

## Lesson A1–6

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# Understanding Recycling and its Relationship to the Environment

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**Unit A.** Natural Resources

**Problem Area I.** Introduction to Natural Resources

**Lesson 6.** Understanding Recycling and its Relationship to the Environment

### New Mexico Content Standard:

**Pathway Strand:** Natural Resources and Environmental Systems

**Standard: I:** Recognize importance of resource and human interrelations to conduct management activities in natural habitats.

**Benchmark: I-A:** Identify resource management components to establish relationships in natural resource systems.

**Performance Standard:** 2. Identify organizations and agencies involved in resource management. 3. Identify impacts by humans on natural resources.

**Student Learning Objectives.** Instruction in this lesson should result in students achieving the following objectives:

1. Understand the recycling process.
2. Understand the importance of recycling.
3. Identify ways in which people can make a difference through recycling.
4. Identify items that can be recycled.
5. Understand the composting process.

**List of Resources.** The following resources may be useful in teaching this lesson:

**Recommended Resources.** One of the following resources should be selected to accompany the lesson:

Porter, Lynn, et al. *Environmental Science and Technology*. 2<sup>nd</sup> Edition. Upper Saddle River, New Jersey: Prentice Hall Interstate, 2003. (Chapter 21)

Lee, Jasper S., et al. *AgriScience Discovery*. Upper Saddle River, New Jersey: Prentice Hall Interstate, 2003.

*The 3R's Activity Book: An Educator's Guide To Fun Recycling Projects*. Illinois Department of Commerce and Community Affairs and University of Illinois Extension.

**Other Resources.** The following resources will be useful to students and teachers:

Lee, Jasper. *Natural Resources and Environmental Technology*. Danville, Illinois: Interstate Publishers, Inc., 2000.

## **List of Equipment, Tools, Supplies, and Facilities**

- Writing surface
- Overhead projector
- Transparencies from attached masters
- Copies of student lab sheets
- Materials to make a mini compost bin (Objective 5)
- Book with picture of compost bin

**Terms.** The following terms are presented in this lesson (shown in bold italics):

- Compost
- Composting
- Microbes
- Natural Resources
- Nonrenewable natural resources
- Recycling
- Remanufacturing
- Renewable natural resources
- Reusing

**Interest Approach.** Use an interest approach that will prepare the students for the lesson. Teachers often develop approaches for their unique class and student situations. A possible approach is included here.

Ask students to develop a list of advantages of recycling. Answers that you may want to look for could be: reduces pollution, save natural resources, saves energy, saves money, saves landfill space, and creates recycling jobs. In addition, use TM: A1–6A to create student interest in the importance of recycling.

## Summary of Content and Teaching Strategies

**Objective 1:** Understand the recycling process.

**Anticipated Problem:** What is recycling?

- I. Recycling is reusing a product or using waste materials to make a new product. In recycling, products are broken down, reprocessed, and returned to active use instead of being discarded. Recycling is a key component of waste management and is vital to the conservation of natural resources. In addition, recycling will save energy and extend the life span of landfills. As the population has increased in the United States, the amount of waste generated has increased dramatically. As landfills begin to fill, recycling is quickly becoming a necessity.
  - A. Reusing is a form of recycling. Reusing is using a product again without remanufacturing. Cleaning a glass bottle after use and refilling it is a good example of reusing a product.
  - B. Remanufacturing is also a form of recycling. Making a previously used product into another product is defined as remanufacturing. For example, aluminum, steel, plastic, and glass containers can all be melted down and reformed into new containers.

Use TM: A1–6B to illustrate the fact that waste materials require a considerable amount of time to degrade thus is important to recycle to extend the life span of landfills.

**Objective 2:** Understand the importance of recycling.

**Anticipated Problem:** Why is recycling important?

- II. Recycling is important for numerous reasons. For instance, recycling conserves natural resources, reduces pollution, saves energy, saves money, saves landfill space, and creates recycling jobs.
  - A. Natural resources are raw materials supplied by nature such as minerals, water, and plants. Any item that is produced, used and thrown away comes from natural resources. Natural resources are classified as renewable and nonrenewable.
  - B. Renewable natural resources are replenishable. Examples include trees and other plants, animals, and water.

- C. **Nonrenewable natural resources** can't be replaced. Examples include minerals, natural gas, coal and oil.
- D. Recycling helps to reduce pollution by reducing the demand for the incineration of waste and by reducing the manufacturing of new items.
  - 1. Recycling saves energy. To illustrate this point, it takes half as much energy to make a recycled newspaper as it takes to make fresh newsprint from trees.
  - 2. Recycling saves money. For example, scrap aluminum is about half the price of raw aluminum.
  - 3. Recycling will help to save landfill space, which is very important due to the fact that the creation of waste continues to increase as the population grows. In addition, the ability to develop new landfill sites will continue to become increasingly more difficult.
  - 4. Recycling helps in the creation of jobs due to the need to separate and remanufacture the waste.

### **Objective 3:** Identify ways in which people can make a difference through recycling.

**Anticipated Problem:** How can people make a difference through recycling?

- III. By practicing the four R's anyone can make a difference. The four R's are reduce, reuse, recycle, and rebuy.
  - A. Reduce—reduce the amount of waste created. Listed below are ways in which people can reduce waste:
    - 1. Give away or sell things that are no longer used, instead of throwing them away.
    - 2. Compost yard waste.
    - 3. Use paper on both sides.
    - 4. Borrow things that you don't use very often, instead of buying them.
    - 5. Don't use disposable utensils, cups, and plates.
  - B. Reuse—using products more than once. Listed below are ideas for reusing products:
    - 1. Reuse glass containers to store food.
    - 2. Pack lunches in reusable containers instead of using lunch sacks.
    - 3. Use grocery bags to hold garbage instead of buying garbage bags.
  - C. Recycle—changing one product into another. If items are not reusable, then be sure to recycle the product if at all possible.
  - D. Rebuy—buying products made from recycled materials. Buying recycled products completes the cycle. If you don't buy recycled products, it defeats the purpose of recycling.

## **Objective 4:** Identify items that can be recycled.

### **Anticipated Problem:** What can be recycled?

- IV. Many types of materials can be recycled. Check with local recycling centers to see what items they accept for recycling. The following materials can be recycled:
- A. Aluminum—Aluminum is recyclable, in fact, about two-thirds of all aluminum cans in the United States are recycled.
  - B. Paper—Most paper products can be recycled. Nearly half of all wastepaper in the United States is recycled.
  - C. Glass—Most glass can be recycled. It is important to separate the colors. Colored glass should not be mixed with clear glass.
  - D. Plastics—It is important to recycle plastic as it typically takes 200 to 400 years to decay in a landfill. Plastic items are coded based on the type of plastic used in making the product. In order to recycle plastic, it must be sorted by codes.
  - E. Metals—Metals from various products can be remanufactured into different products. For example, metal from old cars can be recycled.
  - F. Lubricating Oils—Oil dumped into a water source or on the ground could cause pollution problems. It is recommended that used oils are collected and recycled.

## **Objective 5:** Understand the composting process.

### **Anticipated Problem:** What is composting?

- V. **Composting** is a waste management technique in which organic matter is decomposed through the action of microbes and other decomposers such as earthworms. **Microbes** are microscopic organisms such as bacteria and fungi. The composting process yields **compost** that can be used as soil amendment to enrich or improve the consistency of soil. Composting turns organic matter, such as grass clippings, fallen leaves, or food waste into a rich, natural fertilizer.
- A. The composting process requires organic matter, decomposers, water, and oxygen. When compost bins have sufficient water and air, bacteria will thrive. Bacteria can generate temperatures of up to 150 degrees Fahrenheit. A mixture of several materials will decompose faster than a single material and adding water and partially decomposed animal manure promotes bacterial action, which leads to quicker decomposition.
  - B. Composting can be used on a large scale by waste disposal systems or on a small scale by people at their homes. Compost bins vary in design and construction; they are usually made of wood or concrete walls. The following will aid in the development of a successful compost bin:
    1. Place coarse stems and twigs at the bottom of the compost bin.
    2. Alternate a one-inch layer of soil with two inches of organic waste, add small amounts of fertilizer, and add water.

3. Add a one-inch top layer of soil on the completed pile.
4. Add earthworms
5. Add water periodically to keep the pile moist but not soggy.
6. Promote air circulation.

Use TM: A1–6C to show students a typical home compost bin and use TM: A1–6D to show students the method of alternating layers of material in the compost bin.

**Review/Summary.** Focus the review and summary of the lesson around the student learning objectives. Call on students to explain the content associated with each objective.

**Application.** Application can involve one or more of the following student activities using attached lab sheets:

**Evaluation.** Evaluation should focus on student achievement of the objectives for the lesson. Various techniques can be used, such as student performance on the application activities. A sample written test is attached.

## **Answers to Sample Test:**

### **Part One: Matching**

1 = b, 2 = e, 3 = a, 4 = f, 5 = c, 6 = d

### **Part Two: Completion**

1. compost
2. plastic
3. remanufacturing
4. renewable
5. air and water
6. recycling

### **Part Three: Short Answer**

1. answers may vary, examples—grass clippings, leaves, food waste
2. reduce, reuse, recycle, rebuy
3. conserves natural resources, reduces pollution, saves energy, saves money, saves landfill space, creates recycling jobs.
4. plastic is sorted based on the code printed on the item.
5. glass is sorted by color
6. answers may vary, examples include—compost yard waste, use paper on both sides, don't use disposable utensils, cups, or plates.

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**Test**

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**Lesson A1–6: Understanding Recycling and its Relationship to the Environment****Part One: Matching**

Instructions. Match the term with the correct response. Write the letter of the term by the definition.

- |                      |                                   |
|----------------------|-----------------------------------|
| a. composting        | d. microbes                       |
| b. reusing           | e. nonrenewable natural resources |
| c. natural resources | f. recycling                      |

- \_\_\_\_\_ 1. Using a product again without remanufacturing  
\_\_\_\_\_ 2. Natural resources that cannot be replaced such as coal and oil.  
\_\_\_\_\_ 3. Waste management technique in which organic matter is decomposed through the action of decomposers.  
\_\_\_\_\_ 4. Reusing a product or using waste materials to make a new product.  
\_\_\_\_\_ 5. Raw materials supplied by nature such as minerals, water, or plants.  
\_\_\_\_\_ 6. Microscopic organisms such as bacteria and fungi that breakdown organic matter.

**Part Two: Completion**

Instructions. Provide the word or words to complete the following statements.

1. \_\_\_\_\_ can be used as a soil amendment to enrich or improve the consistency of soil.
2. It typically takes \_\_\_\_\_ 200—400 years to decay in a landfill.
3. \_\_\_\_\_ is defined as making a previously used product into another product.
4. \_\_\_\_\_ natural resources are replenishable and include plants, animals, and water.
5. When compost bins have sufficient \_\_\_\_\_ and \_\_\_\_\_, bacterial will thrive.
6. \_\_\_\_\_ is vital to the conservation of our natural resources.

### **Part Three: Short Answer**

**Instructions.** Provide information to answer the following questions.

1. Name three items that could be added to a home composting bin.
  2. What are the four R's of the recycling process?
  3. List six reasons why recycling is important.
  4. Prior to recycling, plastic is sorted based on what criteria?
  5. Prior to recycling, glass is sorted based on what criteria?
  6. Name two ways in which someone could reduce waste?

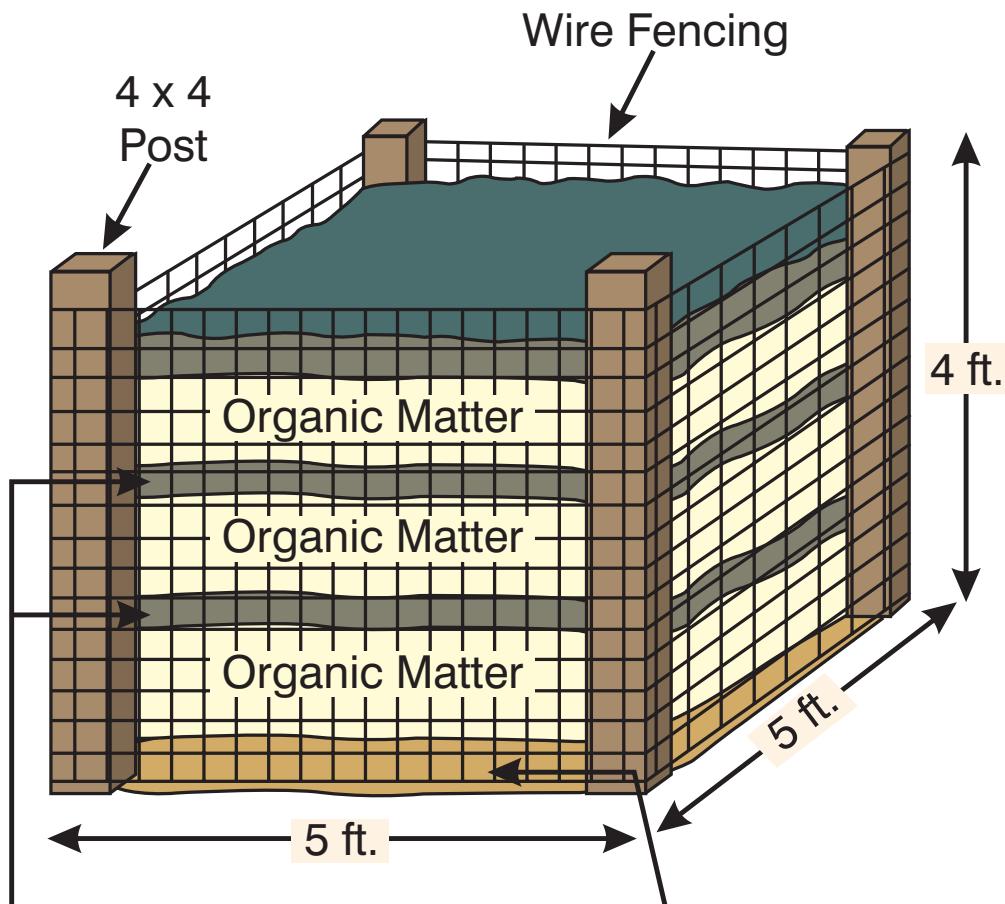
## RECYCLING FACTS

- ◆ **Americans throw away enough aluminum every three months to rebuild our entire commercial air fleet.**
- ◆ **Every year Americans throw away enough office and writing paper to build a wall 12 feet high from New York to Los Angeles.**
- ◆ **Americans throw away about 2.5 million plastic bottles every hour.**
- ◆ **7 million cars are thrown away each year.**

# HOW LONG DOES IT TAKE TO DEGRADE?

- ◆ **Banana peel: 3 to 4 weeks**
- ◆ **Paper bag: 1 month**
- ◆ **Wool sock: 1 year**
- ◆ **Wood: 10–15 years**
- ◆ **Tin can: 80–100 years**
- ◆ **Aluminum can: 200–500 years**
- ◆ **Disposable diapers: 500–600 years**
- ◆ **Plastic jug: 1 million years**
- ◆ **Glass bottle: unknown**
- ◆ **Styrofoam: eternity**

# DESIGN FOR A SMALL HOME COMPOSTING BIN

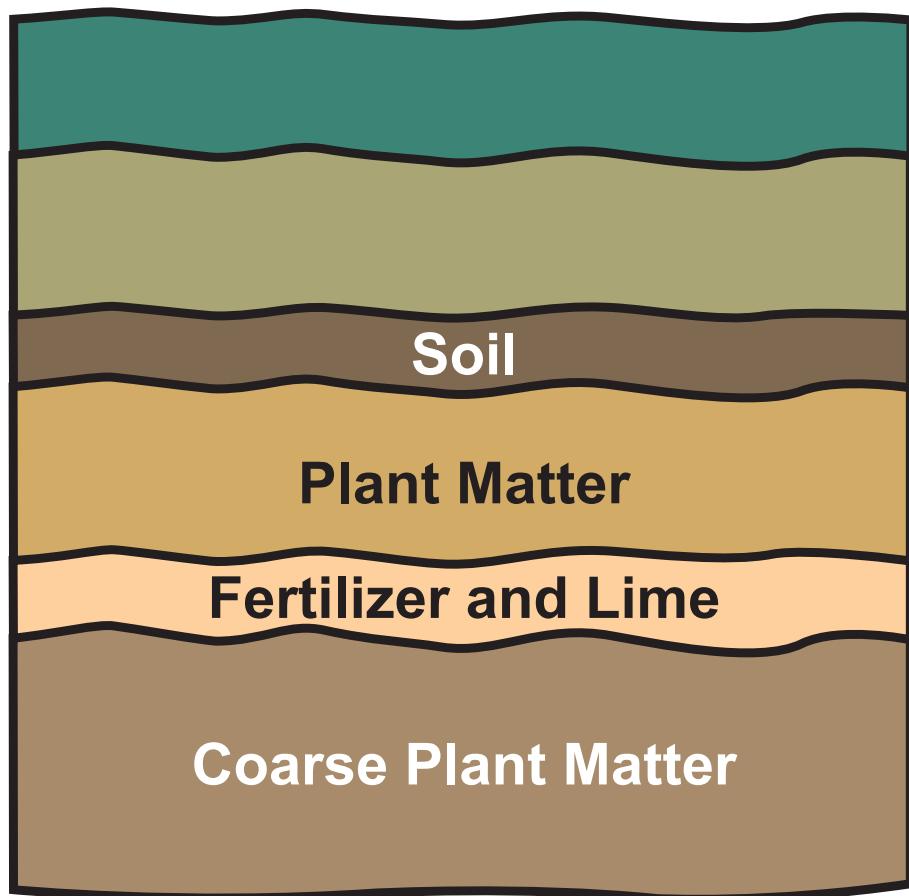


1 in.-2 in. soil, 2 cups  
10-10-10 or 8-8-8  
fertilizer, 2 cups  
agricultural lime

1 ft. layers 6-8 in. twigs  
or brush for aeration

(Courtesy, Interstate Publishers, Inc.)

# ALTERNATING LAYERS OF MATERIAL IN A COMPOST PIT



(Courtesy, Interstate Publishers, Inc.)