire Ave. NW, Washington, DC 20036.

Glass Packaging Institute, 1133 20th St. NW, Rm. 321, Washington, DC 20036.

Institute of Scrap Recycling Industries, 1627 K St. NW, Washington, DC 20006.

Izaak Walton League of America, Inc., 1701 N. Fort Myers Dr., Suite 1100, Arlington, VA 22209.

Keep America Beautiful, 9 W. Broad St., Stamford, CT 06902.


National Solid Waste Management Association, 1120 Connecticut Ave. NW, Washington, DC 20005.

National Wildlife Federation, 1412 16th St. NW, Washington, DC 20036.

The New Alchemy Institute, 237 Hatchville R., E. Falmouth, MA 02536.

Resources for the Future, 1616 P St. NW, Washington, DC 20036.


U.S. Environmental Protection Agency, 401 M St. SW, Washington, DC 20460 (Office of Solid Waste Manage. and Emergency Response; Office of Public Awareness; Office of Pesticides and Toxic Substances); Region V, Office of Public Affairs, 230 S. Dearborn St., Chicago, IL 60604.
April 22, 1970, was a day for the environment. All across the nation an estimated 25 million people marched, sang, joined cleanup crews, and listened to speeches in honor of our planet. When the sun set that evening, Earth Day was over—but a new era of public concern for environmental problems had dawned.

Since that first Earth Day, the environmental movement has had its ups and downs. On the upside are the accomplishments that followed Earth Day, such as the passage of many important environmental laws and the formation of the Environmental Protection Agency. On the downside is the fact that the environmental movement lost momentum in the 1980s. Few new environmental laws were passed, and there was pressure on lawmakers to weaken existing legislation.

But things started to change as the 1980s drew to a close. Reports of holes in the ozone layer, barges piled high with garbage, tropical deforestation, beach closings, and the threat of global warming focused public attention once again on environmental problems. And as the 1990s get under way, there is a growing commitment on the part of kids, parents, government officials, businesspeople, and others to tackle and solve environmental problems.

In this year's Wildlife Week kit we've provided ideas for ways you and your kids can get involved—from cutting down on energy use to writing letters designed to influence leaders in business and government. Here's a breakdown of the kit's contents:

- **Educator's Guide**—This 16-page activity guide is divided into three chapters, focusing on habitat, energy, and pollution. The activities following the background information in each chapter are designed to help kids take part in efforts to improve environmental quality. The suggested age groups are:
  - Primary (grades K–2)
  - Intermediate (grades 3–5)
  - Advanced (grades 6–9)

- **Earth Day Theme Poster**—This four-color poster has lots of quick conservation ideas that anyone can adopt! And on the back there's a timeline outlining some of the most important environmental events since Earth Day 1970.

- **16-Picture Poster**—Each of the 16 animals and plants portrayed on the poster has been affected by people's activities—sometimes in a positive way, and sometimes in a negative way. Information about each animal or plant is printed on the back.

- **Earth Day Stamps**—We've provided 36 stamps in your Wildlife Week kit. You might want to give them to your kids as a reward for completing the activities in this guide.

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Drawing by Pidgeon

If the Pilgrims had used aluminum cans at the first Thanksgiving, the cans would still be around today. Help cut waste by recycling your cans.
There's No Place Like Home

Acres Away: Why are habitats around the world disappearing so quickly? Natural disasters, such as droughts and hurricanes, affect some wild areas. But most habitat destruction is caused by people. As the human population continues to increase, more and more land is being developed for homes and farming. In 1988 alone, an estimated 300,000 to 500,000 acres of wetlands in the U.S. were drained for development. Development also causes increased pollution and soil erosion.

More people also means an increased demand for products, such as lumber and minerals, that come from wild places. In tropical rain forests, for example, many areas are destroyed when people harvest valuable hardwoods.

The Habitat Connection: Wild species aren't the only ones that lose out when habitats are destroyed. When a coastal wetland is filled to make way for development, for example, people who fish for a living face the loss of clams, crabs, fish, and other commercial species that lived in those wetlands. (Coastal wetlands serve as nurseries for more than 80 percent of all commercial fish and shellfish species in U.S. waters.) Hunters and bird watchers may notice fewer migrating waterfowl, since these birds no longer have wetlands in which to feed and rest. And coastal residents may suffer the effects of increased flooding when wetlands are no longer there to help buffer flood waters.

The loss of wild places may also be felt far away from the source of destruction. As thousands of acres of tropical rain forests are cut down throughout the world, people everywhere lose the potential benefits of medicines that might have been discovered in these forests.

Hope for Habitats: Despite the millions of acres of habitat that have already been lost, there is hope for the future in the efforts of legislators, other individuals, and organizations. Laws such as the Endangered Species Act, first passed in 1973, protect endangered and threatened species and their habitats. Conservation organizations, including the National Wildlife Federation, The Nature Conservancy, and the National Audubon Society, are actively working to protect habitats. And the World Bank and other international lending institutions are starting to consider the environmental effects of development projects before funding them.

Perhaps the most encouraging efforts are those of individuals determined to protect and restore local habitats. In California, for example, kids hauled 20 truckloads of garbage out of a creek near their school and later opened a fish hatchery to help restock the creek. And all around the nation, people are setting aside places for wildlife by establishing backyard and schoolyard habitats.

Bald eagles, giant pandas, Florida panthers—many people know that these species are in trouble. But what people might not know is why these animals are having a hard time surviving. Like most other endangered species, eagles, pandas, and panthers are in trouble mainly because they’re losing their homes, or habitats. All around the world, forests, wetlands, grasslands, and other habitats are disappearing so fast that species are having a tough time staying alive.

Habitat Basics: A habitat provides the food, water, shelter, and living space that a plant or animal needs to survive. In a habitat, plants and animals depend on and interact with each other. For example, in a freshwater marsh, cattails and other plants provide food and shelter for insects, birds, and mammals. Larger animals, in turn, rely on these smaller creatures for food.
in Tune with Habitats

Objectives: Define habitat. Explain that all living things need food, water, shelter, and living space. Describe the habitats of several different animals.

Ages: Primary

Materials: Pictures of animals (See activity for suggestions.)

Subjects: Science and Music

To help your kids understand what a habitat is and why it's important to wildlife, sing a habitat song with them. Depending on the age of the kids you're working with, you may want to add movements to the song or have small groups of kids sing different parts.

Start the activity by discussing the term habitat with the kids. Explain that a habitat is the place where an animal or plant lives and gets the things it needs to survive—its food, water, shelter, and space. Have the kids name some familiar animals and plants and describe where they live.

Now go over the verses of the song with the kids. Show them a picture of each of the animals mentioned and talk about where each animal lives. (Use a cotton-tail rabbit for the meadow, a spider monkey for the jungle, a fringe-toed lizard for the desert, and an alligator for the swamp.) Afterward teach the kids the words to the song.

WHERE'S THE HABITAT?
(Sing to the tune of "Frère Jacques.")

Leader: Where's the rabbit?  Where's the rabbit?
All: Here I am. Here I am.
Leader: Meadow grass is soft and deep.
All: That's where rabbits hop and leap.
    Hop away, leap away.

Leader: Where's the monkey?
    Where's the monkey?
All: Here I am. Here I am.
Leader: Jungle trees are towering.
All: That's where monkeys climb and swing.
    Climb away, swing away.

Leader: Where's the lizard?
    Where's the lizard?
All: Here I am. Here I am.
Leader: Desert sands get lots of sun.
All: That's where lizards crawl and run.
    Crawl away, run away.

Leader: Where's the 'gator?
    Where's the 'gator?
All: Here I am. Here I am.
Leader: Swampy water's dark and dim.
All: That's where 'gators creep and swim.
    Creep away, swim away.

BRANCHING OUT: MAKING THE HABITAT DIFFERENCE

Once your kids know more about what a habitat is, they can help protect habitats and the plants and animals that live in them. Here are some ideas for easy habitat projects:

Habitat Cleanup: Adopt a community park, stream, or other natural area and hold monthly cleanups. Although young children should not pick up broken glass, chemical containers, or other hazardous materials, they can pick up cans, plastic, and other litter. (Make sure the children wear gloves.) You can also ask older children to help with the cleanup, and assign each older student to oversee a younger habitat helper.

Attracting Wildlife to Your Schoolyard: Setting out feeders stocked with seed, such as sunflower or cracked corn; suet; raisins; or nuts can provide food for birds and other animals. And it can help your kids see what kinds of animals live in your area.

Plant a Tree: Help your kids plant trees, shrubs, and other vegetation in your schoolyard or community. Check with a local nature center, native plant society, or botanical garden for the best species to plant in your area.
You Can Help!

**Objective:** Describe several ways that people can help protect habitats.

**Ages:** Intermediate and Advanced

**Materials:** See specific suggestions.

**Subjects:** Science, Language Arts, and Social Studies

At times it may seem there’s nothing an individual or a small group can do to stop habitat destruction. But there are things that you and your kids can do to help protect habitats—both in your area and in other parts of the world. In this activity we’ve listed some projects and programs that you can get involved in. You may also want to have your kids brainstorm other ways that they can help make a difference in the effort to preserve habitats.

FIVE WAYS TO HELP

1. **Learn everything you can about a habitat of your choice.** You may want to pick a local natural area, such as a nearby forest or river. Or you might want to choose a habitat in another part of the world, such as a tropical rain forest. After studying the habitat you’ve chosen, share your knowledge with others. The more people know about habitat problems, the more likely it is that they will do something to help.

2. **Adopt a local natural area.** Take your kids on a field trip to the area and have them observe the environment and wildlife. Then have them record what they see and how they feel by writing poems or essays or by drawing pictures. Also find out who oversees the area and ask if your group can help maintain or improve it. For example, your kids can organize a litter pickup. And they can help preserve the adopted habitat by getting involved in local issues that may relate to the area.

3. **Write letters to your senators and representatives to let them know you are concerned about habitat destruction.** You can make your letters more specific by focusing on one habitat issue. (For more about writing effective letters, see "The Write Stuff" on page 13.)

4. **Set up a hands-on program in your area to combat habitat destruction.** You could organize a tree-planting project; a river, stream, or beach cleanup; or a highway anti-litter campaign. You could also create a schoolyard or backyard habitat. For more information on how to set up schoolyard and backyard habitats, write to the National Wildlife Federation, Backyard Wildlife Habitat Program Information Packet, 1400 16th St. NW, Washington, DC 20036-2266. (Please specify schoolyard or backyard habitat information.)

5. **Raise money to support ongoing programs that are helping to protect habitats.** Here are some ideas for fund-raising projects that will also help others learn more about habitats:

   - Make and sell recycled-paper greeting cards or notecards that feature drawings of a certain habitat and the plants and animals that live there. On the back of the cards, the kids can include information about the habitat and species shown. (There are many places that sell recycled paper. Here’s one company that produces a catalog of recycled products, including paper supplies: Earth Care Paper Inc., P.O. Box 3335, Madison, WI 53704.)

   - Organize a habitat party or festival featuring foods, music, and special entertainment. You might make dandelion tea and meadow muffins for a "Meadow Party," or play Cajun music and serve a spicy dip for a Louisiana swamp celebration.

   - Have your kids create drawings and poems about a habitat and assemble their work into a booklet. Then photocopy the booklet and sell the copies to parents and community members.

   - Show films or videos about different habitats or about the plants and animals that live in them. You can raise money by selling refreshments at the program. (See page 16 for a list of audiovisual materials.)

   - Organize a sporting event, such as a "Walk for Wetlands," "Run for Rain Forests," or "Bike Ride for Beaches." Participants can get sponsors to pay for each mile traveled.

(Adapted from "You Can Help!" on pages 52–55 of NatureScope—Rain Forests: Tropical Treasures.)
Are You Part of the Problem?

**Objective:** Discuss how individual actions can affect habitats.
**Ages:** Advanced
**Materials:** Copies of page 6
**Subjects:** Science and Social Studies

It's easy to think that only businesses and governments cause habitat destruction. But individuals also contribute to the problem. In this activity, your kids can discover how people's actions in the United States can affect habitats around the world.

Begin by asking the kids to name some of the reasons why habitats are being destroyed. (To make room for houses and other development; to clear land for farming; to supply materials for industries such as logging and mining; and so on) List their ideas where everyone can see them.

Then ask the kids if they think that some of the things they do contribute to habitat destruction. If they say yes, ask them to explain how.

Next pass out copies of the discussion questions on page 6 and have the kids break up into small groups to discuss each question as honestly as they can. Use the information under "Answers and Ideas" to talk about the kids' answers. Also discuss how the actions of individuals can directly and indirectly affect habitats. For example, by buying certain kinds of tropical fish, people may contribute to the destruction of coral reefs and the creatures that live there. And by purchasing products made by companies that cut down rain forests, consumers indirectly play a part in the loss of these forests.

(Adapted from "Are You Part of the Problem?" on pages 56–57 of NatureScope—Rain Forests: Tropical Treasures.)

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**ANSWERS AND IDEAS**

1. Opinions will vary on the first question. Ways to inform other consumers include putting up posters in libraries and other public places, writing an article for the school newspaper, and writing a letter to the editor of an aquarium magazine or another publication involved with the aquarium pet industry.

2. Forests are cut down to harvest wood, which is used to make paper, building materials, and other products; oceans may be polluted when oil is spilled during transit; strip mining can erode topsoil and pollute water. Recycling paper can help conserve trees; recycling some kinds of plastic can conserve oil; and recycling aluminum can save energy and reduce the need for mining to collect bauxite, the ore used to make aluminum. You can start a recycling drive in your school or community. (See page 14 for tips on organizing a recycling drive.)

3. By boycotting a product, an individual stands up for what he or she believes in and can tell others about the problems associated with the product. Ways to convince others include telling them about the plants and animals that live in rain forests, explaining the effects of rain forest destruction, and pointing out the possibility of discovering new kinds of medicines and other products in rain forests. (For more about tropical rain forests, see NatureScope—Rain Forests: Tropical Treasures.)

4. To make a decision, you might need to know what kinds of plants and animals depend on wetlands for survival, how wetlands are useful to people, and what can happen when wetlands are destroyed. (For more information and activities about wetlands, see NatureScope—Wading into Wetlands.)

5. Other options include using natural predators to control insect pests, finding less toxic chemicals to kill insects, and using more efficient agricultural techniques, such as mixed plantings.

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**TALK TONIGHT**

"you can help save rain forests"

**Time:**

**Place:**

**Speaker:**

**RECYCLE DRIVE**

Saturday at 8:00 AM
newspapers, cans, glass accepted
1. Many people buy tropical fish from pet stores for their saltwater aquariums at home. These saltwater fish are often taken from the waters around coral reefs. Many of these saltwater fish are legally captured by divers. But sometimes divers illegally use poison to weaken the fish to make them easier to catch. Many of the captured fish die before reaching the stores. The poison also harms other animals that live around the reefs.
   A. Do you feel that saltwater fish should be kept as pets? Why or why not?
   B. What are some ways you could inform other consumers about the problems associated with collecting saltwater fish?

2. The United States has only about 4 percent of the world’s population. Yet we use many times that amount of the world’s resources, such as wood, energy, and food.
   A. What are some of the ways that this enormous use of resources can contribute to habitat destruction?
   B. Can you think of some ways that recycling materials in the United States might help protect habitats here and in other parts of the world?
   C. What could you do at home or at school to help promote recycling and other forms of conservation?

3. If you knew that your favorite type of soda was produced by a company that was supporting the destruction of tropical rain forests, would you stop buying it? What do you think the value is of one person boycotting a product? Would you try to get your friends to stop buying the soda? If so, how would you convince them?

4. Would you spend any of your own money on a project to help protect wetlands such as marshes and swamps? Why or why not? What information would you need to help you decide whether to spend your money to help protect wetlands?

5. In 1987, the U.S. government prohibited the use of the pesticide heptachlor in this country. Heptachlor was banned in the United States because it is so dangerous to wildlife and people. It can cause cancer and can remain in the environment for decades. One U.S. company still manufactures heptachlor to sell to other countries. People in these countries use heptachlor to control termites, ants, and other insects. Sometimes heptachlor ends up in food that people in these countries eat, and in food that is shipped to the United States.
   A. How do you feel about a U.S. company selling heptachlor to other countries?
   B. What alternative methods of pest control can you think of that people in other countries could use instead of heptachlor?
Everyone Needs Energy

It's a fact of life in the late 20th century: We're dependent on oil, coal, and natural gas. In fact, it would be almost impossible for us to live without them. But our dependence on these energy sources is causing serious environmental problems—problems that continue to worsen as our energy consumption rises.

AN UNHEALTHY DEPENDENCY

The main culprits behind these problems are fossil fuels—energy sources that formed millions of years ago from the remains of ancient animals or plants. The industrialized world relies on these fuels to satisfy most of its energy needs.

Problems from the Start: From finding them to transporting them to using them, there are many problems associated with fossil fuels. Initially, for example, habitat is damaged or destroyed to locate and extract the energy source. Strip mining for coal is a dramatic example of how extracting a fuel destroys habitat.

Getting the fuel to consumers can cause major problems too. Remember when the oil tanker Exxon Valdez ran into a reef in Alaskan waters in 1989? The accident resulted in a spill that emptied nearly 11 million gallons of oil into Prince William Sound.

When we use fossil fuels—that is, when we drive our cars, turn on the heat, cook, or do any number of the things that we do every day—we also contribute to pollution. Motor vehicles, fueled by gasoline and other oil products, emit polluting exhaust into the air. And the electricity that we use whenever we flip on a switch usually comes from power plants that burn fossil fuels to create electricity. Waste products from these plants end up in the air and water, contributing not only to pollution, but also to the greenhouse effect. (See the glossary on page 16 for a definition of the greenhouse effect.)

BREAKING THE HABIT

There's another problem with fossil fuels: The supplies of coal, natural gas, and oil are decreasing. Some scientists estimate, for example, that we may have only another 40 years worth of oil left.

No Easy Answers: Most experts agree that a switch to other types of fuel is a given, although no one knows how soon the switch will occur. Right now, the alternatives to fossil fuels can't supply us with the amount of energy we're used to consuming—at least, not without serious cost and safety problems.

Nuclear power, for example, has an advantage over fossil fuels because it creates less air pollution. But the dangers of operating nuclear plants, the costs associated with them, and the uncertainties surrounding the storage of nuclear waste make many people feel it is a risky fossil fuel substitute.

Hope for the Future? There are some promising alternatives, though, that could be less environmentally damaging than fossil fuels and less dangerous than nuclear power. Right now, these alternative energies—namely, solar power, wind power, geothermal power, and a few others—provide only about 10 percent of our nation's energy. But they have the potential to provide much more. Experts agree, though, that more research and development is needed before these alternative energy sources can realistically replace fossil fuels.

The Big Turn-Off: There's one thing everybody can do right now to slow down the energy crisis, and that's save energy. During the oil embargo of the 1970s, Americans cut the nation's energy use by 25 percent. And we could easily increase that percentage if everyone, from business leaders to kids, made the effort. (For some specific ideas about how you can save energy, see "Take an Energy Audit!" on page 9.)
It’s Cool to Save Fuel

Objectives: Define fossil fuel and explain how these fuels form. Name some problems that result from using fossil fuels, and discuss some ways everyone can help solve the problems.

Ages: Primary and Intermediate

Materials: Chalkboard or easel paper

Subjects: Science and Language Arts

Try this activity to introduce your group to fossil fuels and get the kids thinking about ways to save energy. Before you start, copy the words to the chant, “Underground Energy,” where everyone can see them.

Begin by having the kids form groups to brainstorm and list some things we use every day that require energy. Discuss what the kids come up with and list their ideas where everyone can see them.

Next explain how fossil fuels form and how we get these fuels out of the ground, using the information under “Energy Info” below. Then discuss some of the ways we can conserve energy.

Now get the kids out of their seats to perform “Underground Energy.” To make the poem a bit easier, say each pair of lines and demonstrate the motions, then have the kids repeat them. Go through the poem a few times with the group, and then have them perform it for others.

Branching Out: Energy Alternatives

Many energy experts agree that the use of solar power, wind power, and other alternatives to fossil fuels will continue to increase in the near future. Have your kids research and present reports on these energy alternatives and their pros and cons. Other fossil fuel alternatives besides solar and wind energy include geothermal energy, hydropower, nuclear energy, synthetic fuels, and tidal energy.

Underground Energy

- Teeny weeny, itsy bitsy Creatures long ago
- Piled up, piled up Very, very slow
- Pressure, heat; pressure, heat Turned them into goop
- Icky, sticky, yucky, grimy, Slimy, oily soup
- Drill down, pump it up One, two, three
- Burn it, turn it into energy
- Power up, power on Everyone needs fuel
- Lights our lights, runs our cars, Warms us when we’re cool

- Uh oh, go slow— We’re using it too fast
- Energy is running out, But we can make it last
- When you’re gone, don’t leave on Your lights or your TV
- Reduce, reuse, recycle too— It’s up to you and me!

Energy Info

Fuel from Fossils: Coal, oil, and natural gas are the main sources of energy we use today. Because they are made up of the remains of ancient animals or plants, these energy sources are called fossil fuels. Oil and natural gas formed from the remains of plants and animals that settled on the bottom of ancient lakes and seas. Coal formed from compacted plants. But all formed millions of years ago with the help of bacteria, pressure from overlying layers of sediment and rocks, and heat from deep within the earth.

From Ground to Consumer: We usually mine (coal) or pump (oil and gas) fossil fuels to get them out of the ground. We then process them to make products we can use. For example, we refine oil to produce gasoline, diesel fuel, and other products.

Time to Save: Using fossil fuels creates problems. For example, burning them creates air pollution and contributes to global warming. And getting fossil fuels out of the ground can destroy habitats. (See the background information on page 7 for more about the problems associated with fossil fuels.)

Another problem with fossil fuels is that we’re running out of them. By conserving energy, we can cut down on the problems related to fossil fuel use and stretch our limited supplies.
Take an Energy Audit!

**Objective:** Describe several ways to save energy in your home.
**Ages:** Primary, Intermediate, and Advanced
**Materials:** Copies of page 10, pencils
**Subject:** Science

By doing an "energy audit" in their homes, your kids can discover some ways to help save energy—and get their parents involved too. Start by asking the kids to name some of the ways they’ve used energy so far that day. Then point out how this energy use can contribute to pollution. For example, power plants that produce electricity may also create pollutants that cause acid rain. (See the background information on page 7 for more about energy use and pollution.)

Next point out that if everyone cuts down on the amount of energy he or she uses each day, we can also help reduce pollution. And we can help conserve our limited sources of energy at the same time. Explain to the kids that they’ll be finding out about some ways to save energy at home.

Pass out copies of page 10. Tell the kids to take the checklist home and fill it out with the help of their parents. They should also record their total energy score.

Have the kids bring in their completed checklists and go over the results as a group, using the information under “The Whys of Energy Savings” to talk about saving energy. You might also want to make copies of the discussion points and have the kids take them home for their parents to read.

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**THE WHYS OF ENERGY SAVINGS**

1. The biggest part of the average household’s energy budget goes to heating and cooling a home. By keeping your thermostat within the limits described in the checklist, you can save energy and money. For example, just lowering your thermostat 5° F throughout the winter can cut 15 percent off your heating bill. And during the night or if no one will be home for more than 4 hours, you can save even more energy by keeping your thermostat between 55° F and 60° F. (Turning your heat down at night may not be energy efficient if your home is equipped with a heat pump. Check with your local electric company for tips on saving energy with a heat pump.)

2. Lots of heat can escape through your home’s windows. Storm windows add extra insulation that can cut this heat loss in half.

3. If you feel a draft around a window or door, that means there’s a crack or gap where air is leaking in and out of your home. And that means you’re wasting energy. You can save energy by caulking the areas around window and door frames and by adding weatherstripping around doors and windows.

4. A fireplace can be a real energy waster! When the fireplace isn’t being used, warm air from your home can escape up the chimney if the damper is left open. And even when the fireplace is being used, heat can still be lost through the chimney. You can reduce heat loss by keeping the damper closed when the fireplace isn’t being used and by using glass doors on the fireplace opening when the fireplace is in use.

5. By insulating your water heater, you can help conserve heat that would otherwise be lost through the walls of the tank. (Be sure to follow the instructions on the insulation kit carefully and don’t cover up vents, doors, or relief valves.)

6. Fluorescent light bulbs use one-quarter the energy that incandescent light bulbs use, and they usually last 8 to 10 times longer.

7. A low-flow showerhead can cut your water use in half. Besides conserving water, you’ll also save the energy that would have been used to heat the extra water for your shower!

8. A faucet that leaks one drop of hot water per second can waste about 3000 gallons of water in a year, as well as the energy used to heat that water.

9. It takes a lot of energy to heat water. By using cold water to wash your clothes, you’ll conserve energy.

10. By recycling paper, glass, and aluminum, you can save energy. It takes a lot less energy, for example, to produce a bottle from recycled glass than it does to make one from raw materials.

11. By turning off lights and TVs when no one is using them, you’ll avoid wasting energy.

12. The automatic dry setting on dishwashers uses extra energy. You can save energy by proping the dishwasher door open and letting the dishes air dry.

*Note:* You can also take some bigger steps to save energy, such as improving the insulation in the walls and attic of your home, buying energy-efficient appliances when you replace old ones, and servicing your heating and cooling system each year. Your local department of energy or power company can provide you with more detailed information on improving the energy efficiency of your home. They may also offer professional audits of your home energy use.

For a more extensive conservation audit activity, write to Earth Day 1990, P.O. Box AA, Stanford, CA 94309.
ENERGY CHECKLIST

1. What's Your Temperature? Check your thermostat to see where it's set. Give yourself 1 point if:
   A. It's a cool day, the heat is on, and the thermostat is set at 68° F or lower
   B. It's a cool night, the heat is on, and the thermostat is set at 60° F or lower
   C. It's a warm day, the air conditioning is on, and the thermostat is set at 78° F or higher
   Give yourself 2 points if neither the heat nor air conditioning is on!

2. Window Watch: Take a look at your windows. Are there storm windows on every one? Give yourself 3 points if all your windows have storm windows, 2 points if just some of them do, and 0 points if none have storm windows.

3. Dreaded Drafts: Check for drafts around windows and doors. Put your hand where the window or door meets its frame and feel for moving air. (This works best on a windy day or when there's a big difference between inside and outside temperatures.) Give yourself 2 points if you don't have any drafty windows or doors, 1 point if just some of them are drafty, and 0 points if all are drafty.

4. Up in Smoke: If you have a fireplace, check to see if the damper is closed when the fireplace isn't being used. If it is, give yourself 1 point. And if you also have glass doors on the fireplace, give yourself another point. (If you don't have a fireplace at all, give yourself 3 points.)

5. Hot Stuff: Is your water heater insulated? If it is, give yourself 3 points. And if you have insulation around your hot-water pipes, you get 1 point.

6. A Bright Idea: Check your lights to see if they're equipped with incandescent light bulbs or fluorescent light bulbs. Give yourself 3 points if you find fluorescent bulbs instead of incandescent bulbs.

7. Shower Saver: Do you have a low-flow showerhead in your bathroom? If you do, give yourself 2 points.

8. Faucet Find: Take a look around your house to see if any of your faucets are leaking. If all your faucets are leakproof, you get 2 points.

9. Go for the Cold: Do you usually wash your clothes in hot, warm, or cold water? Give yourself 2 points for cold water, 1 point for warm water, and 0 points for hot water.

10. Recycling Power: Do you recycle your newspapers, glass, and aluminum cans? If you do, give yourself 3 points! If you don't recycle all three, give yourself 1 point for each item you recycle.

11. Lights Out? Check the rooms in your house. Are the lights, TVs, and stereos off in all the rooms that aren't being used? If they are, you get another 3 points.

12. Drip Dry: Do you let clean dishes in the dishwasher air dry, or use the automatic dry setting? Give yourself 1 point if you let them air dry.

ENERGY SCORES
26–30 points: Your home is a super energy saver!
21–25 points: Your home has a few energy "leaks" that need fixing, but you're doing OK!
14–20 points: You're on the right track, but you really can improve your energy savings.
13 points and below: Your house needs some energy-savings help!
If you visit an American city, you will find it very pretty. Just two things of which you must beware: don’t drink the water and don’t breathe the air.

—Tom Lehrer

**ALL ABOUT POLLUTION**

Pollution is anything that contaminates the environment. The polluting agents, or pollutants, are things that make the environment less suitable for life, such as chemicals, noise, and litter. Here’s a look at three major types of pollution—land, water, and air—and the pollutants that contribute to each one:

**Trouble Underfoot:** Plastic packaging materials, disposable diapers, bottles, cans, food waste, office paper, and newspapers are just a few of the things we discard every day. And our convenience-oriented, “use-it-once-and-throw-it-away” lifestyle is creating a big solid waste disposal problem. Our municipal landfills are filling up fast. By the year 2000, more than half of them will be full and closed down. And most communities are running out of space to build new ones.

Trash isn’t the only thing we’re disposing of on our land. We’re also burying hazardous substances, disposing of them improperly in landfills or on private land, and stockpiling them on plant sites and other areas. These wastes can poison the soil and pollute the water.

**Deadly Waters:** Across the country and around the world, our rivers, lakes, streams, and oceans are the dumping grounds for thousands of tons of waste each year. Industries, wastewater treatment plants, and power plants discharge wastes—some of which are toxic—directly into waterways. Many industrial and power plants also discharge heated wastewater, which can harm aquatic life.

Fertilizers, pesticides, and other toxic chemicals run off city streets, suburban lawns, and farms, and wash into waterways; so do sediments from logging areas and mining and construction sites. And, as we mentioned earlier, improperly stored hazardous substances often seep into waterways or groundwater. In addition, many water systems are being polluted by acid rain.

**Something in the Air:** Every day our automobiles, industries, and power plants spew tons of carbon monoxide, hydrocarbons, particulates, sulfur oxides, and nitrogen compounds into the air. Many of these compounds come back to haunt us in the form of smog, soot, or acid rain. And they often end up polluting our land and water, as well as our air.

In addition, by burning fossil fuels, we are releasing huge amounts of carbon dioxide into the atmosphere each year. This carbon dioxide is believed to be accumulating in the earth’s atmosphere and trapping heat from the sun, contributing to the “greenhouse effect.” And the chlorofluorocarbons (CFCs) we use in foam packaging, coolants, and other products are destroying the ozone layer—the upper layer of the earth’s atmosphere that protects us from solar radiation.

**POLLUTION SOLUTIONS**

From international treaties to grassroots efforts, a lot is being done to help solve pollution problems. For example, the Clean Air Act and the Clean Water Act are just two of the laws passed by the U.S. Congress to help control pollution. State and local governments have also passed laws designed to reduce air and water pollution and to cut down on the amount of trash heading to landfills. For example, some cities require residents to recycle. And a few towns and cities have constructed trails that enable people to walk and bike from place to place more easily, helping to reduce air pollution.

Organizations and individuals have also taken pollution control measures. For example, some companies and schools are reducing the landfill waste they generate by requiring their cafeterias to use reusable tableware. But it’s going to take a lot more effort, from toughening and enforcing existing laws to modifying the behavior of individuals, businesses, and governments, to get pollution under control.
Personal Pollution Pledges

Objectives: Define pollution. Discuss some ways people can cause pollution in their everyday lives, and give examples of ways each of us can cut down on pollution.

Ages: Primary

Materials: Crayons or markers, chalkboard or easel paper

Subjects: Science and Social Studies

Everyone plays a role in causing pollution. To help your kids discover how they can be a part of pollution solutions, try this activity. But before you begin, enlarge the earth diagram shown below and make enough copies of it for everyone.

Start the activity by explaining what pollution is. (something in the environment that creates unhealthy living conditions) Then ask the kids if they can give some examples of pollution. (litter, smog, dirty water, excessive noise, and so on) Next tell the kids that a lot of the things each of us does every day can contribute to pollution. For example, it takes energy to run TVs, radios, lights, stoves, and everything else that we plug in and turn on. This energy comes to us from power plants. The power plants create energy by burning fuels such as coal or oil. And burning these fuels pollutes the air.

Tell the kids that things we throw away can also cause pollution. Ask if anybody knows where our garbage goes when it's picked up and taken away. Then explain that most garbage goes to landfills. But many landfills are getting full. Some garbage is also burned, which causes air pollution. And sometimes garbage is dumped in the ocean, which can harm ocean animals and plants.

Next have the kids brainstorm some ways they can help cut down on pollution. Write their suggestions on a chalkboard or piece of easel paper. (To help get them started, you might want to list some of the ideas provided under “Personal Pollution Solutions.”) Then pass out copies of the earth picture you enlarged earlier and have the kids color it, leaving the rectangle in the middle blank. When they've finished coloring, have them fill in the rectangle with a personal pledge stating one specific way they'll help to fight pollution. Then hang their personal pledges up where everyone can see them.

PERSONAL POLLUTION SOLUTIONS

- Use the backs of paper whenever you can, instead of using only one side.
- Ask your parents to save grocery bags and reuse them instead of getting new ones every time they go shopping.
- Instead of using paper towels, use a sponge or cloth towel to clean up.
- Turn out the lights, TV, or radio if you're going to be out of the room for more than a few minutes.
- Ask your parents to buy drinks in glass or aluminum containers instead of plastic, since glass and aluminum are easier to recycle.
- Recycle bottles, cans, and newspapers instead of throwing them away.

I, ___________________________, pledge to help the earth by

______________________________
______________________________
Objective: Write an effective letter to help fight pollution.
Ages: Intermediate and Advanced
Materials: None
Subjects: Language Arts and Social Studies

Acid rain, toxic waste, overflowing landfills, contaminated groundwater, and other pollution problems may seem overwhelming, especially to kids. But it’s important that kids realize they can do something about pollution. And writing letters to elected officials, agencies, and others is just one way kids can make a difference.

At the right we’ve listed where kids can write, the types of information they can get from each person or place, and the types of action they can ask each person or place to take. We’ve also listed some tips for writing effective letters. Here are a few other things for kids to remember about letter-writing campaigns:

- **Be persistent.** You may find that your message doesn’t get through the first time you write. In fact, you may need to write several letters, including letters to different people, before your message reaches the right person and gets a response.

- **Follow through on your letters.** Get more support for your position by getting others to write letters as well. You could also circulate a petition calling for a particular action and send the list of signatures to the appropriate people.

- **Don’t forget to send letters of praise.** Your letters don’t have to complain about something or ask that something be done. Remember to let legislators, businesses, and others who have worked to reduce pollution know that you appreciate their efforts.

- **Elected Officials**—By writing to your U.S. representatives and senators, state legislators, mayor, and other elected officials, you can influence public policy. For instance, if you think your town, your state, or the nation ought to have a new law or strengthen an existing law, you can ask your legislator to introduce appropriate legislation. Letters to your Congressional representatives should be addressed as follows: The Honorable _____________, U.S. Senate, Washington, DC 20510 or The Honorable _____________, U.S. House of Representatives, Washington, DC 20515. Check with your local library for the addresses of your state legislators and other elected officials.

- **Editors of Newspapers**—The “Letters to the Editor” section of your local newspaper is probably one of the most widely read sections. By writing to the editor and having your letter published, you can alert others in your community to environmental issues. And the editor may publish a feature story about the issue if he or she thinks there’s enough interest.

- **State, Local, and Federal Agencies**—If you want to have a stream checked for pollutants or a site checked for hazardous wastes, contact your state department of environmental management, department of natural resources, or other agency charged with monitoring your state’s environmental quality. Check with your local library for the name and address of the agency to contact. (If your community doesn’t have a pollution-monitoring agency, you might want to lobby to have one created!)

- **Business and Industry**—You can write to businesses and industries to let them know how you feel about their impact on the environment and to suggest ways they can reduce the amount of pollutants they may be releasing into the environment.

(continued next page)
TIPS FOR WRITING EFFECTIVE LETTERS

- Use your own words and write on your own stationery. You don’t have to type your letter, but make sure it’s legible.
- Ask for a reply and include your return address on the letter.
- Keep it short. A one-page letter has a greater chance of being read than a longer letter.
- Identify your subject clearly. For instance, when you write to elected officials asking them to vote one way on a particular bill, refer to the bill by its number or its popular name, such as the “Clean Water Act.”
- Discuss only one issue in each letter you write. Sometimes different people in legislative offices, agencies, and companies deal with different issues. By addressing only one issue in your letter, you have a greater chance that your letter will be read by the appropriate person.
- Ask for something specific. For example, you might ask a legislator to introduce a bottle deposit law in your state or vote for a law that requires tougher penalties for polluters.
- Explain why the issue is important to you. Don’t just say “Please vote for H.R. 501” or “Please check out the dump site next to my school.” Explain how the law will affect you and your community or how the site is affecting you.
- Don’t be unnecessarily critical, and never threaten or insult the person you’re writing to.

BRANCHING OUT: DOING MORE

In addition to writing letters, kids can get involved in action projects to reduce pollution. For example, they can start a chapter of K.A.P. (Kids Against Pollution), a nationwide network of kids who are working to reduce pollution. (For more information, write to K.A.P. c/o Nick Byrne, Tenakill School, 275 High St., Closter, NJ 07624.) And your group can help reduce pollution and save energy by convincing their school and local businesses to buy and use recycled paper. They can also help by organizing a recycling drive. Here’s how:

1. Decide what you want to recycle. For example, you can collect newspapers, glass, plastic, and/or aluminum. Also decide on a time frame for the drive—whether it will last for one day or be held one day each month for a few months.
2. Contact a recycling collector in your area at least six to seven weeks before the drive is held. (Check the Yellow Pages under “recycling.” You can also call 1-800-228-2525 from anywhere in the U.S. to find the aluminum recycling center closest to you.) Be sure the collector agrees to accept the materials you’ve decided to collect. And check on any rules the collector may have. For example, many glass collectors require that you separate glass by color and clean the containers.
3. Arrange for a place to store the collected materials. This is important if you’re holding the drive over a few months or can’t transport the materials to the recycling center immediately.
4. Choose a convenient location for the drive, such as a school or recreation center. Check with the proper authorities for permission to use the area.
5. Line up transportation to get materials from the storage or collection area to the recycling center.
6. Publicize the drive. Make posters and/or fliers to tell people what you are collecting. Include the date, time, and location of the drive. You can also ask local newspapers and radio stations to advertise the drive.
Poster Picks

Objectives: Name several animals or plants that are endangered because of people's actions. Describe some ways that people can protect the environment.

Ages: See individual activities.

Materials: Theme poster, 16-picture poster (See specific activities for other materials.)

Subjects: Science, Social Studies, and Geography

Here are some activities you can do using the 16-picture poster and theme poster. You might want to laminate the 16-picture poster and cut it apart so the kids can look at each picture individually.

1. Conservation Checklist (Primary, Intermediate, and Advanced)

As a group, discuss the facts on the theme poster front. Then have the kids brainstorm specific things they can do to help protect the environment, such as recycling glass bottles and aluminum cans at home. Write down the kids' ideas where everyone can see them. Afterward, make enough copies of the list for everyone in your group and pass them out. Have the kids check off any items on the list that they already do. Then, as they accomplish other items on the list, they can check them off too.

2. Globetrotters (Primary and Intermediate)

Place a map of the world where everyone can see it. Ask for a volunteer to pick one animal or plant from the 16-picture poster and read the information to find out where it lives. Then have him or her locate on the world map the areas where that animal or plant lives. The kids can tape the animal or plant's picture on the map near its home, and then use a piece of yarn to connect the picture to the specific locations. Have the kids take turns until all 16 pictures have been "matched up" to their locations.

3. Cause and Effect (Intermediate and Advanced)

Go over the back of the 16-picture poster with the kids. See if they can think of things that they do that might affect each of these animals. Then have them think of other animals, such as rhinoceroses, whales, and wolves, that are also affected by human actions, and brainstorm things that they can do to help lessen people's effects on these animals.

4. Somewhere in Time (Intermediate and Advanced)

Use the time line on the back of the theme poster to get the kids thinking about important environmental events. After discussing these events, have the kids make their own version of the Earth Day time line on a bulletin board. You can expand it with one or all of the suggestions below:

- Have your kids come up with events other than those listed on the time line. For example, they could add the passage of Superfund legislation in 1980 or the 1989 ban on the importation of ivory. They could also add events that occurred before 1970.

- Have the kids choose an endangered or threatened animal, such as the whooping crane or African elephant, and add important dates in its history to the time line. They could include things such as dramatic population changes and the passage of laws that have affected the species.

- Have the kids think about future environmental events. What kinds of positive or negative developments do they envision? Have them extend the time line to include some of their futuristic predictions.
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 Citizens Action Guide from the National Wildlife Federation gives action-oriented suggestions for how individuals can help the environment. Advanced and up

Endangered Animals by Victor Waldrop et al. (National Wildlife Federation, 1989). Intermediate and Advanced

Garbage by Karen O'Connor (Lucent, 1989). Intermediate and Advanced

The Lorax by Dr. Seuss (Random House, 1971). All ages


Planet Earth by David Lambert (Facts on File, 1985). Primary and Intermediate

You Can Do It is a pamphlet from the National Wildlife Federation that features conservation tips for kids. All ages

ACTIVITY SOURCES

A Way with Waste is a curriculum guide for grades K–12. Write to Washington Dept. of Ecology, 350 150th Ave. NE, Redmond, WA 98052

CLASS Project is a series of environmental investigations for use with kids in grades 6–9, produced by the National Wildlife Federation.

Living Lightly in the City: An Urban Environmental Education Curriculum consists of four volumes: K–3; 4–6; 7–9; and 10–12. Write to the Schiltz Audubon Center, 1111 E. Brown Deer Rd., Milwaukee, WI 53217.

Earth Day 1990 is sponsoring many Earth Day programs and has produced an environmental lesson plan for elementary and secondary teachers. Write to Earth Day 1990, P.O. Box AA, Stanford, CA 94309

NatureScope is an environmental education activity series for use with kids in grades K–8, produced by the National Wildlife Federation. The series includes several environment-related issues, including Endangered Species, Diving into Oceans, Wading into Wetlands, and Rain Forests: Tropical Treasures. A special issue on pollution will be available in May, 1990.

Project Learning Tree has several recycling and energy activities. Write to the American Forest Council, 1250 Connecticut Ave. NW, Washington, DC 20036.

Project WILD has several pollution-related activities. Write to the Western Regional Environmental Education Council, Salina Star Route, Boulder, CO 80302.

Saving Energy is a Wonders of Learning Kit that includes 30 student booklets, a read-along cassette, and activity suggestions. Available from National Geographic, Educational Services, Dept. 90, Washington, DC 20036. Intermediate


AUDIOVISUALS

The Lorax is an animated film about destruction of natural resources and pollution. Available for rent from The Film and Video Library, The University of Michigan, 400 Fourth St., Ann Arbor, MI 48103-4816, or from Population Reference Bureau, Inc., 777 14th St. NW, Suite 800, Washington, DC 20005. All ages

National Geographic Society has two filmstrip sets about energy and pollution: Challenges to a Healthy Environment (Advanced) and This World of Energy: II (Intermediate and Advanced). Write to National Geographic, Educational Services, Dept. 90, Washington, DC 20036.

Recycle Mania is a cassette by Billy B. Bill Brennan) with six songs about recycling. Available from Do Dreams Music Co., P.O. Box 5623, Tacoma Park, MD 20912. Primary and Intermediate

Recycling: Waste Into Wealth is available in film or video. It includes tips on how to start a recycling program. For more information write to Bullfrog Films Inc., Ojai, PA 19547. Intermediate and Advanced

Solar Energy: How It Works is available in film or video. Write to Churchill Films, 12210 Nebraska Ave., Los Angeles, CA 90025. Intermediate and Advanced

GLOSSARY

acid rain—acidic chemicals in the atmosphere that return to earth as rain, snow, sleet, hail, fog, dew, dry particles, or gas. Acid rain is more accurately called acid deposition.

chlorofluorocarbons (CFCs)—chemicals that are used to produce foam packaging, coolants, and other products.

fossil fuels—coal, oil, and other fuel sources that formed millions of years ago from the remains of ancient plants and animals.

greenhouse effect—the trapping of heat by gases, such as carbon dioxide, in the earth’s atmosphere. Many scientists think the greenhouse effect is causing global warming.

groundwater—water that has seeped into the soil and collected in underground reservoirs, or aquifers.

habitat—an area that provides an animal or plant with food, water, shelter, and living space.

ozone layer—the protective layer of gas high in the earth’s atmosphere that filters out much of the sun’s harmful ultraviolet radiation. The “ozone hole” is a thinning of this layer caused by the release of chlorine atoms from chemicals such as CFCs.

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