

LESSON 9: Buying Recycled Products

LESSON'S CONCEPT

Purchasing and using materials made from recycled products instead of nonrecycled products conserves natural resources.

PURPOSE

Students learn about items made from recycled materials.

OVERVIEW

In this lesson students will:

- Discuss what types of materials can be made from recycled products.
- Compare the properties of paper towels made from recycled fibers to those made from nonrecycled fibers and design a chart to summarize their finding.
- Identify five items in their homes that are made from recycled materials.
- Conduct an informal survey to find out why people do not buy more products made from recycled materials.
- Work in groups to investigate the differences between white paper made from recycled and nonrecycled fibers and the differences between plastics made from recycled materials and nonrecycled materials.
- Design or invent an item that can be made from recycled materials.
- Present arguments on why recycled paper and other products made from recycled materials should be bought and used.
- Describe how to “close the loop” in the use of paper.
- Design an advertisement for a product made from recycled materials.

CORRELATIONS TO CALIFORNIA'S CONTENT STANDARDS AND FRAMEWORKS

- Students participate in a discussion about, and work in groups to conduct research on, the differences in items made from recycled and nonrecycled materials.

- “Students listen critically and respond appropriately to oral communication.” (*English–Language Arts Content Standards for California Public Schools, Kindergarten Through Grade Twelve*, page 20)
- Students observe and compare properties of paper towels made from recycled fibers to paper towels made from nonrecycled fibers.
 - Students “measure and estimate weight, length, or volume of objects.” (*Science Content Standards, Grades K–12; Grade 4; Investigation and Experimentation, Standard 6b*)
 - “Many forms of matter are identifiable by their color, texture, or shape; by their hardness or flexibility; by their taste and odor; by the sound or light that they emit and that we can perceive.” (*Science Framework*, page 41)
- Students present arguments about whether recycled paper and other products made from recycled materials should be bought and used.
 - “Students listen critically and respond appropriately to oral communication. They speak in a manner that guides the listener to understand important ideas by using proper phrasing, pitch, and modulation.” (*English–Language Arts Content Standards for California Public Schools, Kindergarten Through Grade Twelve*, page 26)
- Students design an advertisement for a product made from recycled material.
 - Students “choose the form of writing (e.g., personal letter, letter to the editor, review, poem, report, narrative) that best suits the intended purpose.” (*English–Language Arts Content Standards for California Public Schools, Kindergarten*

Through Grade Twelve, page 37)

SCIENTIFIC THINKING PROCESSES

observing, communicating, comparing, relating, inferring, applying

TIME

60 minutes to prepare for the lesson; 60–90 minutes to implement Part I; two or three days at 45–60 minutes per day for Part II; about 60 minutes for the rest of the lesson

lesson.

- ___ 2. Obtain school supply catalogs (which can be borrowed from your school's or district's office) for some recycled products.
- ___ 3. Obtain other catalogs that contain descriptions of products made from recycled products (a list is on page 420).
- ___ 4. Make a transparency of "Closing the Loop with Recycled Paper Products" (page 418).
- ___ 5. Make a copy and cut apart "Instructions for Group Investigations Concerning Recycled Products" (page 417).

MATERIALS

For "Part I, Comparing the Properties of Paper Towels"

- ___ Two types of paper towels: one made with recycled paper and one without; make sure that they look similar in size and weight and contain the same amount of ply (one or two). Keep the sales receipt to provide students with the cost information for each roll of paper towels.
- ___ Duct tape
- ___ Scissors
- ___ Balance or other weight scale
- ___ Washers (about 100, same size to use as weights)
- ___ Four containers of water in which to dip the paper towels
- ___ Four containers in which the water from wet paper towels can be squeezed
- ___ Four measuring cups or graduated cylinders
- ___ A symbol and writing from a package (e.g., cereal box) that indicates that the box is made from recycled material

VOCABULARY

closing the loop, pre-consumer, post-consumer, recycled materials

PREPARATION

- ___ 1. Read the "Background Information for the Teacher" at the end of this

___ A symbol from a package that indicates that the box can be recycled

For "Part II, Group Investigations About Products Made from Recycled Materials"

- ___ School supply catalogs
- ___ Catalogs that contain description of products made from recycled products
- ___ A ream of recycled paper and one of nonrecycled paper
- ___ Cut-apart copies of "Instructions for Group Investigations Concerning Recycled Products" (Number of copies will depend on the number of groups.)

For "Application"

- ___ The transparency of "Closing the Loop with Recycled Paper Products"

Note: Students might need additional supplies to help them complete their investigations.

PRE-ACTIVITY QUESTIONS

- A. Ask students to describe the steps of bringing a piece of paper from a tree to their classroom. *For example: tree to lumber mill to paper mill to store or warehouse to school to class.* If possible illustrate these steps. Discuss with students:
 - After the paper is used by a student, what could be the next step? *The paper is thrown away and sent to a landfill; the paper is used on both sides and placed in the paper recycling box.*
 - If the paper is recycled, what will happen to it? *The paper will be picked up by a recycling company and taken to a storage facility and then to a paper manufacturing plant where it will be made into new paper.*
 - Is that the end of the cycle? *No.*
 - What can be done to continue the cycle? *The school needs to buy recycled paper.*

- And then . . . *it can be recycled again.*
- B. Discuss what type of products are made from recycled materials. See “Background Information for the Teacher.” List these on the chalkboard or a piece of butcher paper and save the list for discussion.
- C. Ask students whether they buy recycled products? Why or why not? *No, because there are no recycled products available for me to buy; they are too expensive; they are not as good as new.*
- D. Ask students whether they have ever heard of post-consumer and pre-consumer recycled paper? What do they think these terms mean? Explain that some paper that is sold as “made from recycled paper” is really made from paper that has never been used. This paper includes scraps and pieces obtained from paper manufacturing and printing companies. This type of waste paper is called pre-consumer because it was never used by consumers. On the other hand, post-consumer waste paper is paper that was used for printing or writing. Recycled paper with post-consumer waste is truly recycled paper. Most “recycled” paper contains a mixture of pre-consumer and post-consumer paper and some paper pulp made from nonrecycled fibers (which is necessary to add strength to the paper, because paper fibers lose their length and strength every time they are recycled).

Homework Assignment: Ask students to conduct an informal survey with at least two people on why they do not buy more products made from recycled materials.

PROCEDURE

Part I, Comparing the Properties of Paper Towels

- A. On the following day list on the chalkboard what the students found out about why people do not buy more recycled products. One of the possible reasons why people do not buy many recycled products is that they believe that products made from recycled materials are not as good as products made from nonrecycled materials. In this activity students will be designing and conducting tests to see whether recycled paper towels are as good as nonrecycled paper towels.
- B. Plan to set up stations for each test. Have students brainstorm and come up with ways they can test the paper towels for weight, strength, absorption, and cost. Show students the paper towels that they will test.
- C. Ask students to write a hypothesis (what they think the results of the experiment will show). Have the class or groups of students design a chart to summarize their findings.
- D. Students can work in groups and complete all tests, or two groups can be assigned to each test. One way to set up each test is described below:
1. Weight—Weigh a sheet of paper towel on a balance scale; or weigh the entire roll and divide by the number of sheets to get a weight per sheet.
 2. Strength—Stretch a piece of paper towel between two desks and use duct tape to secure each side of the towel to each desk. Place washers on top of the towel until it tears; then count and record the number of washers. Do this with wet and dry paper towels made from both recycled and nonrecycled fibers.
 3. Absorption—Place a piece of paper towel in a container of water, have it absorb the water, and take it out, allowing it to drip back into the container. When it has just about stopped dripping, squeeze it into another container of water, and use a measuring cup or a graduated cylinder to measure the amount of water the paper towel held.
 4. Cost—Divide the cost by the number of sheets to get a cost per sheet, and then divide the cost by the length in inches indicated on the package to find out the cost per inch (assuming that both paper towels are the same width).
- E. Provide two types of paper towels to each group: one paper towel made with recycled fibers and one made without recycled fibers.
- Have students conduct the tests.
 - Ask students to use the chart they designed and summarize their findings on the chart.
- F. Will the results of your experiment influence your buying habits? How? Why?

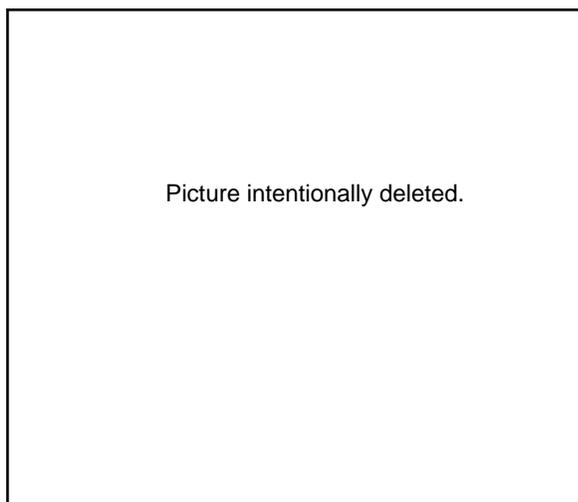
Part II, Group Investigations About Products Made from Recycled Materials

- A. Share with students the following information:

Recycled products may cost more than those made from raw materials. This is because consumers do not pay the true price for the products made from raw materials. Our government gives tax breaks and subsidies to industries that harvest wood and mine minerals, which in turn are manufactured into products that consumers can buy at a relatively low cost. The health and environmental costs associated with mining and processing raw materials are also not included in the consumer's price. For example, a health and environmental cost would be polluted water from mine wastes or water used and polluted during the processing of raw materials.

Note: It is important that students be allowed to direct their own learning in the following section. The role of the teacher is that of a facilitator to provide guidance and answer questions if students ask for help. If a group fails to acquire the information or results it wanted, the students in the group should analyze what happened so that the experience becomes a learning experience. The students should make recommendations on what they could do differently next time.

- B. Tell students that they will work in groups to conduct various investigations concerning recycled products. Separate the class



Students in Tina Porter's science class at Curtner Elementary School conduct an experiment to test the strength of paper towels made from recycled fibers and paper towels made from nonrecycled fibers.

into groups of three or four students. Assign or have students select one of the four tasks on the sheet, "Instructions for Group Investigations Concerning Recycled Products." Then provide the instructions for each group. Note that some groups will have identical tasks but might have a different approach on how to gather information.

- Group 1 will research the cost of regular paper versus paper made from recycled fibers.
 - Group 2 will research the differences between recycled and nonrecycled paper by having different people observe, feel, write on, and draw on both types of paper.
 - Group 3 will also conduct research on the differences between recycled and nonrecycled paper by having group members observe, feel, write, and draw on both types of paper.
 - Group 4 will do research on items made from recycled plastics and other materials.
- C. Provide materials to group members. Make certain that all the groups design or invent an item that can be made from recycled materials. Remind students that in order to recycle, they will need to make a new item out of an old item. The groups should compile their findings and present these to the class.
- D. Show students the symbol and writing that indicate that an item is made from recycled material. Also show the symbol that indicates that the item is recyclable. Ask students if it is possible to get the two symbols confused and assume that an item is made from recycled materials, intentionally delete the symbol indicates that it could be recycled.



Carton or paper is made from recycled paper fibers.



The paper is made from recycled paper fibers.



The package is recyclable although it may not be made from recycled materials.

Homework Assignment: Ask students to find five items in their homes that are made from recycled materials. For example, they can examine cereal boxes or other cardboard boxes that contain dry food and look for the label that indicates that the box is made from recycled materials. They can also identify in a store several products made from recycled materials.

E. Ask students to share their homework assignments.

DISCUSSION/QUESTIONS

Discuss with students:

- Is the list that we developed at the beginning of the lesson about products made from recycled materials accurate? If not, how should it be changed? Is it complete? What should be added?
- What did we find out about recycled and nonrecycled paper towels? *They were similar in quality. Are there some recycled paper towels that could be better and others that could be worse than some brands of nonrecycled paper towels? Possibly.*
- What did we find out about recycled and nonrecycled copy paper? *The paper seemed the same.*
- What happens to a recyclable item that is placed in a landfill instead of being recycled?

It is buried and the natural resources used to make it are lost.

- What would happen if there were no more natural resources to start the cycle? *We wouldn't be able to make new products.*
- What might the Earth look like if there were no more natural resources? *There wouldn't be any trees, soil, rocks, plants, animals, or water.*
- Why is it important to keep items in the recycling loop? *To conserve natural resources.*
- Why is it important to buy recycled products? *It supports markets so more items from recycled products will be made instead of using raw materials.*
- What is the difference between something made from recycled materials and something that is recyclable? *Recycled materials contain recycled products; recyclable means it can be recycled.*

APPLICATION

- A. Ask students to present arguments verbally or in writing on whether recycled paper and other products made from recycled materials should be bought and used.
- B. Ask students to describe in writing and illustrations the steps on how to “close the loop” in the use of paper (as students did at the beginning of the lesson). The focus

Picture intentionally deleted.

Students in Tina Porter’s science class at Curtner Elementary School conduct an experiment to test the strength of paper towels made from recycled fibers and paper towels made from nonrecycled fibers.

should be on visually showing “closing the loop.”

- One way to do this is to have each group use arrows to draw the progress from tree to consumer in paper production; then add the steps for paper waste that is recycled and also that is placed in a landfill.
 - Have groups share their drawings.
 - Show the students the transparency of “Closing the Loop with Recycled Paper Products” and have students compare their drawings to the one on the transparency.
- C. Have students design an advertisement for a product made from recycled material. Encourage students to look at advertisements in newspapers and magazines and help them to identify how each advertisement encourages people to buy a product. For example, an advertisement might appeal to one’s emotion or sense of adventure; have a famous person endorse it; use the beauty of nature to sell the product; or show people having fun when using the product.

Project Idea: Have students encourage school officials to buy recycled products for the school. See the extension below to get students started on this project.

EXTENSIONS

- A. Have students inventory current purchases at school to find out what recyclable materials are purchased. What materials made from recycled products are purchased? They can find out:
- What keeps people (e.g., school officials) from buying recycled paper for copiers? Why is it more expensive?
 - How can we buy recycled products, even if they are more expensive?
 - Is there a district that buys recycled paper? How did it get permission to buy recycled paper? The group should compile its findings and present them to the class.
- B. Have students make recycled paper (see the K–3 Module, Unit 2, Lesson 4). Students can then use the recycled paper, give it away as a gift for someone else to

use, or sell it. They can experiment with different types of paper, colors, or other types of fibers (e.g., from fabrics).

- C. Have students identify properties of recycled plastic to plastic that is not made from recycled materials.

RESOURCES

Videos

Get Activated. Green Earth Club 2 series. Ontario, Canada: TV Ontario, 1986 (15 minutes). Chatsworth, Calif.: Distributed by AIMS Media.

Describes experiments and projects students have done to become more knowledgeable about environmental problems, such as determining which toilet paper decomposes the fastest and writing about our environment.

Our Own Space. The Green Earth Club 2 series. Ontario, Canada: TV Ontario, 1991 (15 minutes). Distributed by AIMS Media.

Encourages students to make positive changes in their community. Shows students cleaning up litter, performing an audit at their school (what is bought, what is used, and what is thrown away), composting, and conducting research on a project.

Recycling: The Endless Circle. Washington, D.C.: National Geographic, 1992 (25 minutes).

Explains how recycling returns used materials to make new products, therefore reducing waste. The processes involved in recycling paper, aluminum, and plastic are described.

Book

Chandler, Gary, and Kevin Graham. *Recycling.* Making a Better World series. New York: Twenty-First Century Books, 1996.

Contains information on various products made from recycled items, such as plastic lumber and biodegradable golf tees (an idea developed and patented by a thirteen-year-old boy).

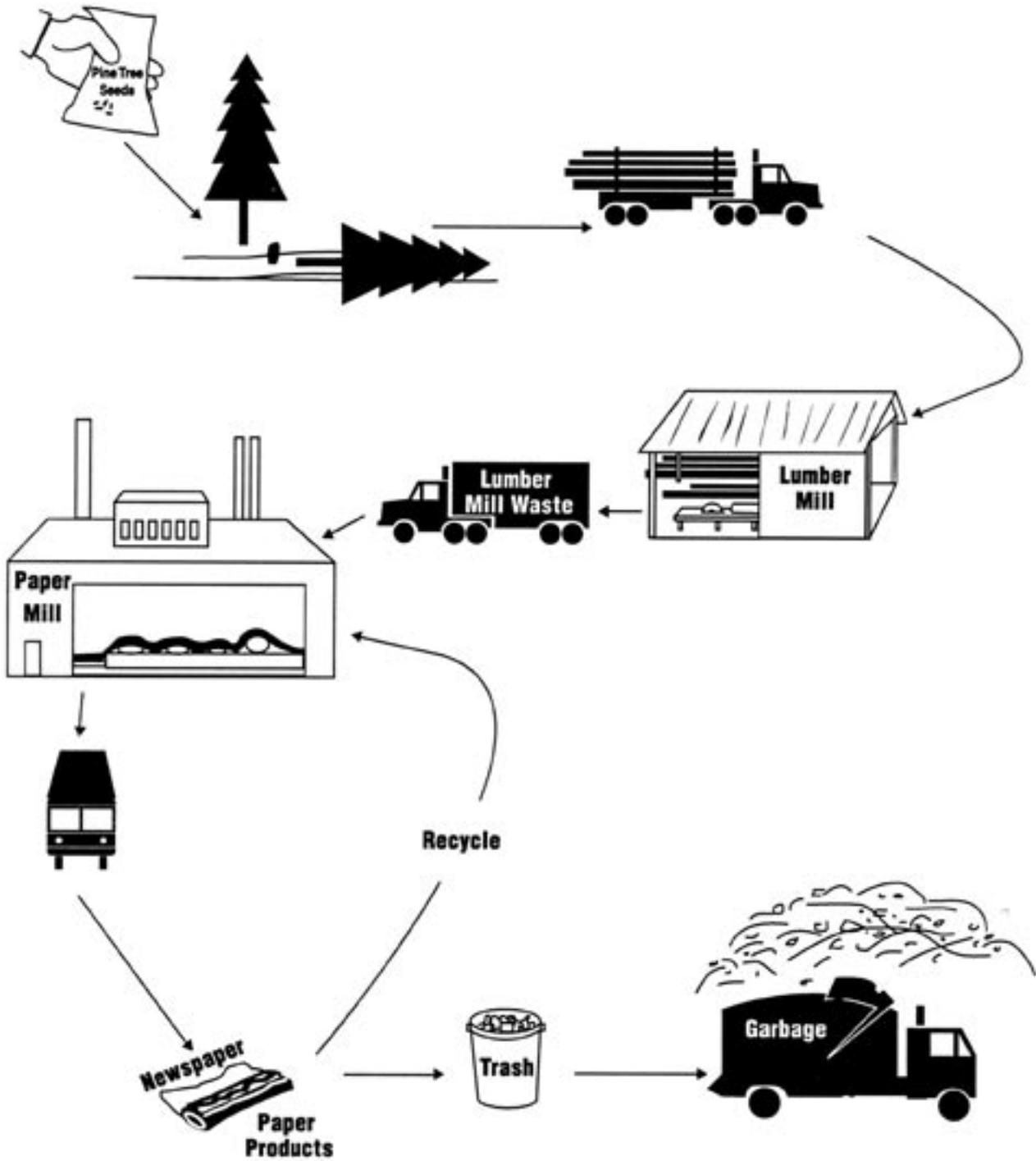
Websites

See “Appendix F–V, Recycling websites” for a list of websites related to recycling.

INSTRUCTIONS FOR GROUP INVESTIGATIONS CONCERNING RECYCLED PRODUCTS

<p>Group 1: Research the cost of paper not made from recycled fibers to paper made from recycled fibers.</p> <ul style="list-style-type: none"> • What kind of paper does our school purchase? • Why does our school purchase the kind of paper it does? <p>Design or invent an item that can be made from recycled materials. Remember that in order to recycle something, you need to make a new item out of an old item.</p>	<p>Group 2: Research the differences between recycled and nonrecycled paper.</p> <ul style="list-style-type: none"> • Take the two papers and put a code on each kind so only you know which one is which. • Have different people feel, write on, draw on, and examine images that have been copied on them. • Record their ideas of which one is recycled and which one is not. (As a control, give the same kind of paper to some testers.) <p>Design or invent an item that can be made from recycled materials. Remember that in order to recycle something, you need to make a new item out of an old item.</p>
<p>Group 3: Research the differences between recycled paper and nonrecycled paper.</p> <p>Take ten sheets of each kind of paper and test each by writing, drawing, and copying on them; and observe any differences between the two papers. Compile your results.</p> <p>Design or invent an item that can be made from recycled materials. Remember that in order to recycle something, you need to make a new item out of an old item.</p>	<p>Group 4: Do research on items made from recycled plastic and other materials. What kind of items are made from recycled materials? Compile your results.</p> <p>Design or invent an item that can be made from recycled materials. Remember that in order to recycle something, you need to make a new item out of an old item.</p>

CLOSING THE LOOP WITH RECYCLED PAPER PRODUCTS



BACKGROUND INFORMATION FOR THE TEACHER

After an item is recycled into another product, it is important for that item to be purchased by a consumer. When a one-time-use item is made, bought, and used by a consumer; discarded in a trash can; and then taken to a landfill, the energy and materials used to make that item are wasted. Additional natural resources and energy are needed to replace that item.

Most people assume that there will always be natural resources and energy sources to replace and manufacture new items. However, those natural resources (e.g., bauxite and other minerals) and energy resources (e.g., fossil fuels, such as petroleum and coal) that are not renewable are in limited supply. Once an object is in a landfill, it is usually no longer available for use again. This one-way or linear approach to managing waste often wastes natural resources.

When an item is recycled, the material is being reused to make a new item. This cycling approach is preferable because natural resources are conserved. Making products from recycled materials saves natural resources compared to using raw materials to make products. In addition, if recycled materials are used to make products, large amounts of energy needed to acquire and process the raw material can be conserved. However, the recycling process is not complete until the “loop is closed,” and that means buying products made from recycled materials. Manufacturing companies make what people buy, and if more people buy recycled products, more recycled products will probably be placed on the market. Consumers can increase demand when they buy products made from recycled materials.

Some paper that is sold as “made from recycled paper” is really made from paper that has never been used. This paper includes scraps and pieces obtained from paper manufacturing companies (e.g., the cut ends of paper rolls when these are cut to standard-sized paper) and printing plants. This type of waste paper is called pre-consumer, since it was never used by consumers. On the other hand, post-consumer waste paper is paper that was used for printing or writing. Recycled paper containing post-consumer waste is truly recycled paper and allows the consumer to “close the loop.”

Often recycled products are more expensive to the consumer and, therefore, offer little incentive for the purchaser. In some cases it is because there is not a high enough consumer demand to make large productions of the recycled materials. In other cases recycled materials might cost more because of the costs that manufacturing companies need to recover for purchasing new machinery or for modifying their existing machinery to handle recycled products.

Another reason that recycled products tend to cost more is because the consumer does not pay the true cost of items made from raw materials. Many laws and policies were developed many years ago when it was believed that the availability of natural resources was limitless. As a result, present government subsidies, tax breaks, depletion allowances, and cheap access to the use of public lands support many logging and mining industries.¹ This allows certain natural resources to be manufactured into products that consumers can buy at a relatively low cost.

If the true costs of items made from raw materials were charged, this would include health costs (associated with air and water pollution as a result of the manufacturing of raw materials) and costs for repairing environmental damage to the land caused by some improper logging and mining practices. When these costs are reflected in the market price, products made from raw materials would be much more expensive than those made from recycled materials.

Another obstacle to recycled goods is psychological—Americans tend to value new items, and those made with recycled materials may be viewed as “used” and therefore less desirable. In addition, many people do not see garbage as a problem and want the convenience of using something once, then throwing it away. Yet buying products made from recycled materials is part of the public’s responsibility for closing the loop. This helps to bring natural resources, once destined for landfills, back into the cycle to make new products and lowers the amount of raw natural resources needed to be acquired (e.g., through mining, extraction, harvesting).

¹G. Tyler Miller, Jr. *Environmental Science: Working with the Earth* (Fifth edition). Belmont, Calif.: Wadsworth Publishing Company, 1995, pp. 348–349.

Many items are currently made from recycled material. These include copy paper, paper towels, toilet paper, cereal and other boxes; aluminum cans; and some plastics (benches, clothes, shoes, insulation in jackets).

Inventions, technology, and marketing are the key elements to make additional products out of recycled materials available to consumers.

Manufacturing companies should be encouraged to make products from recycled materials. Businesses need to use and promote these products and community members need to buy them.

Additional information on purchasing recycled products is provided in "Appendix B-III, Recycling."

Some Catalogs That Feature Recycled Products

Note: The listing of a company catalog below does not imply endorsement or promotion of the company by the California Integrated Waste Management Board.

Animal Town
P.O. Box 485
Healdsburg, CA 95448
1-800-445-8642

Co-op America
1612 K Street, NW, Suite 600
Washington, DC 20006
(202) 872-5307

The Eco Zone
RR2, Box 2210
Brackney, PA 18812
717-663-2962
1-800-874-2310

Hammermill Papers
2064 West 16th Street
Erie, PA 16505
1-800-892-5467

Harmony: Products in Harmony with the Earth
360 Interlocken Blvd., Suite 300
Broomfield, CO 80021
1-800-869-3446

Real Goods
555 Leslie Street
Ukiah, CA 95482-5576
1-800-762-7325

Signature Marketing
134 West Street
Simsbury, CT 06070
(860) 658-7172