

Unit 8: How We Can Conserve Water

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Unit 8: How We Can Conserve Water

Objectives: Each student will be able to:

- F Explain the importance of practicing water conservation.
- F List ways we can conserve water

Words to Remember:

\$ aerator	\$ decompose	\$ landscape	\$ textile
\$ compost	\$ drought	\$ micro irrigation	\$ TVA
\$ conservation	\$ erosion	\$ mulch	\$ xeriscape
\$ decay	\$ irrigation	\$ residue management	

Background Information

Water use has increased in recent years. We now use more water than ever before in our homes, our factories and on our farms. Some of this water can be cleaned and recycled for immediate reuse. Some of it cannot. The world's population continues to grow and we need more and more water for all these people. The more water we use, the more water we contaminate. This water must be cleaned before we can use it again or release it to the environment.

The amount of water we use for different operations is sometimes amazing:



The automobile industry uses four hundred billion gallons of water yearly to produce 5 million cars!

It takes 26 gallons of water to grow 1 ear of corn!



It takes 70 gallons of water to produce one gallon of gasoline.

About 12,000 gallons of water are needed to grow one bushel of wheat.



It takes about 300 gallons of water to produce just one loaf of bread.



A cow must drink about 36 gallons of water to produce 12 gallons of

milk.

People use a lot of water in their homes. A 5 minute shower can use about 25 gallons of water. Many toilets still use about 5-7 gallons of water to flush.

During the 1800's, water use was a lot less. People did not have cars to drive. Home conveniences such as toilets, garbage disposals, washing machines or dishwashers did not exist. We did not water our lawns and gardens. Large factories and electric power plants did not exist. Today, modern conveniences and factories use a lot of water. Water use goes up as the world's population grows. This puts an even greater demand on our fresh water resources. We sometimes need more water than is readily available. We can make more water available by cleaning it to use it again. Sometimes, we even take the salt out of sea water so we can use it. But, we return much of our used water, which is now polluted, back to the environment.

Water Conservation. One way to reduce water pollution is to change our water use habits by practicing water **conservation**. Every industry and private citizen has a responsibility to use good water conservation habits.



Water sources are abundant in the state of Alabama. These resources include 14 major river

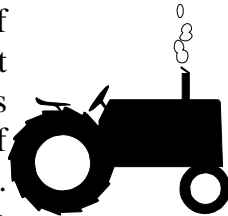
systems and the coastline on the Gulf of Mexico. The average annual rainfall in Alabama is the second highest in the nation. Louisiana is the only state with more average annual rainfall.

With this much water, you may think that people in Alabama need not worry about having enough water. However, in Alabama, the average use of water per person has increased 150% since 1955. Much of the water in the Coosa, Tallapoosa and Alabama river systems is used seven to fifteen times before it reaches the Gulf of Mexico. (The water is used, treated and then returned back to the river system--by many different users). This poses a threat to Alabama's water supply. To maintain both water quantity and quality we need to practice responsible use of our water supplies. The following sections discuss ways we can conserve water.

Water Conservation on the Farm. In the United States, the largest user of water is agriculture. Water is needed for crops, for mixing fertilizers and pesticides, and as drinking water for farm animals.

Because of adequate rainfall most years, agriculture is not the largest user of water in Alabama. However, water use on farms is increasing. Since agriculture is a very important industry in our state, it is necessary for farmers to conserve water.

There are many ways to conserve water on the farm. One way is to find alternate methods for watering crops. Some methods of watering reduce evaporation losses. Others reduce soil leaching losses. Another way to conserve water is to grow crops suitable for the climate and to use efficient farm practices. Water that is used to transport animal wastes and wash water can often be recycled and used again for other purposes.



When there isn't enough rain to meet crop needs, farmers may supply additional water in a process called **irrigation**. Water used for crop irrigation accounts for one of the largest uses of water in agriculture.

However, irrigation can waste a lot of water. Some of the water evaporates. A lot of the water simply soaks into the ground and is not used by plants.

The **micro irrigation** method (also called drip and trickle irrigation) is an alternative way to irrigate some crops. This method reduces water waste. It delivers water directly to each plant through a series of pipes and attachments that allow water to drip slowly.

Moderate to heavy rainfall prior to planting and after harvesting crops can cause **erosion** and rapid storm water runoff. One way to reduce water loss from runoff is to leave more plant residues (the part of the plant left over after harvesting) on the soil surface. This practice is called **residue management**. Plant residues protect the soil from falling raindrops which tear soil particles apart.

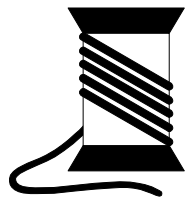
By growing crops suitable to the particular climate, farmers can help reduce water waste. The same applies to home landscapes. For example, rice requires a lot of water to grow. California grows rice, but the state does not always have enough water to support this crop's water needs. There is often too little water to meet the people's need for enough drinking water. Choosing a crop not suited to the climate may put a strain on the water supply. The result is too little water to meet all water needs.

Water Conservation by Business and Industry. In industry, water is used to manufacture products and to make steam. Steam is used to generate power to run engines. Water is also used to cool hot equipment and for air conditioning. Power plants, factories, hospitals, restaurants and

car washes all depend upon water.

Actually, much of the water used in industry is not lost in use (as happens with evaporation during irrigation). It is simply returned to its source after use. Prevention of pollution, rather than conservation, is more of a concern with industrial wastewater. After water is used in industry it can be very hot and contain contaminants; these may cause problems when the water is released into the environment.

The major industries in Alabama are associated with plant and animal production. These include the woodpulp, paper, timber and **textile** industries. Many industries depend on agriculture (for example, cotton and forest products) for their manufactured or processed products. Therefore, you might say if we conserved water in agriculture we are conserving water in industry for the final product.



Water Conservation in the Home. Everyone can help conserve water by using water wisely at home. Of the water used in homes, each person uses only about 1/2 gallon daily for drinking purposes. Tasks such as cooking, cleaning, bathing, flushing toilets, watering our yards and washing cars account for the remainder. (See Figure 8.1). Changing a few of our habits can help reduce home water use. Some of the ways in which we can save water every day include the following:



✓ Install a flow restrictor or water saving nozzle on your showerhead. This can reduce water flow up to 50%. Install an **aerator** on your kitchen faucet.

✓ While waiting for bath water to get warm, collect the cold water in a bucket. Use this water for watering plants.

✓ Use ultra low-flow toilets. These use

less than 2 gallons of water per flush. An alternative is to fill a 1/2 to 1 gallon plastic container with water. Put some rocks in the bottom of the container and place it in the flush tank of the toilet. This will replace 1/2 to 1 gallon of the water used to fill the toilet bowl each time you flush.

✓ Use only the amount of water needed when washing a load of clothes.

✓ Use a small pan of water to wash vegetables and fruits instead of letting the water run continuously.



✓ Use a **compost** pile for food scraps rather than running the garbage disposal which needs a lot of water to operate. Adding yard wastes to this pile will make good **mulch** for outdoor plants. Mulch around plants helps keep water in the soil.

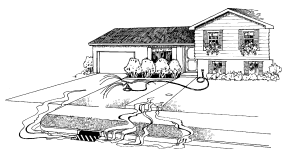
✓ Keep a jug of drinking water in the refrigerator instead of running the water waiting for it to get cold.

✓ Use a broom or blower instead of a water hose when cleaning sidewalks and driveways.

✓ Plant shrubs and trees in your yard suitable for the area, type of soil and climate. **Xeriscape** is a term that describes a way to **landscape** that reduces the need for watering.



✓ Water your lawn and outdoor plants early in the morning or late in the evening to help reduce evaporation losses. And be careful not to let your sprinklers waste water by running out onto the street or driveway!

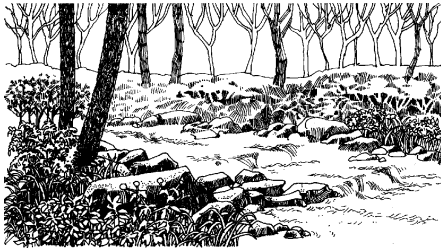


One way to conserve water is to have a plan to save our water supplies. The **Tennessee Valley Authority (TVA)** is an

example of an agency which manages water supplies. It is a governmental agency which helps to manage the Tennessee River watershed. This watershed includes northern Alabama.

TVA has built many reservoirs. These reservoirs store water supplies for use in times of **drought**. They also help control flooding during periods of high rainfall. They help provide water for hydroelectric power plants.

Water conservation saves money. It helps protect the environment and reduces pollution. Saving water also helps preserve our water supplies for future generations. Everyone must take responsibility for helping to conserve our water resources.



Questions for Review

1. Name some reasons why we now use more water than ever before.
2. What is water **conservation**?
3. What is the largest consuming user of water in the United States?
4. Why is Alabama agriculture not as dependent upon water for irrigation as some other states?
5. What are some of the farming methods that can reduce water loss?
6. Why should business and industry focus on prevention of water pollution?
7. Name some ways we can conserve water in our homes.
8. What is the **Tennessee Valley Authority**?
9. What are some of the purposes of reservoirs?

Questions for Thought

1. If two-thirds of the earth is covered with

water, why should we worry about water conservation?

2. Reservoirs are lakes usually made by damming up streams to store water. What are some possible damaging effects to the environment when reservoirs are built?
3. If water is constantly recycled in the hydrologic cycle, why should be concerned about conserving water?
4. Suppose you worked with a local government agency. What are some of the things you could do to encourage your community to conserve water?

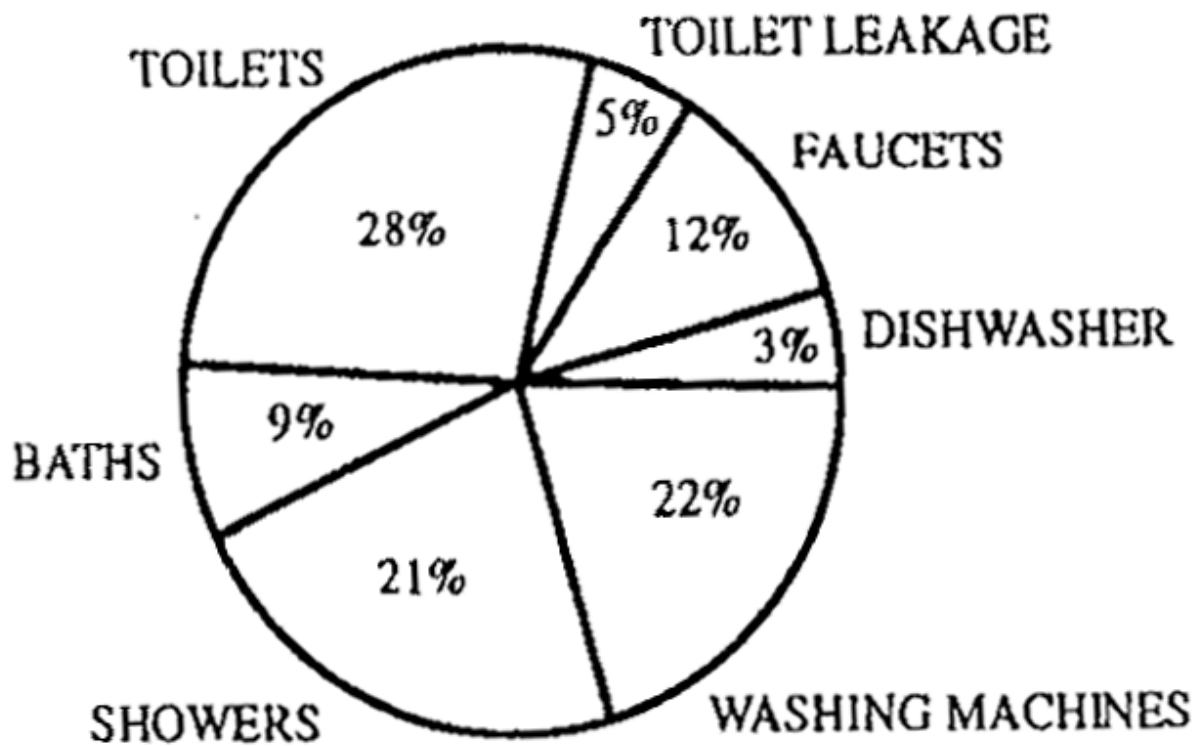
Service Learning Idea:

"Give Water A Hand"

The American Water Works Association is sponsoring a project for youth to help solve water problems. This program is called "Give Water A Hand." Free materials are provided and include guidebooks for four areas: school, home, farm and community. A teacher's guide is also available. Groups may wish to complete a project and submit it in a contest. For more information, call Anne Guarnera in AWWA's Public Affairs Department in Denver, Colorado at (303) 794-7711, ext. 4114 or write to:

American Water Works Association
Public Affairs Department
6666 W. Quincy Ave.
Denver, CO 80235

FIGURE 8.1: Average Water Use Inside the Home



Source: Conserving Water At Home. University of Georgia Cooperative Extension Service, Circular 819-1.

FACT SHEET: How We Can Conserve Water

Interesting facts to remember about how we can conserve water:

1. Although water is recycled in the environment, we must take care to not use more fresh water than is available.
2. More water is used today than ever before by industry, agriculture and people in their homes.
3. In Alabama, water consumption has increased by 150% in the last 40 years.
4. Agriculture is the largest *consumptive* user of water in the United States (water is used up or lost by processes such as evaporation or loss during irrigation).
5. Two methods used on farms which help conserve water are: **micro irrigation** and **residue management**.
6. Changing our water use habits at home is one way everyone can be involved in water conservation.
7. Plumbing devices which help conserve water are: **aerators** on faucets, flow restrictors on showerheads and low-flow toilets.
8. Proper management of water resources by governmental agencies (such as the **TVA**) helps to keep water supplies plentiful.
9. Water conservation saves money, helps protect the environment, reduces pollution and helps preserve water supplies for future generations.

GLOSSARY: How We Can Conserve Water

aerator	A device that can be attached to faucets which mixes air into the water flow.
compost	The mixture made of mainly decayed plant matter; it is used to condition and add nutrients to the soil.
conservation	The act of protecting and preserving something, particularly our natural resources.
decay	The break down of plant or animal matter by bacteria or fungi.
decompose	To break down into basic elements; to rot.
drought	A period of little or no rain.
erosion	The process of soil being worn away; it can be caused by water or wind.
irrigation	The process of supplying water to land by the use of ditches, pipes or canals.
landscape	To make an area of land more beautiful by planting trees, shrubs, grass, etc.
micro irrigation	A method of watering crops in which water is delivered directly to plants through a series of pipes and attachments that allow water to drip slowly.
mulch	A layer of leaves or straw placed around plants; it reduces evaporation and helps water to drain into the soil.
residue management	A farming method which reduces water loss by leaving the remains of crops on the soil after harvesting; it helps prevent erosion.
textile industry	The industry which produces cloth or fabric and/or clothing.
TVA	The Tennessee Valley Authority--a governmental agency which helps manage the Tennessee River watershed.
xeriscape	A method of landscaping which conserves water; it reduces the use of grass and encourages the planting of native shrubs, trees and groundcover.

WORKSHEET 8.1: Definitions

Directions: In the left column are definitions to the *Words to Remember* and in the right column are the words. Match the words with the correct definitions. Place the letter of the correct word in the blank to the left of the definition.

-
- | | | |
|-----------|--|-----------------------|
| _____ 1. | A period of little or no rain. | A. aerator |
| _____ 2. | A method of landscaping which conserves water; it reduces the use of grass and encourages the planting of native shrubs, trees and groundcover. | B. compost |
| _____ 3. | To make an area of land more beautiful by planting trees, shrubs, grass, etc. | C. conservation |
| _____ 4. | The process of soil being worn away; it can be caused by water or wind. | D. drought |
| _____ 5. | The act of protecting and preserving something, particularly our natural resources. | E. erosion |
| _____ 6. | A farming method which reduces water loss by leaving the remains of crops on the soil after harvesting; it helps prevent erosion. | F. irrigation |
| _____ 7. | The industry which produces cloth or fabric and/or clothing. | G. landscape |
| _____ 8. | The process of supplying water to land by the use of ditches, pipes or canals. | H. micro irrigation |
| _____ 9. | The mixture made of mainly decayed plant matter; it is used to condition and add nutrients to the soil. | I. mulch |
| _____ 10. | A layer of leaves or straw placed around plants; it reduces evaporation and helps water to drain into the soil. | J. residue management |
| _____ 11. | A method of watering crops in which water is delivered directly to plants through a series of pipes and attachments that allow water to drip slowly. | K. textile industry |
| _____ 12. | A device that can be attached to faucets which mixes air into the water flow. | L. TVA |
| _____ 13. | The Tennessee Valley Authority--a governmental agency which helps manage the Tennessee River watershed. | M. xeriscape |

WORKSHEET 8.2: Vocabulary

Find the following words in the puzzle below:

AERATOR
ALABAMA
COMPOST
CONSERVATION
DECAY
DROUGHT
EROSION

FLOODING
IRRIGATION
LANDSCAPE
LEAKS
MULCH
RAINFALL

RECYCLE
RESERVOIR
TVA
WATER
WATER METER
XERISCAPE

R X R A F R E S E R V O I R P W H I R W
E J N S V X Z B Y L D V E M O U K X A A
G N I D O O L F A C N F H A T N H T C T
A D O M N E X T Y P I M E L W O E M O V
I B C E Y U E D I S A F C A E R F N W A
M B L O E I C O S M M W A B F N T L O I
C T M M I R B C R Y L E I A W B L P I E
O M G N G A O K S C E O F M U A O J K N
N A L O D N I S W L D M G A F N W N B W
S J D K S G H U I N E O E N O G W Y H S
E U I E L F S S T O N G I I M E N G K A
R N R A C I D F I T N A T Y W H L T T X
V V K D E A P L G I R R I G A T I O N M
A P X S N K Y W M L Y O A Y B C S O Q L
T A M W I R K O N L A N D S C A P E I V
I R D D T J O E P Y V V L Y W Z I N X S
O Q Y A N Q C O I N P S N E R B X J A T
N L K S G J I H T Z Y K E E A S M W N U
C E A G B M U L C H O S L F I K T U Y D
M E T M O O N W T K Y E W I R U S X B T
H A T N W I R T A N S C H E M D O K I C
O T D Z N G O M C A O H C Y R T W N Q T
N I M W Y R T Y N O H Z X O E E H B F T
M W N Y P E A U I W G N U S M O T O A E
W M E A S C R N X T I G M T E P C Y U V
K O B Q O Y E H A N H O W K O I O S C C
X E R I S C A P E T N W O H W I N S E Z
S N W T M L S U R A E U E R I G I U T S
T Q E T C E I E N O T O Y N W M T X U E
W A T E R M E T E R O I S N B E N S O J

WORKSHEET 8.3: Facts About How We Can Conserve Water

Directions: Below are sentences with words left out. Fill in the blanks with the words provided. Each word may be used once. You may use the *Background Information* to help you.

aerator
agriculture
compost
conservation

irrigation
micro
preserve
reservoirs

residue management
Tennessee Valley Authority
water
xeriscape

During the 1800's, _____ use was a lot less. People did not have cars to drive. Home conveniences such as toilets, garbage disposals, washing machines or dishwashers did not exist. Water use goes up as the world's population grows. One way to improve our water use is to practice water _____.

In the United States, the largest *consumptive* user of water is _____ (although this is not the largest user of water in Alabama). When there isn't enough water to water crops, farmers need to supply water in a process called _____. This process accounts for one of the largest uses of water on farms. The _____ **irrigation** method helps to reduce water waste by delivering water directly to each plant through a series of pipes and attachments that allow water to drip slowly. A way to reduce **erosion** is the _____ method. This method reduces water loss by leaving crop remnants on the soil after harvesting.

Everyone can help to conserve water by using water wisely at home. Some of the ways in which we can save water include: installing an _____ on your kitchen faucet, using bath water to water plants and using low-flow toilets. To reduce the

need for a garbage disposal, you may make a _____ pile from food scraps.

We can plant shrubs and trees in our yards that are suitable for the area and climate.

_____ is a term that describes a way to landscape that reduces the need for watering.

One way to conserve water is to have a plan to save our water supplies. An agency which manages the Tennessee River watershed is the _____
_____. This agency has built many
_____ which help store water supplies. Water conservation protects our environment and helps to _____ our water supplies for future generations.

ACTIVITY 8.1: Building A Compost Pile

Goal:

To create a compost pile

Objectives:

- # To identify items that are appropriate for a compost pile
- # To demonstrate that composting can help in water conservation

Materials:

- F 4 wooden pallets or about 5 feet of screening or chicken wire
- F bricks or cinder blocks
- F wire
- F boards (2" x 4") about 3 feet long
- F shovel
- F bucket for collecting food scraps
- F long-stemmed thermometer

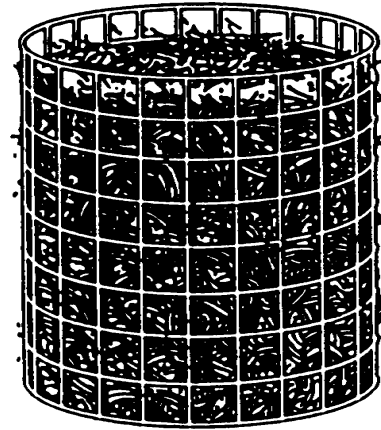
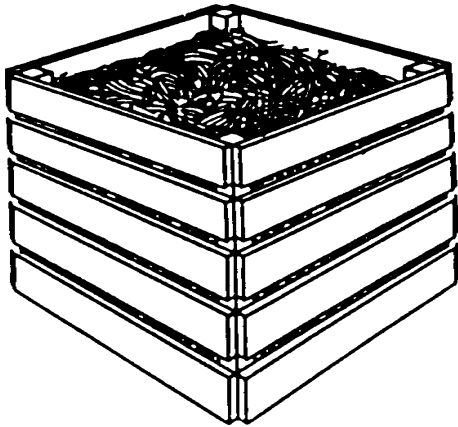
Background Information:

We can recycle our yard and food wastes by using them to build a **compost** pile. In a compost pile, microorganisms help these wastes **decay**. The decay process is something that occurs in nature. We speed up this process in a compost pile. A compost pile may take anywhere from several weeks to several months to decay. The length of time depends on the size and type of pile. Once the waste material has decayed, it is ready to use. The name of the decayed material is **compost**. Compost is useful to use as mulch and fertilizer in our yards and gardens.

Using compost around plants in our yards conserves water. Compost helps keep the water from evaporating and the soil from washing away. It helps clay and sandy soil retain water. Compost is a natural source of fertilizer. It reduces the amount of garbage sent to landfills or garbage dumps. It also prevents possible contamination of groundwater supplies. By composting our waste, we also save by not running our garbage disposals!

Procedure:

1. Find a good location for your compost pile. The location should be away from buildings and trees. The ideal spot is partially shady and drains well when it rains. The compost pile needs to be convenient to a water supply.
2. Place some cinder blocks or bricks on the ground in the place you've picked. Put the boards across the bricks. Or, you may place some large sticks or twigs in this spot. This will form the base of the pile and help provide for good air movement.
3. Place the 4 wooden pallets on their ends. Wire these together. This will form a square. Or, make a round cylinder with the screen and wire together. Place this on top of the boards.



4. Over the next week, begin collecting materials for your pile. The following are some things that may be put into a compost pile:

- \$ grass clippings
- \$ egg shells
- \$ fruit, vegetable scraps
- \$ tea bags
- \$ fireplace ashes
- \$ hair
- \$ cotton rags
- \$ shredded newspaper
- \$ coffee grounds
- \$ vacuum cleaner lint
(filters,too!)
- \$ dry leaves, small twigs

NOTE: Do not put any meat scraps, bones, grease, dairy products, breads, mayonnaise or peanut butter into compost. These items will attract pests and flies and also cause bad odors. Do not put any dog or cat feces into the pile. You should also avoid unwanted weeds, diseased plants or anything toxic.

Collect the scraps in a bucket and bring to class at your next meeting.

5. Bring grass clippings and leaves from your homes or look around your building for leaves and yard wastes.
6. Begin building your compost pile. Three layers are needed. The first layer should be brown particles such as dry

leaves or wood chips. The second layer should be green particles such as vegetable scraps or grass clippings. The top layer should be soil. Put about 2-3 parts brown materials to 1 part green matter. Cover these layers with a layer of soil.

7. The pile should be about 3 feet high to compost efficiently. When finished assembling the pile, moisten it with water. The pile should be just damp, not soggy.
8. The microorganisms in the soil layer will begin to break down the food and yard wastes. Turn the contents of the pile every few weeks to give it some air and to mix it well. After a while, the inside of the pile will begin to heat up. In fact, it may reach 150°! This means the microorganisms are at work. Keep the pile damp.
9. When the pile cools down and turns into a dark, crumbly material, it is ready for use as mulch and fertilizer.
10. Keep a record sheet for your compost pile. Record the dates it was started and turned. Keep a record of materials added to the compost pile and the temperature of the compost pile on a regular basis.

Discussion:

By composting yard and food wastes, we are recycling nutrients back into the soil. Microorganisms in soil help break down the waste materials. This action by bacteria in compost piles is similar to what happens in wastewater treatment plants where bacteria help to break down sewage. Water and air are also necessary for bacterial action in compost. We must keep the pile damp and turn it occasionally to aerate it.

The compost pile should remain odor free if properly maintained. If it is too wet or has too little air it may have a bad odor. Be careful not to add the items mentioned such as fatty foods and meat products. These will make it smell bad. If the compost pile develops a bad odor, add more leaves or dry materials, and turn it well.

The compost is ready to use when the temperature of the pile cools down and it turns into a dark, crumbly material. Put it around shrubs in your yard to help keep the soil moist. You can also mix it with potting soil for potted plants.

Discussion Questions:

1. Which materials added to the pile decayed the fastest?
2. What are some materials that will not **decompose**?
3. Why is water needed for the compost pile?
4. How hot did your pile get? What does this rise in temperature mean?
5. In which ways are we helping to conserve water by using a compost pile?

Extending The Idea:

Take the students outdoors to an area where there are fallen leaves. Dig a hole about 4-6 inches deep and observe the appearance of leaves when they have been buried in the ground. Explain that the leaf

breakdown seen here is nature's way of composting. When we build a compost pile, we are simply speeding up this natural process.

Desired Outcome:

Students will build a compost pile that decays in a timely manner. Proper materials should be added to the pile to prevent bad odors. The compost should be available for use within a few weeks to a few months.

Service Idea:

1. Find out if your city or town does anything useful with yard wastes. Some places shred limbs and twigs and dispose of them separately from other garbage. You may like to get an effort organized to make use of yard wastes in your community.
2. Have students start a collection of food wastes at their school. Meats, dairy and some other products should be avoided. Perhaps just vegetable and fruit peelings could be collected and added to their own or the community's compost pile.

References:

Composting Handbook. Alabama Cooperative Extension Service, Auburn University.

Composting: Nature's Way To Recycle. Cooperative Extension Service, Mississippi State University. Publication 1782.

Let's Reduce And Recycle: Curriculum For Solid Waste Awareness. U.S. EPA. EPA/530-SW-90-005. August, 1990.

Recycling Yard Wastes: Home Composting. Clemson University Cooperative Extension Service. Leaflet 48, October, 1991.

ACTIVITY 8.2: Checking For Leaks At Home

Goal:

To reduce water leaks in the home.

Objectives:

- # To check for common water leak problems in the home.
- # To demonstrate that leaky faucets and toilets are wasting water.

Materials:

- F food coloring
- F empty bowl or glass
- F Leak Test Record Sheet

Procedure:

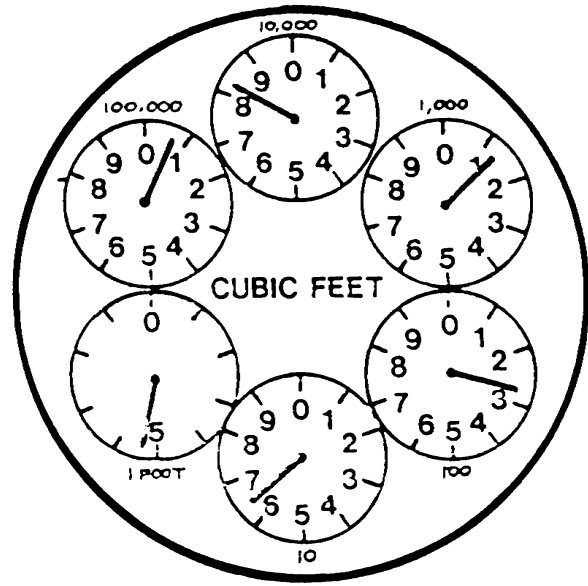
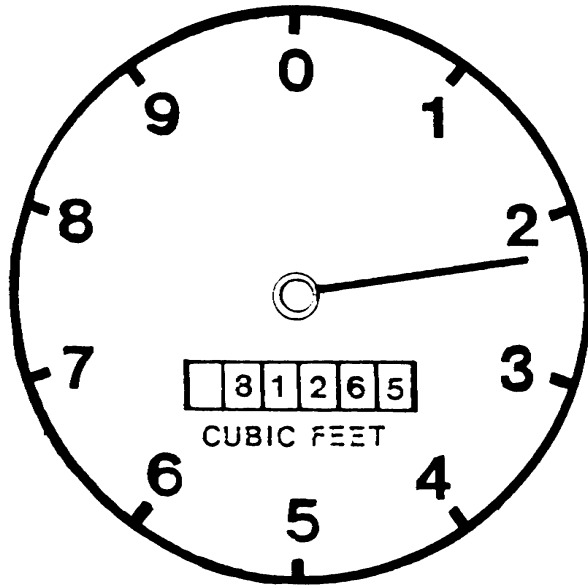
The following procedures will test for leaks in toilets, faucets and leaky pipes in the whole house.

TOILETS

CHECK A	<ol style="list-style-type: none">1. Make sure there are no wastes in toilet bowl.2. Take off tank cover.3. Put a few drops of food coloring in the tank water.4. Without flushing, check to see if any colored water has appeared in the bowl. If the water is colored, there is a leak.
CHECK B	<ol style="list-style-type: none">1. With cover still removed from tank, flush toilet.2. Wait 10 minutes.3. Check the refill tube in tank to see if any water is still flowing through it to the overflow pipe. If so, there is a leak.

FAUCETS

<ol style="list-style-type: none">1. Put a glass or bowl under the faucet in sink or bathtub.2. Leave glass or bowl in place for 1 hour.3. After 1 hour, check to see if any water has collected. If so, there is a leak. <p>NOTE: You may also check underneath sinks where the hot and cold valves are located. Try the same procedure--sometimes this is an area where leaks are found.</p>



LEAKY PIPES

1. Locate the water meter for your house. It may look like one pictured above.
2. Pick a time when everyone will be gone from the house (preferably for at least several hours) and no water will be used. Read the numbers on the meter and write them down.
3. After returning home, read the numbers again and write them down.
4. Is there any difference between the two numbers? If so, there is a leak somewhere in the plumbing of the house.

NOTE: If you have a meter like the one pictured on the right, begin with the highest number (100,000) and add on the numbers, in order, from highest to lowest. For example, the one in the picture would read 81,265 cubic feet--just like the one on the left.

Tell your parents if you have found any leaks. Sometimes installing a new washer is enough to fix the leak. Washers may be purchased at hardware stores. To fix major leaks, a plumber may have to be called.

Fill out the Leak Test Record Sheet on the next page for any leaks which you have found.

ACTIVITY 8.2: Checking For Leaks At Home

Leak Test Record List

TOILETS

No. toilets in home ____	#1	#2	#3
Location of toilet			
Results of Check A (water coloring)			
Results of Check B (refill tube flowing)			

FAUCETS

No. of faucets in home ____	#1	#2	#3	#4	#5	#6	#7	#8
Location of faucet								
Results of leak check								

LEAKY PIPES

Water Meter Readings	Time	Reading
1st Reading		
2nd Reading		
Difference (2nd reading-1st reading)		

Discussion:

Most water used at home is used in the bathroom. The bathroom is also the place where we can conserve the most water. By checking for leaks, we can see if we are wasting any of this water. Checking other faucets and pipes is also a good idea.

Discussion Questions:

1. Did you find any leaks in your home?
2. If you did find any leaks, is anyone going to fix them?
3. Before this exercise, did you know where your water meter was located?
4. Refer to Background Information for Unit 8. What are some ways you can conserve water in your home?
5. If you had to go outside and pump all of your water from a well, how do you think this would affect your water use?

Extending the Idea:

1. Invite an official from your local water authority to come to the class. Ask the water authority official to demonstrate how to read a water meter. He may also show you how to fix leaks. Some have pamphlets available on how you can help conserve water at home.
2. Ask students to bring copies of their last 2 water bills. Compare water

usage in the class. Note anyone who has water-saving devices. These devices include low-flow toilets or showerheads.

3. Use some of the ways mentioned in *Background Information* on how to save water at home and see if your next month's water bill is any lower. Get everyone in your family involved in water conservation!

Desired Outcome:

Students will be more aware of their water usage at home. A reduction in water leaks and the use of water-saving devices should result in less wasteful use of water and, hopefully, lower water bills. Involving parents with the fixing of leaks and in the location of the water meter will increase the family's awareness of water usage.

Activity adapted from "A Turn of the Tap," Water Watchers, used by permission of Massachusetts Water Resources Authority and from "Slow The Flow: Water Conservation in Our Homes," in Friends: A Magazine for Young Reader From Georgia 4-H Clubs, January, 1992 edition, used by permission of the Cooperative Extension Service, University of Georgia.

ACTIVITY 8.3: Landscaping To Conserve Water

Goal:

To **landscape** a building using plantings appropriate to Alabama and to the water resources of the site so that we can conserve outdoor water use.

Objective:

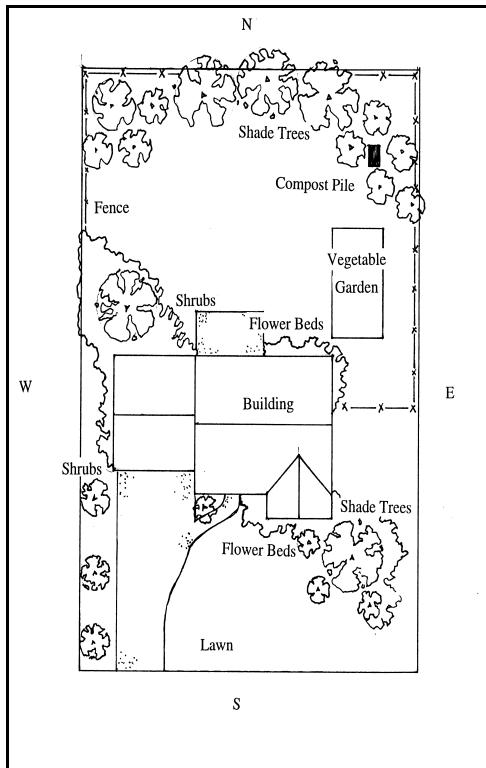
- # To analyze site for shade and water conditions.
- # To match plant requirements to the available condition.
- # To develop a landscape plan.

Materials:

- F Paper (preferably graph paper)
- F pencils
- F list of plants suitable to the climate in Alabama

Procedure:¹

1. Make a landscape plan. Draw an outline of your building on a sheet of paper. Graph paper works best. Note which direction is North on map. Use the sample plan below as a model.
2. Mark any existing large trees or plants on the map.
3. Mark areas which are shady or sunny.
4. Refer to the list of plants that are suitable to the climate in Alabama. Select some small trees, shrubs and flowers to landscape your schoolyard. Remember to pick ones that grow in your area of the state.
5. Place plants in places where they will grow best. Plants requiring a lot of sun should be placed in a sunny location. Plants requiring partial or total shade should be placed in such a spot. Be sure to consider the plants' water requirements. Plants that require a lot water should be planted in a moist area. Plants requiring less water or dry conditions should be plants in drier areas.
6. Draw your plants on your map.
7. When finished, compare your landscape plan with others in the class.



Teacher Note:

¹ If students are working on a plan to landscape the school or other public building, they may wish to work in groups of 2 or 3.

Discussion:

Landscaping plans should consider natural water requirements for plants. Different plants have different requirements for temperature, water needs, and soil types. Plants which grow well in other parts of the United States, such as New England, may not be suitable for Alabama. When we plant our gardens, we must consider the growth needs of plants which we select. We can reduce outdoor water use by planting plants suited to the conditions in our yards. This is known as **xeriscaping**.

Evaluate the plans of the students. There could be many different variations. Discuss the good points and potential problems of each.

Discussion Questions:

1. Why is it important to consider a plant's water needs before we plant it in our yard?
2. How could compost material help in our garden plan?
3. What are some plants that can grow in dry conditions in Alabama?
4. Name some flowers that require moist and sunny conditions.
5. Lawns often require watering when rainfall is not adequate. Can you think of any alternatives to planting large lawns?

Desired Outcome:

Students will select plantings appropriate to their environment so that excess water use is reduced.

Optional Activities:

1. Include a place for a compost pile in your landscape plan. Refer to Activity 8.1 for an appropriate spot for your pile.
2. Check with a local nursery or your county Extension office to see if have anyone who can speak with your group about plants native to your climate.

Service Learning Idea:

Have the students design a landscape plan for a local nursing home or elderly shut-ins. Perhaps a fund raiser could help provide funds to purchase some plantings.

References:

Conserving Water. Xeriscaping: Landscape Design For Water Conservation. The Water Quality Handbook. Circular ANR-790.

Williams, D. Landscape Plant Selection For Reduced Fertilizer And Pesticide Use. Alabama Cooperative Extension Service. Circular ANR-750. Auburn, AL.

Xeriscape Landscaping: Preventing Pollution and Using Resources Efficiently. U.S. EPA. EPA-840-B-93-001. April, 1993.

ACTIVITY 8.3: Landscaping To Conserve Water

Plants Suitable For Landscape In Alabama

Name	Size (Height x Width)	Growth Rate	Type	Exposure	Moisture Requirement	Soil pH
Large Shade Trees						
Red Maple	45' x 30'	Med.	Deciduous ¹	Sun	Moist	Adaptable
River Birch	70' x 40'	Fast	Deciduous	Sun	Moist	Adaptable
Southern Magnolia	70' x 45'	Slow to Med.	Evergreen ²	Sun	Moist	Adaptable
Willow Oak	90' x 45'	Med.	Semi- evergreen	Sun	Adaptable	Adaptable
Chinese Elm	50' x 25'	Fast	Deciduous	Sun	Adaptable	Adaptable
Small To Medium Trees						
Redbud	25' x 20'	Med. to Fast	Deciduous	Sun	Adaptable	Adaptable
Dogwood	25' x 20'	Fast	Deciduous	Partial Shade	Moist	Adaptable
American Holly	40' x 25'	Med.	Evergreen	Sun	Moist	Adaptable
Crapemyrtle	6' to 25' x 15'	Fast	Deciduous	Sun	Adaptable	Adaptable
Bradford Pear	40' x 25'	Med.	Deciduous	Sun	Adaptable	Adaptable
Evergreen Shrubs						
Boxwood	4' x 4'	Slow	Evergreen	Partial Shade	Moist	Adaptable
Camellia	12' x 8'	Med.	Evergreen	Sun	Moist	5 - 6
Dwarf Burford Holly	6' x 8'	Med.	Evergreen	Sun/Partial Sun	Moist/Dry	Adaptable
Kurume Azalea	4' x 4'	Med.	Evergreen	Sun	Moist	5 - 6

¹ deciduous: a plant which loses its leaves every year (for example, a maple)

² evergreen: a plant which keeps its leaves all year (for example, a holly or pine tree)

³ perennial: a plant which lives for several years

⁴ annual: a plant which lives for only 1 year

Name	Size (Height x Width)	Growth Rate	Type	Exposure	Moisture Requirement	Soil pH
Deciduous Shrubs						
Butterfly-bush	8' x 6'	Fast	Deciduous	Sun	Adaptable	Adaptable
Border Forsythia	8' x 10'	Fast	Deciduous	Sun	Adaptable	Adaptable
Oakleaf Hydrangea	6' x 6'	Med.	Deciduous	Partial Sun	Moist	5 - 6
Winter Honeysuckle	8' x 8'	Fast	Deciduous	Sun	Adaptable	Adaptable
Groundcovers						
English Ivy	8" Climbing	Fast	Evergreen	Shade/Sun	Moist	Adaptable
Blue Pacific Shore Juniper	18" x 6'	Slow	Evergreen	Sun	Dry	Adaptable
Monkeygrass	18" x 18"	Slow	Shade/Sun	Moist	Moist	Adaptable
Common Periwinkle	6" x 6'	Med./Fast	Evergreen	Partial Sun	Moist	Adaptable
Perennials³						
Shasta Daisy	(Height) 12 - 36"	Fast	Perennial	Morning Sun	Moist	Adaptable
Sweet William	6 - 18"	Fast	Perennial	Sun	Moist	Adaptable
Daylily	24 - 48"	Fast	Perennial	Sun/Partial Shade	Moist	Adaptable
Hosta	12 - 36"	Fast	Perennial	Shade/Morn- ing Sun	Moist	Adaptable
Moss Phlox	6 - 12"	Fast	Perennial	Sun	Adaptable	Adaptable
Annual⁴ Flowers						
Snapdragon	1 - 4'	Fast	Annual	Morning Sun	Moist	Adaptable
Impatiens	6 - 24"	Fast	Annual	Shade/Partial Shade	Moist	Adaptable
Petunia	6 - 18"	Fast	Annual	Sun	Moist	Adaptable
Salvia	12 - 36"	Fast	Annual	Sun	Moist	Adaptable
Pansy	6 - 12"	Fast	Annual	Morning Sun	Moist	Adaptable

Adapted from Landscape Plant Selection For Reduced Fertilizer And Pesticide Use. Dave Williams, Alabama Cooperative Extension Service. Circular ANR-750.

ANSWER KEY
WORKSHEET 8.1: Definitions

Directions: In the left column are definitions to the *Words to Remember* and in the right column are the words. Match the words with the correct definitions. Place the letter of the correct word in the blank to the left of the definition.

-
- | | | |
|--------------|--|-----------------------|
| <u>D</u> 1. | A period of little or no rain. | A. aerator |
| <u>M</u> 2. | A method of landscaping which conserves water; it reduces the use of grass and encourages the planting of native shrubs, trees and groundcover. | B. compost |
| <u>G</u> 3. | To make an area of land more beautiful by planting trees, shrubs, grass, etc. | C. conservation |
| <u>E</u> 4. | The process of soil being worn away; it can be caused by water or wind. | D. drought |
| <u>C</u> 5. | The act of protecting and preserving something, particularly our natural resources. | E. erosion |
| <u>J</u> 6. | A farming method which reduces water loss by leaving the remains of crops on the soil after harvesting; it helps prevent erosion. | F. irrigation |
| <u>K</u> 7. | The industry which produces cloth or fabric and/or clothing. | G. landscape |
| <u>F</u> 8. | The process of supplying water to land by the use of ditches, pipes or canals. | H. micro irrigation |
| <u>B</u> 9. | The mixture made of mainly decayed plant matter; it is used to condition and add nutrients to the soil. | I. mulch |
| <u>I</u> 10. | A layer of leaves or straw placed around plants; it reduces evaporation and helps water to drain into the soil. | J. residue management |
| <u>H</u> 11. | A method of watering crops in which water is delivered directly to plants through a series of pipes and attachments that allow water to drip slowly. | K. textile industry |
| <u>A</u> 12. | A device that can be attached to faucets which mixes air into the water flow. | L. TVA |
| <u>L</u> 13. | The Tennessee Valley Authority--a governmental agency which helps manage the Tennessee River watershed. | M. xeriscape |

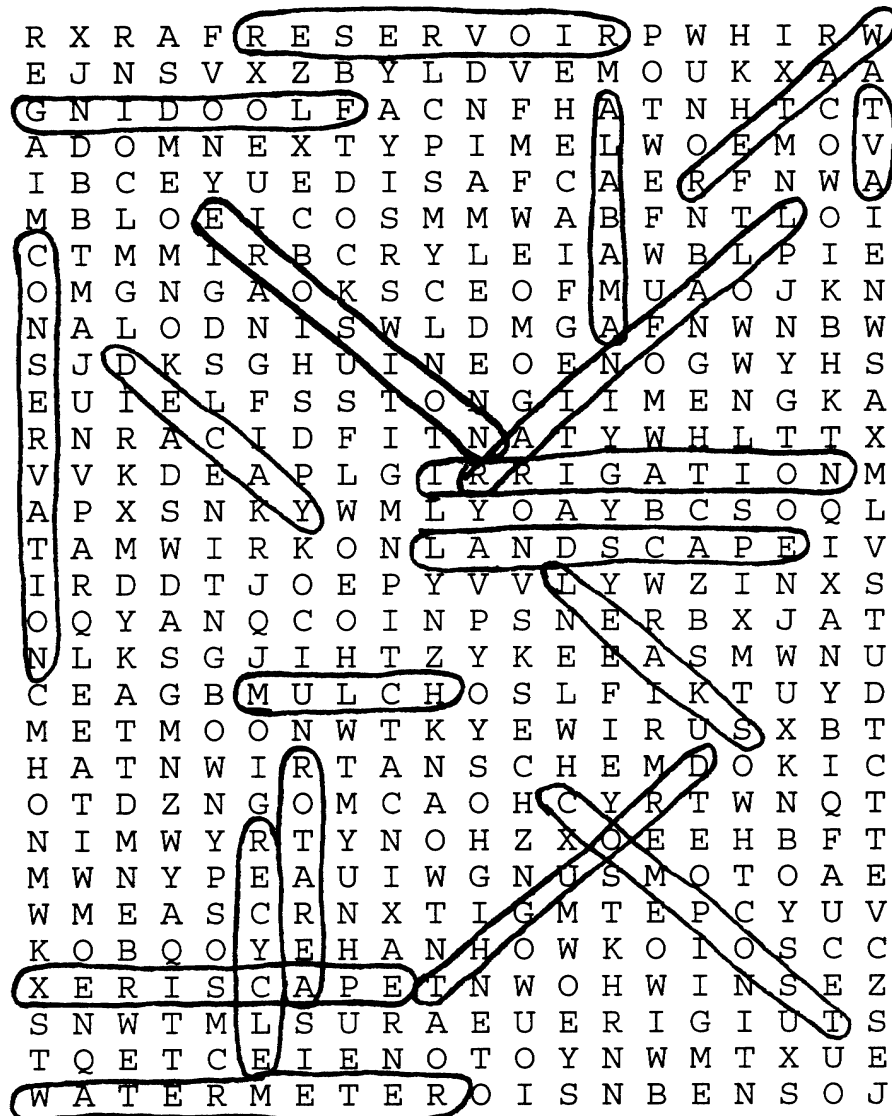
ANSWER KEY
WORKSHEET 8.2: Vocabulary

Find the following words in the puzzle below:

AERATOR
ALABAMA
COMPOST
CONSERVATION
DECAY
DROUGHT
EROSION

FLOODING
IRRIGATION
LANDSCAPE
LEAKS
MULCH
RAINFALL

RECYCLE
RESERVOIR
TVA
WATER
WATER METER
XERISCAPE



ANSWER KEY
WORKSHEET 8.3: Facts About How We Can Conserve Water

Directions: Below are sentences with words left out. Fill in the blanks with the words provided. Each word may be used once. You may use the *Background Information* to help you.

aerator
agriculture
compost
conservation

irrigation
micro
preserve
reservoirs

residue management
Tennessee Valley Authority
water
xeriscape

During the 1800's, WATER use was a lot less. People did not have cars to drive. Home conveniences such as toilets, garbage disposals, washing machines or dishwashers did not exist. Water use goes up as the world's population grows. One way to improve our water use is to practice water CONSERVATION.

In the United States, the largest *consumptive* user of water is AGRICULTURE (although this is not the largest user of water in Alabama). When there isn't enough water to water crops, farmers need to supply water in a process called IRRIGATION. This process accounts for one of the largest uses of water on farms. The MICRO **irrigation** method helps to reduce water waste by delivering water directly to each plant through a series of pipes and attachments that allow water to drip slowly. A way to reduce **erosion** is the RESIDUE MANAGEMENT method. This method reduces water loss by leaving crop remnants on the soil after harvesting.

Everyone can help to conserve water by using water wisely at home. Some of the ways in which we can save water include: installing an AERATOR on your kitchen faucet, using bath water to water plants and using low-flow toilets. To reduce the need for a garbage disposal, you may make a COMPOST pile from food scraps. We can plant shrubs and

trees in our yards that are suitable for the area and climate.

XERISCAPE is a term that describes a way to landscape that reduces the need for watering.

One way to conserve water is to have a plan to save our water supplies. An agency which manages the Tennessee River watershed is the **TENNESSEE**

VALLEY **AUTHORITY**. This agency has built many

RESERVOIRS which help store water supplies. Water conservation protects our environment and helps to **PRESERVE** our water supplies for future generations.

HOW AM I DOING?

<u>Page</u>	<u>Yes</u>	<u>No</u>	<u>Date</u>
8-3 Practice reading and saying Words to Remember	_____	_____	_____
8-6 Answer Questions for Review	_____	_____	_____
8-6 Answer Questions for Thought	_____	_____	_____
8-8 Read Fact Sheet	_____	_____	_____
8-9 Review Glossary	_____	_____	_____
	<u>Possible Score</u>	<u>My Score</u>	<u>Date</u>
8-10 Worksheet 8.1: Definitions	<u>13</u>	_____	_____
8-11 Worksheet 8.2: Vocabulary (Word Puzzle)	<u>19</u>	_____	_____
8-12 Worksheet 8.3: Facts About How We Can Conserve Water	<u>12</u>	_____	_____
	<u>Complete</u>	<u>In-Complete</u>	<u>Date</u>
8-14 Activity 8.1: Building A Compost Pile	_____	_____	_____
8-18 Activity 8.2: Checking For Leaks At Home	_____	_____	_____
8-22 Activity 8.3: Landscaping To Conserve Water	_____	_____	_____