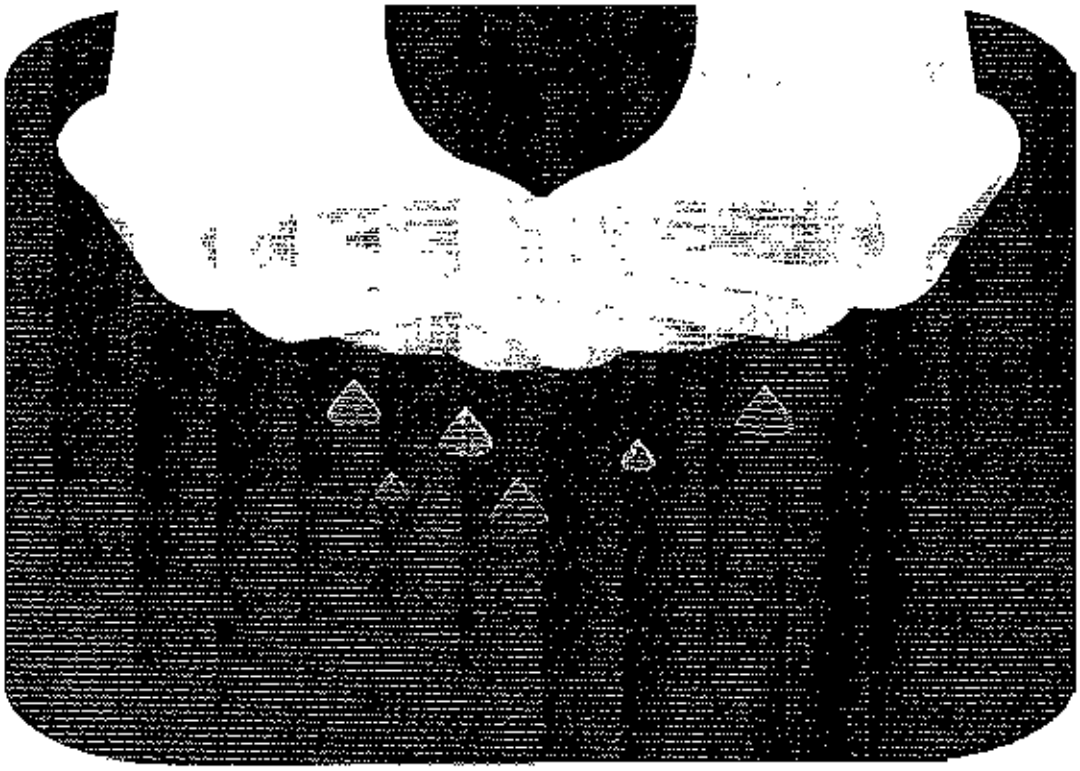
"Water Conservation: Just Do It!"



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Overview/Description:

Since over 70% of the Earth's surface is covered by water and less than 1% of this water is fresh and available for human consumption, students need to learn and discuss methods that can be used to conserve and purify this natural and limited resource. Students will analyze how much water they use on a daily basis as well as how much water their families use. In addition, they will brainstorm ways to reduce their daily water usage and usage by their families.

The students that I teach are in a Varying Exceptionalities Earth Space Science class for 9th grade students (Reading Levels 1-3, Math Levels 1-3 and Science Levels 1-3. These students have been diagnosed as having Specific Learning Disabilities, Emotional Behavioral Disorders, and Attention Deficit Disorders. Since these Special Education (SPED) students learn best when they are taught using a variety of learning styles, this project addresses visual, auditory, and kinesthetic-tactile lessons and activities. This project is needed because our Earth Space Science textbook has limited information and activities on the topic of water conservation and it is an important issue in our everyday lives. Lessons and activities will include the use of E.Z.C. reader strips, graphic organizers, reading activities, laboratory activities, dry-erase boards and markers/erasers, binders to organize handouts, charts, graphic organizers, etc., and USB drives to save information and present a Power Point Presentation about water conservation at the end of the project.

This project could be adapted to 8th grade Earth Space Science classes or higher levels of achievement (Levels 3 or higher) in 9th grade Earth Space Science classes. This project could be easily be adapted to a class of 15 or more. The number of students that participated in my project this year was eight. Last year when I received the mini-grant, four students participated in the project.

Goals and Objectives:

The students in my Earth Space Science class will be able to conserve water in their own homes as well as in their school and communities. They will test water for pollution and organize information learned to create and present a Power Point Presentation about water conservation.

This project will include literacy activities that will use E.Z.C. reader strips, which enable the students to highlight sentences while reading to assist those Special Education (SPED) students with visual and perceptual disorders and dyslexia. Graphic organizers will be used to help students organize important information gathered from literacy reading activities. Laboratory activities such as using a water quality test kit will give students a hands-on lesson in water pollution. Dry-erase boards will be used by students to write down answers to questions and participate during reviews and question and answer sessions. Binders will be used by students to organize handouts, charts, graphic organizers, etc. and assist them when preparing their Power Point Presentations. USB flash drives will be used by each student to save information and present a Power Point Presentation about water conservation at the end of the project.

Sunshine State Standards:

(and **Next Generation Sunshine State Standards: Grades 9-12**):

SC.D.2.4.1: The student understands the interconnectedness of the systems on Earth and the quality of life.

Next Generation Sunshine State Standard: SC.912.L.17.7:

Characterize the biotic and abiotic components that define freshwater systems, marine systems and terrestrial systems.

SC.G.2.4.4: The student knows that the world ecosystems are shaped by physical factors that limit their productivity.

Next Generation Sunshine State Standard: SC.912.L.17.19:

Describe how different natural resources are produced and how their rates of use and renewal limit availability.

SC.G.2.4.6: The student knows the ways in which humans today are placing their environment support systems at risk (e.g. rapid human population growth, environmental degradation, and resource depletion).

Next Generation Sunshine State Standard: SC.912.L.17.16

Discuss the large-scale environmental impacts resulting from human activity, including waste spills, oil spills, runoff, greenhouse gases, ozone depletion, and surface and groundwater pollution.

SC.H.3.4.2: The student knows that technological problems often create a demand for new scientific knowledge and that new technologies make it possible for scientists to extend their research in a way that advances science.

Next Generation Sunshine State Standard: SC.912.N.4.1

Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.

SC.H.3.4.3: The student knows that scientists can bring information, insights, and analytical skills to matters of public concern and help people understand the possible causes and effects of events.

Next Generation Sunshine State Standard: SC.912.N.4.1

Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.

SC.H.3.4.6: The student knows that scientific knowledge is used by those who engage in design and technology to solve practical problems, taking human values and limitations into account.

Next Generation Sunshine State Standard: SC.912.N.4.1

Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.

Date: 02/10/10

Next Generation Sunshine State Standards: SC.G.2.4.6, SC.H.3.4.3, SC.G.2.4.4, SC.D.2.4.1, SC.H.3.4.2, SC.H.3.4.6

Objectives: SWBAT ***Water Conservation Mini-Grant***

*Introduction to water conservation and pollution.
*KWL graphic organizer: discuss and fill-out "know" column.
*Water Conservation demonstration lab, video clips from computer and Internet using projector, questions and answers using dry-erase boards, small groups, charts.
*Add hand-outs and other information to binders.

Procedures:		Materials:		Assessments		ESOL Strategies			
X	Speaking Activities	X	Board		Quiz/Test	X	Assign Buddy/Pairs	X	Preview/Review
X	Listening Activities		Overheard	X	Class Participation	X	AV Presentation		Games
X	Reading (Oral/Silent)	X	Text/Workbook	X	Questioning	X	Teacher Read Aloud		Simplified Lang/Text
X	Writing Activities		Tapes/CDs	X	Observation		Cooperative Groups		Simplified Worksheet
X	Lecture/Discussion	X	Av/Visuals	X	Dramatization	X	Model the Task		Cooperative Learning
	Quiz/Test	X	Handouts	X	Peer/Group	X	Hands-on Activity	X	Targeted Vocabulary
X	Classwork	X	Props/Reality	X	Project	X	Charts/Diagrams/Graphs	X	Visual Clues/Pictures
X	Cooperative Learning	X	Software/Computer		Presentation	X	Directed Reading/Writing		
X	Laboratory	X	Projector						

Assignment: Observe water usage and conservation possibilities at home.

Date: 02/12/10

Next Generation Sunshine State Standards: SC.G.2.4.6, SC.H.3.4.3, SC.G.2.4.4, SC.D.2.4.1, SC.H.3.4.2, SC.H.3.4.6

Objectives: SWBAT ***Water Conservation Mini-Grant***

*Earth Space Science textbooks: pgs. 730-733, read and discuss, "Human Impact on Water Resources." Use E.Z.C. reader strips while reading. Complete activity on pg. 734.
*Books: Kid's Discover Conservation: Use E.Z.C. reader strips and fill-in graphic organizers.
*Review questions and answers using dry-erase boards.
*Add hand-outs and other information to binders.

Procedures:		Materials:		Assessments		ESOL Strategies			
X	Speaking Activities	X	Board	X	Quiz/Test		Assign Buddy/Pairs	X	Preview/Review
X	Listening Activities		Overheard	X	Class Participation	X	AV Presentation		Games
X	Reading (Oral/Silent)	X	Text/Workbook	X	Questioning	X	Teacher Read Aloud		Simplified Lang/Text
X	Writing Activities		Tapes/CDs	X	Observation		Cooperative Groups		Simplified Worksheet
X	Lecture/Discussion	X	Av/Visuals		Dramatization	X	Model the Task		Cooperative Learning
X	Quiz/Test	X	Handouts		Peer/Group		Hands-on Activity	X	Targeted Vocabulary
X	Classwork	X	Props/Reality		Project	X	Charts/Diagrams/Graphs	X	Visual Clues/Pictures
	Cooperative Learning	X	Software/Computer		Presentation	X	Directed Reading/Writing		
	Laboratory	X	Projector						

Assignment: Personal Water Use Charts (Sat – Sun.) and family information on water use.

Date: 02/17/10

Next Generation Sunshine State Standards: SC.G.2.4.6, SC.H.3.4.3, SC.G.2.4.4, SC.D.2.4.1, SC.H.3.4.2, SC.H.3.4.6

Objectives: SWBAT ***Water Conservation Mini-Grant***

*Books: Kid's Discover Conservation: Use E.Z.C. readers strips and fill-in graphic organizers.

*Clean Water Lesson.

*Fact Sheets: "Did you know?" and "100 ways to conserve"(Computer and Projector).

*Review questions and answers using dry-erase boards.

*Add hand-outs and other information to binders.

Procedures:		Materials:		Assessments		ESOL Strategies			
X	Speaking Activities	X	Board		Quiz/Test	X	Assign Buddy/Pairs	X	Preview/Review
X	Listening Activities		Overhead	X	Class Participation	X	AV Presentation		Games
X	Reading (Oral/Silent)	X	Text/Workbook	X	Questioning	X	Teacher Read Aloud		Simplified Lang/Text
X	Writing Activities		Tapes/CDs	X	Observation		Cooperative Groups		Simplified Worksheet
X	Lecture/Discussion	X	Av/Visuals	X	Dramatization	X	Model the Task		Cooperative Learning
	Quiz/Test	X	Handouts	X	Peer/Group	X	Hands-on Activity	X	Targeted Vocabulary
X	Classwork	X	Props/Reality	X	Project	X	Charts/Diagrams/Graphs	X	Visual Clues/Pictures
X	Cooperative Learning	X	Software/Computer		Presentation	X	Directed Reading/Writing		
X	Laboratory	X	Projector						

Assignment: Personal Water Use Charts (Sat – Sun.) & bring water sample from home.

Date: 02/19/10

Next Generation Sunshine State Standards: SC.G.2.4.6, SC.H.3.4.3, SC.G.2.4.4, SC.D.2.4.1, SC.H.3.4.2, SC.H.3.4.6

Objectives: SWBAT ***Water Conservation Mini-Grant***

*Books: Kid's Discover Conservation: Use E.Z.C. reader strips and fill-in graphic organizers.

*Water Lab and Water Quality Test Kit Lab.

*Review questions and answers using dry-erase boards.

*Add hand-outs and other information to binders.

Procedures:		Materials:		Assessments		ESOL Strategies			
X	Speaking Activities	X	Board	X	Quiz/Test		Assign Buddy/Pairs	X	Preview/Review
X	Listening Activities		Overhead	X	Class Participation	X	AV Presentation		Games
X	Reading (Oral/Silent)	X	Text/Workbook	X	Questioning	X	Teacher Read Aloud		Simplified Lang/Text
X	Writing Activities		Tapes/CDs	X	Observation		Cooperative Groups		Simplified Worksheet
X	Lecture/Discussion	X	Av/Visuals		Dramatization	X	Model the Task		Cooperative Learning
X	Quiz/Test	X	Handouts		Peer/Group		Hands-on Activity	X	Targeted Vocabulary
X	Classwork	X	Props/Reality		Project	X	Charts/Diagrams/Graphs	X	Visual Clues/Pictures
	Cooperative Learning	X	Software/Computer		Presentation	X	Directed Reading/Writing		
	Laboratory	X	Projector						

Assignment: Personal Water Use Charts (Sat. – Sun.).

Date: 02/23/10

Next Generation Sunshine State Standards: SC.G.2.4.6, SC.H.3.4.3, SC.G.2.4.4, SC.D.2.4.1, SC.H.3.4.2, SC.H.3.4.6

Objectives: SWBAT ***Water Conservation Mini-Grant***

*Collect Personal Water Use Charts.

*Review results of Water Quality Test Kit Lab and Questions and Answers.

*Add hand-outs and other information to binders.

*Review Rubric for grading Power Point Presentation and Directions for Project.

* Computer Lab: work on Power Point Presentations on Water Conservation (flash drives and binders).

Procedures:		Materials:		Assessments		ESOL Strategies			
X	Speaking Activities	X	Board		Quiz/Test	X	Assign Buddy/Pairs	X	Preview/Review
X	Listening Activities		Overheard	X	Class Participation	X	AV Presentation		Games
X	Reading (Oral/Silent)	X	Text/Workbook	X	Questioning	X	Teacher Read Aloud		Simplified Lang/Text
X	Writing Activities		Tapes/CDs	X	Observation		Cooperative Groups		Simplified Worksheet
X	Lecture/Discussion	X	Av/Visuals	X	Dramatization	X	Model the Task		Cooperative Learning
	Quiz/Test	X	Handouts	X	Peer/Group	X	Hands-on Activity	X	Targeted Vocabulary
X	Classwork	X	Props/Reality	X	Project	X	Charts/Diagrams/Graphs	X	Visual Clues/Pictures
X	Cooperative Learning	X	Software/Computer		Presentation	X	Directed Reading/Writing		
X	Laboratory	X	Projector						

Assignment: Continue on Power Point Presentations and Review Water Conservation.

Date: 02/25/10

Next Generation Sunshine State Standards: SC.G.2.4.6, SC.H.3.4.3, SC.G.2.4.4, SC.D.2.4.1, SC.H.3.4.2, SC.H.3.4.6

Objectives: SWBAT ***Water Conservation Mini-Grant***

Early Release

*Computer Lab: work on Power Point Presentations on Water Conservation (flash drives and binders).

Procedures:		Materials:		Assessments		ESOL Strategies			
X	Speaking Activities	X	Board		Quiz/Test	X	Assign Buddy/Pairs	X	Preview/Review
X	Listening Activities		Overheard	X	Class Participation	X	AV Presentation		Games
X	Reading (Oral/Silent)	X	Text/Workbook	X	Questioning	X	Teacher Read Aloud		Simplified Lang/Text
X	Writing Activities		Tapes/CDs	X	Observation		Cooperative Groups		Simplified Worksheet
X	Lecture/Discussion	X	Av/Visuals	X	Dramatization	X	Model the Task		Cooperative Learning
	Quiz/Test	X	Handouts	X	Peer/Group	X	Hands-on Activity	X	Targeted Vocabulary
X	Classwork	X	Props/Reality	X	Project	X	Charts/Diagrams/Graphs	X	Visual Clues/Pictures
X	Cooperative Learning	X	Software/Computer		Presentation	X	Directed Reading/Writing		
X	Laboratory	X	Projector						

Assignment: Power Point Presentations due next class (Tuesday, March 2nd).

Date: 03/02/10

Next Generation Sunshine State Standards: SC.G.2.4.6, SC.H.3.4.3, SC.G.2.4.4, SC.D.2.4.1, SC.H.3.4.2, SC.H.3.4.6

Objectives: SWBAT *Water Conservation Mini-Grant*

*Students will present Power Point Presentations on Water Conservation.

*Complete last column of "KWL Charts" on what they "Learned" about water conservation.

*Add hand-outs and other information to binders.

*Students will submit binders with organized information and handouts.

Procedures:		Materials:		Assessments		ESOL Strategies			
X	Speaking Activities	X	Board		Quiz/Test	X	Assign Buddy/Pairs	X	Preview/Review
X	Listening Activities		Overheard	X	Class Participation	X	AV Presentation		Games
X	Reading (Oral/Silent)	X	Text/Workbook	X	Questioning	X	Teacher Read Aloud		Simplified Lang/Text
X	Writing Activities		Tapes/CDs	X	Observation		Cooperative Groups		Simplified Worksheet
X	Lecture/Discussion	X	Av/Visuals	X	Dramatization	X	Model the Task		Cooperative Learning
	Quiz/Test	X	Handouts	X	Peer/Group	X	Hands-on Activity	X	Targeted Vocabulary
X	Classwork	X	Props/Reality	X	Project	X	Charts/Diagrams/Graphs	X	Visual Clues/Pictures
X	Cooperative Learning	X	Software/Computer	X	Presentation	X	Directed Reading/Writing		
X	Laboratory	X	Projector						

Assignment: Begin Reading Ch. 19.1 and 19.2 in textbook on Earthquakes.

Materials and Resources:

A classroom space is needed that has a computer with Internet access and a LCD projector. If the classroom does not have a computer and/or a LCD projector, the teacher could borrow these items from the school's media center. Also, computer lab access with Microsoft Power Point Software is needed for the students to prepare their Power Point Presentations.

Graphic Organizers: KWL Worksheet and Effects Sunburst:Consequences or Results

Water Conservation Demonstration Lab

Dry Erase Boards (The Markerboard People)

Water Conservation Demonstration Lab from online Water Conservation Lesson Plan:
http://www.teacherdomain.org/resource/viewtext_printer_friendly/3642

And Video Clips:
Global Water Distribution (Flash Interactive)
Water Treatment Plant (Quick Time Video)
Conserving Water at Home (Quick Time Video)

Earth Science (Geology, the Environment, and the Universe) Textbook by Glencoe/McGraw-Hill (9th Grade Earth Space Science Textbook)

Kid's Discover Conservation Books (Carolina Biological Supply Company)

E.Z.C. Reader Strips (Really Good Stuff, Inc.)

1" Binders and Dividers (Office Depot)

Personal Water Use Charts
http://ciese.org/curriculum/drainproj/instructions.html

Clean Water Lesson
http://www.chewonki.org/cleanwater/water_conservation.asp

Teacher's Power Point Presentation: "Did you know?"

Fact Sheet: "100 ways to conserve"
http://www.wateruseitwisely.com/100-ways-to-conserve/index.php

Fact Sheet: "Conserve Water"
http://charityguide.org/volunteer/fifteen/water-conservation.htm?gclid=CK2y5IGHpp0CFc

Water Lab

Water Quality Test Kit Lab (Carolina Biological Supply Company)

Project Directions for Water Conservation Power Point Presentation

Rubric for Water Conservation Power Point Presentation

USB Flash Drives (Office Depot)

Know?	Predict?	Learned?	Strategies	Apply?
What do I already Know?	What do I expect/want to find out?	What did I find out?	How did I find out?	How am I going to use what I learned?

Source unknown.

 (Water Demo.)

Lesson Plan: Water Conservation

Overview

Although over 70% of Earth's surface is covered with water, less than 1% of this water is available for human consumption. In this lesson, students study the availability of water on Earth and discuss methods that can be used to purify and conserve this critical resource. They also assess how much water they and their families typically use, and think about ways to reduce their water usage. Finally, students explore different techniques being employed for water management around the world, including the use of dams to create reservoirs.

Objectives

- Identify sources of fresh water available for consumption
- Understand the need for water conservation due to the limited fresh water supply
- Explore strategies for conserving water at home
- Compare the benefits and drawbacks of using different water management techniques, particularly dams

Grade Level: 6-8

Suggested Time

Two to three class periods

Multimedia Resources

- Global Water Distribution Flash Interactive
- Water Treatment Plant QuickTime Video
- Conserving Water at Home QuickTime Video
- Water Conservation: Israel QuickTime Video
- Water Conservation: Mexico QuickTime Video
- Water Conservation: Denver, CO QuickTime Video

Materials (Demo.)

- Two 2-liter bottles full of water
- Food coloring (dark color preferable)
- Measuring cups (for measuring amounts ranging from 50 ml to 14.5 ml)
- Five clear containers (to hold water ranging in volume from 1,950 ml to 0.5 ml)
- Markers and tape for making labels
- Map of your local watershed (See Surf Your Watershed for maps)
- Water Use Worksheet PDF Document
- Notebooks for student work

Before the Lesson

- Fill two 2-liter bottles with water. Add enough food coloring so that the water is visible from all seats in the classroom.
- Prepare to lead the class in a discussion about your local watershed by researching the following:
  - How does water get to the school? (Where does it originate? What path does it travel?)
  - How is the water managed along the way?
  - How is the water treated once it leaves your school as wastewater?
  - Where are the water treatment plants?
  - Are there any dams? If so, where are they located?

The Lesson

Part I: How Much Water Do We Really Have?

1. Tell students that you would like them to think about the answer to this question: What percentage of Earth's water is available for human consumption? Ask students to write down their answers. You may want to remind students to consider what they know about oceans and about the type of water that is considered usable by people.

2. Ask a volunteer to demonstrate his or her answer to the question. Give the student a 2-liter bottle filled with colored water and a clear, empty container. Tell the class that the bottle represents all of the water on Earth. Ask the volunteer to pour into the empty container the amount of water that he or she thinks represents the percentage of Earth's water available for human use. (Provide the student with a measuring cup if needed.) Then ask the class to make suggestions about whether more or less water needs to be in the container. Have the volunteer adjust the amount until there is a general consensus among the students. Put the class estimate (the clear container with water) aside.

3. Tell students that you will now demonstrate the amount of water on Earth that is available for human consumption.

a. Show students the second 2-liter bottle filled with colored water. Tell them that this bottle again represents all of the water on Earth. Measure out 1,950 ml of the water and pour it into a clear, empty container. Label the container SALT WATER. Tell students that this represents how much of our planet's water is found in oceans — 97%.
b. Pour the remaining 50 ml from the bottle into another container, and tell students that this represents the amount of fresh water on Earth — 3%. Label this container FRESH WATER. Ask students to guess what percentage of fresh water is available for human use.

   Note: You may also want to place a fresh water sign on the table at this time. As you pour off additional amounts of water in steps c-d, you can place the new containers near the fresh water sign to remind students that each one is part of the "fresh water" category.

c. Measure 35 ml of the fresh water into another container. Label the container ICE CAPS. Tell students that this water is frozen in ice caps, so it is not available for our use!
d. Now measure 14.5 ml of the fresh water into another container. Label the container AIR, SOIL, AND UNDERGROUND. Tell them sorry, but this water is found in the air, in the soil, and deep underground, so it's also not available for human use!

e. There should be about 0.5 ml of water left in the fresh water container. (Note that this is just under two drops of water!) Hold this up and explain that this represents all of the fresh water available for human use. Less than 1% of all water on Earth is available for consumption!
f. Show students the Global Water Distribution Flash Interactive to reinforce the data behind the demonstration.

4. Divide the class into small groups and ask them to discuss what they just witnessed in your demonstration and in the interactive activity. (You may want to review the terms *renewable resource* and *nonrenewable resource* as a class before placing students into their groups.) Have students answer the following questions during their small-group discussions:

a. Where is usable water located?
b. Is this water a renewable resource?

5. Bring the class back together and ask student groups to share some of their ideas. Conclude by reminding students that water is necessary for life and thus important to conserve and maintain so that it stays available for human consumption, as well as for consumption by plants and animals, which people use for food.

Part II: Where Does Your Water Come From?

6. Watch the Water Treatment Plant QuickTime Video and discuss the methods used to purify water for human consumption. Ask students the following questions:

a. Why is it important to treat the water before sending it to homes?
b. What do you think the brown sludge is made of? What other things do you think are removed from water to make it safe for drinking?

7. Show the map of your local watershed. Help students trace the path of water to their school. Discuss the following questions:

a. Where does the water originate and how is it managed along the way?
b. How is the water treated after it leaves the school as wastewater?
c. Where do you think the water treatment plants are located?

Part III: How Much Water Do You Use Per Day?

8. Distribute the Water Use Worksheet PDF Document, and ask students to estimate the amount of water that they and their families typically use in a week.

9. Watch the Conserving Water at Home QuickTime Video. Discuss water conservation techniques that people can use to decrease the waste and pollution of our water resources. Consider the following questions:

a. An average family uses about 300 gallons of water per day. What are some of the best ways to conserve water?
b. What is "gray water" and how can it be used to help conserve water?
c. What is Xeriscape landscaping and how can it help conserve water?

10. Divide the class into small groups again and ask them to brainstorm ways that they and their families can conserve water. After the small-group discussions, bring the class back together and ask each group to share their top three ideas with the class.

Part IV: Managing the Water Supply

11. Increases in population and industrial growth are straining water resources around the world and making the need for water management more urgent. Show students the Water Conservation: Israel QuickTime Video and the Water Conservation: Mexico QuickTime Video. Discuss the following questions:

a. What water problems are faced by Israel? By Mexico?
b. What water conservation techniques does each country use?
c. What are some unanticipated consequences of each of these techniques?

12. Divide the classroom into two groups. Assign one group to develop arguments in support of the use of dams to manage water for large cities. Assign the other group to develop arguments against it. Show the Water Conservation: Denver, CO QuickTime Video, and then have the two groups debate the pros and cons of using dams.

13. Show the class the local watershed map again and label the location of any dams in the area. Discuss the following questions:

a. How might the dams be changing the natural environment in this area?
b. What conservation techniques can be used to help the natural ecosystem survive population increases?

Extension (Optional)

- Invite a guest speaker from the local water conservation department to come to your class and provide detailed information about the process of getting water to students' homes and school, the use of dams and/or reservoirs for water storage, whether or not gray water is collected and reused in the area, etc.
- Take a field trip to a local water treatment plant to expose students firsthand to the complex process of water treatment and reinforce the need for water conservation.

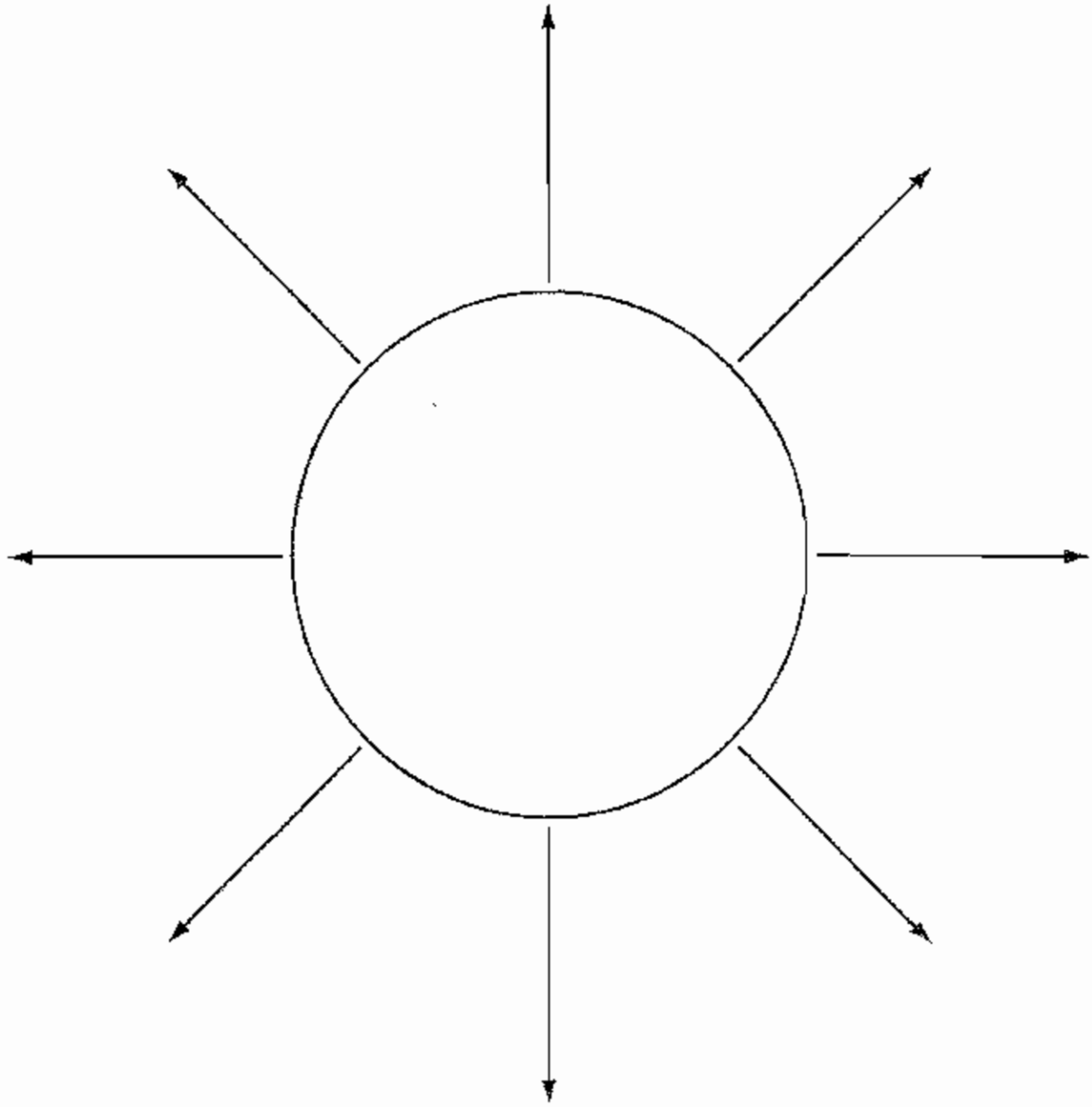
Check for Understanding

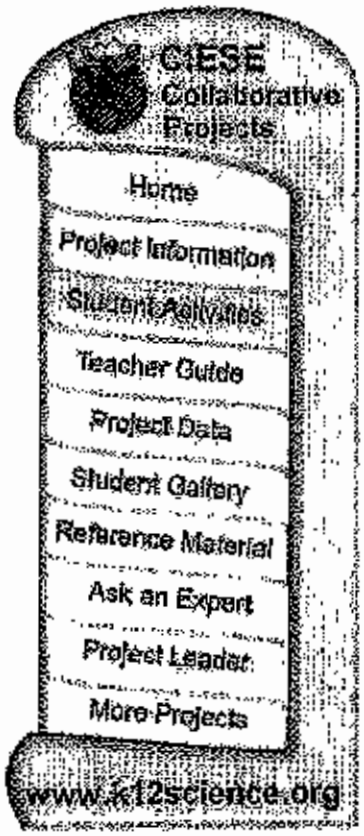
Have each student write an article or editorial discussing his or her ideas about one of the following topics. Let students know that they will need to support their ideas using information they learned from the multimedia resources. You may also want to encourage students to conduct additional research online and/or seek out individuals in the community to interview about local efforts regarding their chosen topic. (Note: You can have students submit their pieces to a school or other newspaper.)

1. Importance of conserving water and techniques for reducing water use at home
2. Positive and negative effects of dams and techniques that big cities can implement to eliminate the need for dams

The Digital Library for Earth System Education (www.dlese.org) offers access to additional resources on this topic.

Effects Sunburst: Consequences or Results





Down the Drain

How much water do you use?

Student Activities

Below are the steps you need to follow in order to gather the data for this project and to determine the average amount of water used by one person in a day. In addition to submitting your class results to the project's database, you will also have the opportunity to examine the data submitted by other participants. You can then compare the average amount of water calculated by your class to other classes in different parts of the world.

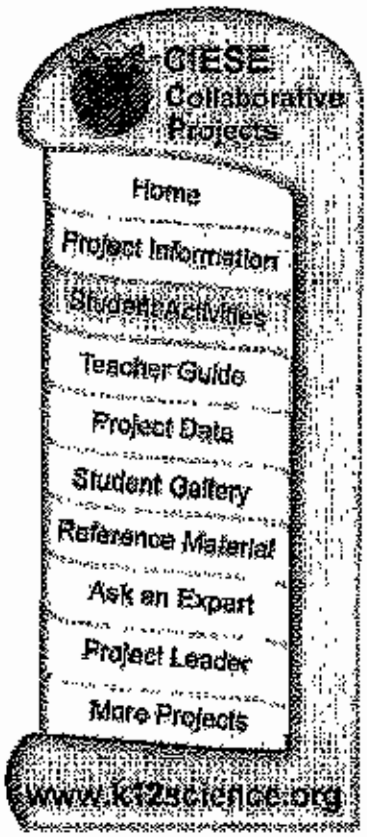
1. Collect Water Usage Information and Make Observations

   a) How Much in a Gallon?
   b) Personal Water Use
   c) Household Water Use
   d) Class Water Use

2. Develop a Hypothesis
3. Make a Prediction
4. Do the Experiment
5. Communicate Your Results

What to learn more? Here are some additional activities to try.

- Go with Your Own Flow
- Wasted Water: Down the Drain
- Water Shortage! What Can You Do?
- Mind Boggler



Down the Drain

How much water do you use?

Return to Instructions

Lesson 1a
How Much in a Gallon?

Next Lesson

NOTE: A one liter container can be substituted for the activity below. Just estimate water usage in liters instead of gallons.

Get a Gallon Container
Bring in a clear plastic gallon container from home or use one provided by your teacher. Fill it up with water.

Make a Guess
Take a good look at the gallon of water. How many gallons do you think you would use to:

- Wash your hands?
- Brush your teeth?
- Take a shower?
- Take a bath?
- Flush the toilet?
- Get a drink?
- Wash the dishes?
- Water the lawn?
- Wash the car?

Running Water
Empty the gallon container of water. Get a stop watch or look at a clock that has a second hand. Turn on a faucet so the water comes out very slowly. Put the empty container under the faucet and at that very same moment start timing. Wait until exactly one minute is up then turn off the faucet. How much water would you guess was in the container? Half? One quarter? Completely full? If the container was completely full, the flow rate of the water would be 1 gallon per minute. If the container was half full, the flow rate of the water would be 0.5 gallons per minute. What would you guess is the flow rate of water for your case?

Empty the container. This time turn on the faucet so that the water is coming out very quickly. Put the container under the faucet and start timing again for exactly one minute. If the first container fills up, quickly move it out of the way and

put another empty container under the faucet. After one minute, turn off the faucet. How many containers were filled with water? What would you guess the flow rate of water to be in this case?

Is Flow Rate Important?
Think about the two flow rates that you observed in Step 3. What if you were washing a dirty dish in the sink and it took you 2 minutes to wash the dish.

- How much water would you use if the water was coming out very slowly (flow rate #1)?
- How much water would you use if the water was coming out very quickly (flow rate #2)?
- Do you think flow rate is important for determining how much water is used?

Comparing Gallons and Liters
Here in the U.S. we still use gallons to measure the quantity of many liquids. However, that is starting to change. Can you think of anything that is measured in liters instead of gallons?

If you would like to convert gallons to liters (or liters to gallons), try using one of the conversion calculators in the Reference Material section.

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Down the Drain

How much water do you use?

Previous Lesson

Lesson 1b
Collect Personal Water Use Information & Make Observations

Next Les

STEP 1

Obtain the Personal Water Use Chart
Print out the Personal Water Use Chart using one of the links below. This chart is also available to be downloaded as a spreadsh with formulas), which can be printed out and used to tabulate results or used in spreadsheet form on a computer to calculate results.

Personal Water Use Chart (HTML web page)
Personal Water Use Chart (PDF format) **
Personal Water Use Chart (Excel format)
Personal Water Use Chart (ClarisWorks format)

** PDF format is readable by any computer. Download a free copy of Adobe Acrobat Reader to view and print the PDF file.

STEP 2

Distribute Personal Water Use Charts to Students
Each student should receive one copy of the Personal Water Use Chart for each member in their household (including themselv should write their names and the name of each household member on each of the sheets they receive.

STEP 3

Students and Household Members Record Water Usage for One Week
Each household member should record the number of times they do each of the activities for one week. If one of the househol unable to record data for an entire week, have them collect as much as they can and then estimate their usage for the remainde Click to see a partially filled out Personal Water Use Chart Example

Note: Students will have to check with an adult in their household to see if they have a standard or low flow shower head and either low flow toilet. "Low flow" means that it uses less water than a regular fixture.

STEP 4

Calculate Results
Results can be calculated manually or by downloading on of the Personal Water Use Chart spreadsheets (Excel or ClarisWorks) an household members' data into the spreadsheet on the computer. If you use a spreadsheet, the formulas are already part of the ch household member's information is entered the totals will automatically be calculated. Directions for manually calculating the results

- Add up the number of times each activity is done by each member of the household and enter these numbers in the sectio that is labeled 'Total Number of Times'.
- For each activity, an estimated amount of water used for the activity is provided. Multiply this number by the "Total Number activity is done by each household member to get the 'Total Weekly Water Use'.
- Add up all the numbers in the "Total Weekly Water Use" column and enter this number at the bottom. This is the "Total Week by this Household Member"

STEP 5

Observations
Think about what you have learned about water use so far. What observations can you make about how much water you and yo members use? Do any of the results surprise you?

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Student Name:_____ Household Member Name:_____

Personal Water Use Chart

{ ——— To be filled in by student ——— }

Activity	Sun	Mon	Tues	Wed	Thurs	Fri	Sat	Total Number of Times	Estimated Amount of Water Used (gallons)	Total Weekly Water Use (gallons)
Washing face or hands									1	
Taking a shower (standard shower head)									50	
Taking a shower (low flow shower head)									25	
Taking a bath									40	
Brushing teeth (water running)									2	
Brushing teeth (water turned off)									0.25	
Flushing the toilet (standard flow toilet)									5	
Flushing the toilet (low flow toilet)									1.5	
Shaving									2	
Getting a drink									0.25	
Cooking a meal									3	
Washing dishes by hand									10	
Running a dishwasher									15	
Doing a load of laundry									30	
Watering lawn									300	
Washing car									50	
Total Weekly Water Use by Household Member (gallons)										

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Student Name_____

Household Water Use Chart

	Household Member Name	Total Weekly Water Use (gallons)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
Total Weekly Water Use by Entire Household (gallons)		
Average Daily Water Use by Entire Household (gallons/day)		
Number of People in Household		
Average Daily Water Use (gallons per person per day)		

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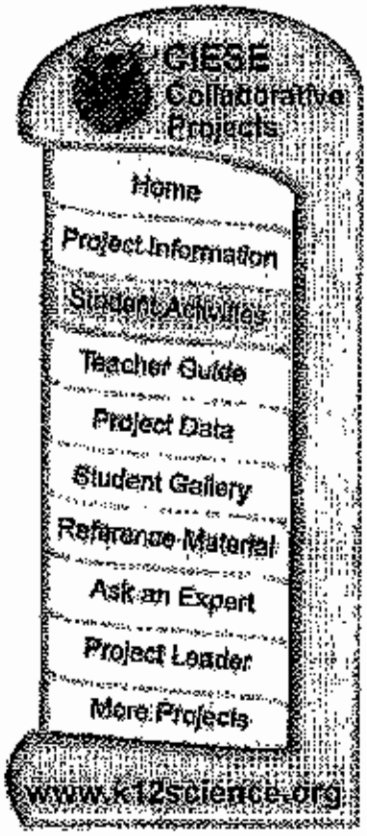

Down the Drain

How much water do you use?

Lesson 1d

Determine Class Water Use & Make Observations

Previous Lesson

Next Lesson

Determine Class Water Use Average

Each student in the class should write the "Average Daily Water Use" number that they calculated for their household on the board. Add up all of these numbers and then divide by the number of students in the class to get one average for the entire class. This number represents the average amount of water used by one person in one day. **This is the number you will submit to the project database in a later step.**

Observations

Think about your results. How does your class average compare to the U.S. national average domestic water use of 80 -100 gallons per person per day (approx. 300 - 375 liters per person per day)? What factors might account for any difference or similarity in the values? Do the results surprise you?

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CLEAN WATER
OUR PRECIOUS RESOURCE

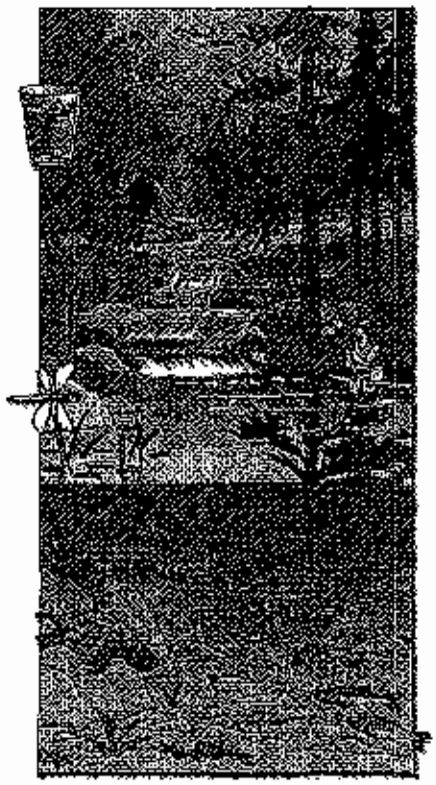
Why Conserve?

Keeping water clean starts with using less

In order to ensure a clean supply of water for everyone we need to be sure to conserve water. Most of the country goes through periods of water shortages, and some areas are using more water than they receive as rain and snow. Even in wet regions of the country water conservation is important because large populations rely on relatively small aquifers and reservoirs. Using water wastefully means more energy use, more pollution, and higher costs.

Water conservation starts at home. Trying a few simple water conservation strategies is a great way to do a lot for the environment. Before you know it you will be saving gallons of water everyday, which means hundreds and even thousands of gallons saved a year. You can also have a big impact by being a good example to other people who may not be conserving water as well as you are.

If you doubt that you can make a difference, just think of this inspirational quote from *Margaret Mead (1901-1978)*. "Never doubt that a small group of thoughtful, committed people can change the world. Indeed, it is the only thing that ever has."



Did You Know...?

- The average American uses over 50 gallons of water every day just in their home. That's well over 18,000 gallons a year.
- Flushing a toilet uses 2-7 gallons of water.
- The average 5 min. shower uses 25-50 gallons.
- Automatic dishwashers use 9-12 gallons.
- Only 0.7% of the water on earth is available fresh water

Simple Things You Can Do:

- Shut off water when brushing teeth or shaving.
- Take short showers instead of baths.
- Install low-flow faucets, shower heads, and toilets.
- Only wash FULL loads of dishes or clothes.
- Use a hose with a shut-off nozzle.
- Refill plastic water bottles and keep them in the fridge. Now you don't have to run the tap to get cold water

Activities

Web Site	Description
Tooth Brushing Experiment	Scroll to the bottom of this link and find out how to experiment with water conservation while brushing your teeth.
Down the Drain: Water Survey	Figure out home much water you and your home use
Home Water Use Calculator	Another water calculator with a bit more information
Clean-Ocean Projects	A YouTube video showing a collaborative effort to clean up the North Pacific Gyre, an area currently overrun with floating plastic debris

More Information

Web Site	Description
H2OUSE.org	Take a tour of the virtual house and learn about conservation strategies.
Water-Guide.org.uk	An educational and fun British site on all things water.
Water Trivia	USGS facts about water

Teacher Resources

Web Site	Description
Project WET	Water Education for Teachers is a similar program to Project WILD and Project Learning Tree. They are a great resource of water related educational materials. We highly recomend their curriculum guide for lesson plans.
Water Graphics	An incredible selection of water related graphics and diagrams collected by the United Nations Environmental Program.
H2O University	Great info, teacher resources, and student activities from the Southern Nevada Water Authority.
US EPA Water	EPA's water education site. More than water conservation, and a good resource for a water unit.
Get-Wise.org	Check out the activities in the water section of the "Teachers Lounge."
Chewonki Water Lesson	Chewonki's Traveling Natural History Programs can bring a lesson to your school.

Back to Clean Water Home

Chewonki

Supporting water education and sustainable water use in Maine.

The Pathways office is the hub of Chewonki's leading-edge environmental sustainability, conservation, and energy curriculum. Pathways develops materials and demonstration projects on a wide range of topics and shares its expertise with educators and students. Pathways also oversees the implementation of sustainable practices on the Chewonki campus in Wiscasset, Maine.

CLEAN WATER
OUR PRECIOUS RESOURCE

Water Pollution

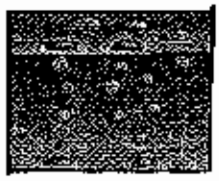
The leading types of water pollution in the U.S.

In a one-inch rainstorm every acre receives 27,000 gallons of water. Where does it all go? Into streams, rivers, lakes, ponds, and the ground. Along its path water picks up pollutants from the air and ground, carrying those pollutants to waterways. A 2000 survey by the US EPA found that 40% of rivers and 45% of lakes in the United States are considered too polluted for fishing, swimming, or aquatic life

The source of the major pollutants in our waterways can be broken up into five categories: Sediment, Chemicals, Oxygen Depleting Nutrients, Metals, and Biological Pollution.

It seems like dirt in the water would not be a problem, but sediment can clog gills, reduce visibility for fish, reduce photosynthesis of aquatic plants, and increase the temperature of water by absorbing more sunlight. These changes can have devastating effects on aquatic ecosystems. According to a 1992 EPA report sediment is the leading cause of surface water pollution. It is important for us to stop erosion of soil and place buffers between open ground and waterways to limit this type of pollution.

Chemicals such as pesticides, herbicides, vehicle fluids, and industrial waste often do not break down easily and can spend a long time in the environment effecting the health of many organisms. Some chemicals also have the nasty tendency to "bioaccumulate," meaning that things high on the food chain can have very dangerous levels of pollutants in them.By reducing the amount of chemicals we use, and by being sure to properly dispose of waste, we help keep water clean.



Household cleaners, lawn fertilizer, and runoff from farms contribute huge amounts of nutrients to our nations waterways. The result of the additional nutrients is increased plant growth and algae blooms. While increased growth sounds good, the resulting plants shade and cool the water. When the plants die decomposers use up all the oxygen in the water leaving none for other aquatic organisms. The result is a "dead-zone" where very little life can survive. A lot of people don't know how much the cleaners and chemicals they use effects life in the water. Help out by teaching others about nutrient pollution, and be sure to use less chemicals at home yourself.

Metals like arsenic, cadmium, lead, and mercury come from industry, electrical generation, mining, vehicle use and improperly disposed of waste. The majority of these find there way into the atmosphere and come down with rain. Some metals are picked up by runoff. Either way they pollute rivers, lakes, and seas. Some metals are dangerous to health, and like some chemicals, can bioaccumulate. We can all use less energy and buy fewer things. This ensures that less material is discarded near water where it will pollute. If we all do our part there will be less metal in the water, and a healthier aquatic environment.

Biological pollution includes pathogens (viruses, bacteria and protozoa) and invasive or non-native species. Biologic pollutants have the potential for severely harming native aquatic life, and even human health. Just because a plant or animal can be found in a geographic area does not mean that the species has always lived there. A lot of animals have been introduced to waterways for sport or beauty. This can harm native wildlife that may exist no where else on the planet. Plants are often introduced by accident on the underside of a boat, or by putting plants from aquariums into streams. By keeping native wildlife healthy by not introducing invasive species you are helping keep water clean.

Reducing the pollution in our waterways is vitally important for the health of the aquatic ecosystems that support all life. We can all do our part by making positive choices when it comes to buffers, waste and recycling, our homes and gardens, our energy, and how we move things around

Did You Know...?

- 1.2 trillion gallons of raw sewage, stormwater, and industrial waste are dumped into U.S. waters annually.
- In 1997 American cropland lost 1.9 billion tons of soil due to erosion. That was 40% better than 1982.

Simple Things You Can Do:

- Conserve water whenever you can.
- Encourage natural buffers to grow, and do not remove buffers that already exist.
- Reduce, reuse, and recycle as much as possible.
- Use fewer, and less harsh, cleaners/chemicals at home.

Did You Know...?

- 73 different kinds of pesticides have been found in groundwater which is potential drinking water.
- Every year the Mississippi River carries 1.5 million tons of nitrogen fertilizer into the Gulf of Mexico. There it creates a dead-zone the size of New Jersey.
- In America, one in six children is exposed to mercury levels high enough to put them at risk for learning disabilities, motor skill impairment, and short-term memory loss.
- A two-inch piece of Eurasian milfoil (an invasive aquatic plant) can infest an entire waterway.

Simple Things You Can Do:

- Don't use chemicals on your lawn and garden.
- Be more energy efficient and use renewable sources of energy such as wind, solar, hydro, geothermal, and biofuels.
- Buy local food and other products instead of those that have been transported long distances.
- Use public transportation and travel by vehicle less.

Activities

Web Site	Description
National Geographic	Check out these cool water pollution activities from National Geographic.
Environmental Kids	Join the Environmental Kids Club and do some fun water activities.
What's Wrong?	A lot of water waste and pollution is happening. Can you figure out all the things that are wrong with this picture?

More Information

Web Site	Description
Water-Pollution.org.uk	A great British site about water pollution and treatment.
Preventing Pollution	A guide to preventing pollution carried by storm water runoff
GrinningPlanet	A good overview of leading pollution causes and sources.
National Water Quality	Water Quality Conditions in the United States. A Profile from the 2000 National Water Quality Inventory

Teacher Resources

Web Site	Description
Discovery Kit	NOAA has put together a helpful discovery kit about water pollution.
Great Lakes	A lot of good information and outlines for teaching about water pollution using the Great Lakes as an example.
Water Pollution	Great two to three day lesson plan for younger kids.
Water Quality testing- easy test more complex	Information, lesson plans, and lab directions for testing water quality with students. We have provided two links: one is a very basic and quick lab, and the other can be much more involved.
Lesson Plans.com	Good basic pollution lesson plan for elementary school.
Lesson Plans.com	Lesson plan on the causes of pollution for grades K-3.
National Geographic	Explore the concept of borders and pollution with kids K-2.

Back to Clean Water Home

Chewonki

Poland Spring

Supporting water education and sustainable water use in NEWA.

The Pathways office is the hub of Chewonki's leading-edge environmental sustainability, conservation, and energy curriculum. Pathways develops materials and demonstration projects on a wide range of topics and shares its expertise with educators and students. Pathways also oversees the implementation of sustainable practices on the Chewonki campus in Wiscasset, Maine.

Fun Water Facts

- Ninety-seven percent of the earth's water is ocean. Two percent of the earth's water is frozen in glaciers. One percent is fresh water for us to use.
- The average American uses about 100 gallons of water a day
- A shower, bathroom faucet, toilet and kitchen sink use two to five gallons a minute
- A dishwasher uses 25 gallons of water in a load.
- A washing machine uses 30 gallons of water in a load.

Water Conservation Tips

- Turn off the faucet while you are brushing your teeth.
- Keep a container of water in the refrigerator instead of running the faucet to get a cold drink.
- Take a short shower instead of a bath.
- Don't leave a water hose running.
- Don't flush the toilet for fun
- Don't throw trash in ponds, rivers or the ocean

Water Experiments

Brushing Your Teeth

How much water can be saved by turning off the faucet when you're brushing your teeth?

Place a large container in your sink under the faucet. Turn on the faucet while you brush your teeth and keep in running until you are finished. Measure the amount of water in the container.

How many cups of water can be saved every time you brush your teeth?

Multiply that number by two since you brush your teeth twice a day

How many gallons is that?

With 52 weeks in a year, you could save how many gallons of water a year?

- Four cups = One quart
- Four quarts = One gallon
- Sixteen cups = One gallon

How Much Water?

Write down your weight

Divide by three

Multiply by four

That's about how many 8-oz glasses it would take to equal all the water in you.

Under Florida law, e-mail addresses are public records. If you do not want your e-mail address released in response to a public-records request, do not send electronic mail to this entity. Instead, contact this office by phone or in writing

100 Ways To Conserve

#01 ***There are a number of ways to save water, and they all start with you.***

#2 When washing dishes by hand, don't let the water run while rinsing. Fill one sink with wash water and the other with rinse water.

#3 Some refrigerators, air conditioners and ice-makers are cooled with wasted flows of water. Consider upgrading with air-cooled appliances for significant water savings

#4 Adjust sprinklers so only your lawn is watered and not the house, sidewalk, or street.

#5 Run your clothes washer and dishwasher only when they are full. You can save up to 1,000 gallons a month.

#6 Choose shrubs and groundcovers instead of turf for hard-to-water areas such as steep slopes and isolated strips.

#7 Install covers on pools and spas and check for leaks around your pumps.

#8 Use the garbage disposal sparingly. Compost vegetable food waste instead and save gallons every time.

#9 Plant in the fall when conditions are cooler and rainfall is more plentiful.

#10 ***For cold drinks keep a pitcher of water in the refrigerator instead of running the tap. This way, every drop goes down you and not the drain.***

#11 Monitor your water bill for unusually high use. Your bill and water meter are tools that can help you discover leaks.

#12 Water your lawn and garden in the morning or evening when temperatures are cooler to minimize evaporation.

#13 Wash your fruits and vegetables in a pan of water instead of running water from the tap.

#14 Spreading a layer of organic mulch around plants retains moisture and saves water, time and money.

#15 Use a broom instead of a hose to clean your driveway and sidewalk and save water every time.

#16 If your shower fills a one-gallon bucket in less than 20 seconds, replace the showerhead with a water-efficient model.

#17 Collect the water you use for rinsing fruits and vegetables, then reuse it to water houseplants.

#18 If water runs off your lawn easily, split your watering time into shorter periods to allow for better absorption.

#19 We're more likely to notice leaks indoors, but don't forget to check outdoor faucets, sprinklers and hoses for leaks.

#20 If you have an automatic refilling device, check your pool periodically for leaks.

#21 Check the root zone of your lawn or garden for moisture before watering using a spade or trowel. If it's still moist two inches under the soil surface, you still have enough water.

#22 When buying new appliances, consider those that offer cycle and load size adjustments. They're more water and energy efficient.

#23 Shorten your shower by a minute or two and you'll save up to 150 gallons per month.

#24 Upgrade older toilets with water efficient models.

#25 Adjust your lawn mower to a higher setting. A taller lawn shades roots and holds soil moisture better than if it is closely clipped.

#26 When cleaning out fish tanks, give the nutrient-rich water to your plants.

#27 Use sprinklers for large areas of grass. Water small patches by hand to avoid waste.

#28 ***Put food coloring in your toilet tank. If it seeps into the toilet bowl without flushing, you have a leak. Fixing it can save up to 1,000 gallons a month.***

#29 When running a bath, plug the tub before turning the water on, then adjust the temperature as the tub fills up.

#30 Walkways and patios provide space that doesn't ever need to be watered. These useful "rooms" can also add value to your property.

#31 Collect water from your roof to water your garden.

#32 Designate one glass for your drinking water each day or refill a water bottle. This will cut down on the number of glasses to wash.

#33 Rather than following a set watering schedule, check for soil moisture two to three inches below the surface before watering.

#34 Install a rain sensor on your irrigation controller so your system won't run when it's raining.

#35 Don't use running water to thaw food. Defrost food in the refrigerator for water efficiency and food safety.

#36 ***Use drip irrigation for shrubs and trees to apply water directly to the roots where it's needed.***

#37 Grab a wrench and fix that leaky faucet. It's simple, inexpensive, and you can save 140 gallons a week.

#38 Reduce the amount of lawn in your yard by planting shrubs and ground covers appropriate to your site and region.

#39 When doing laundry, match the water level to the size of the load.

#40 Teach your children to turn off faucets tightly after each use.

#41 Remember to check your sprinkler system valves periodically for leaks and keep the sprinkler heads in good shape.

#42 ***Use a water-efficient showerhead. They're inexpensive, easy to install, and can save you up to 750 gallons a month.***

See how Waterpik® EcoFlow® can help reduce your water use.

#43 Soak pots and pans instead of letting the water run while you scrape them clean.

#44 Don't water your lawn on windy days when most of the water blows away or evaporates.

#45 Water your plants deeply but less frequently to encourage deep root growth and drought tolerance.

#46 Know where your master water shut-off valve is located. This could save water and prevent damage to your home.

#47 To decrease water from being wasted on sloping lawns, apply water for five minutes and then repeat two to three times.

#48 Group plants with the same watering needs together to avoid overwatering some while underwatering others.

#49 Use a layer of organic material on the surface of your planting beds to minimize weed growth that competes for water.

#50 Use a minimum amount of organic or slow release fertilizer to promote a healthy and drought tolerant landscape.

#51 Trickling or cascading fountains lose less water to evaporation than those spraying water into the air.

#52 Use a commercial car wash that recycles water.

#53 Avoid recreational water toys that require a constant flow of water.

#54 Turn off the water while brushing your teeth and save 25 gallons a month.

#55 Use a rain gauge, or empty tuna can, to track rainfall on your lawn. Then reduce your watering accordingly.

#56 Encourage your school system and local government to develop and promote water conservation among children and adults.

#57 Learn how to shut off your automatic watering system in case it malfunctions or you get an unexpected rain.

#58 Set a kitchen timer when watering your lawn or garden to remind you when to stop. A running hose can discharge up to 10 gallons a minute.

#59 If your toilet flapper doesn't close after flushing, replace it.

#60 Make sure there are water-saving aerators on all of your faucets.

#61 ***Next time you add or replace a flower or shrub, choose a low water use plant for year-round landscape color and save up to 550 gallons each year.***

#62 Install an instant water heater near your kitchen sink so you don't have to run the water while it heats up. This also reduces energy costs.

#63 Use a grease pencil to mark the water level of your pool at the skimmer. Check the mark 24 hours later to see if you have a leak.

#64 If your dishwasher is new, cut back on rinsing. Newer models clean more thoroughly than older ones.

#65 Use a trowel, shovel, or soil probe to examine soil moisture depth. If the top two to three inches of soil are dry it's time to water.

#66 If installing a lawn, select a turf mix or blend that matches your climate and site conditions.

#67 When you save water, you save money on your utility bills too. Saving water is easy for everyone to do.

#68 When the kids want to cool off, use the sprinkler in an area where your lawn needs it the most.

#69 Make sure your swimming pools, fountains, and ponds are equipped with recirculating pumps.

#70 Bathe your young children together.

#71 Consult with your local nursery for information on plant selection and placement for optimum outdoor water savings.

#72 Winterize outdoor spigots when temperatures dip below freezing to prevent pipes from leaking or bursting.

#73 Insulate hot water pipes for more immediate hot water at the faucet and for energy savings.

#74 Wash your car on the lawn, and you'll water your lawn at the same time.

#75 ***Drop your tissue in the trash instead of flushing it and save water every time.***

#76 Direct water from rain gutters and HVAC systems toward water-loving plants in the landscape for automatic water savings.

#77 Make suggestions to your employer about ways to save water and money at work.

#78 Support projects that use reclaimed wastewater for irrigation and industrial uses.

#79 Use a hose nozzle or turn off the water while you wash your car. You'll save up to 100 gallons every time.

#80 Share water conservation tips with friends and neighbors.

#81 If your toilet was installed before 1992, reduce the amount of water used for each flush by inserting a displacement device in the tank.

#82 Setting cooling systems and water softeners for a minimum number of refills saves both water and chemicals, plus more on utility bills.

#83 Washing dark clothes in cold water saves both on water and energy while it helps your clothes to keep their colors.

#84 Leave lower branches on trees and shrubs and allow leaf litter to accumulate on the soil. This keeps the soil cooler and reduces evaporation.

#85 Report broken pipes, open hydrants and errant sprinklers to the property owner or your water provider.

#86 Let your lawn go dormant during the summer. Dormant grass only needs to be watered every three weeks or less if it rains.

#87 Plant with finished compost to add water-holding and nutrient-rich organic matter to the soil.

#88 Use sprinklers that deliver big drops of water close to the ground. Smaller water drops and mist often evaporate before they hit the ground.

#89 Listen for dripping faucets and running toilets. Fixing a leak can save 300 gallons a month or more.

#90 Water only when necessary. More plants die from over-watering than from under-watering.

#91 One more way to get eight glasses of water a day is to re-use the water left over from cooked or steamed foods to start a scrumptious and nutritious soup.

#92 ***Adjust your watering schedule each month to match seasonal weather conditions and landscape requirements.***

#93 Turn off the water while you wash your hair to save up to 150 gallons a month.

#94 Wash your pets outdoors in an area of your lawn that needs water.

#95 When shopping for a new clothes washer, compare resource savings among Energy Star models. Some of these can save up to 20 gallons per load, and energy too.

#96 Apply water only as fast as the soil can absorb it.

#97 Aerate your lawn at least once a year so water can reach the roots rather than run off the surface.

#98 When washing dishes by hand, fill the sink basin or a large container and rinse when all of the dishes have been soaped and scrubbed.

#99 Catch water in an empty tuna can to measure sprinkler output. One inch of water on one square foot of grass equals two-thirds of a gallon of water.

#100 Turn off the water while you shave and save up to 300 gallons a month.

#101 When you give your pet fresh water, don't throw the old water down the drain. Use it to water your trees or shrubs.

#102 If you accidentally drop ice cubes when filling your glass from the freezer, don't throw them in the sink. Drop them in a house plant instead.

#103 To save water and time, consider washing your face or brushing your teeth while in the shower.

#104 While staying in a hotel or even at home, consider reusing your towels.

#105 When backflushing your pool, consider using the water on your landscaping.

#106 For hanging baskets, planters and pots, place ice cubes under the moss or dirt to give your plants a cool drink of water and help eliminate water overflow.

#107 Throw trimmings and peelings from fruits and vegetables into your yard compost to prevent using the garbage disposal.

#108 When you have ice left in your cup from a take-out restaurant, don't throw it in the trash, dump it on a plant.

#109 Have your plumber re-route your gray water to trees and gardens rather than letting it run into the sewer line. Check with your city codes, and if it isn't allowed in your area, start a movement to get that changed.

#110 Keep a bucket in the shower to catch water as it warms up or runs. Use this water to flush toilets or water plants.

#111 When you are washing your hands, don't let the water run while you lather.

Water Lab

Water has many amazing properties due to hydrogen bonding between water molecules. Some of these we have talked about such as, cohesion, adhesion, and surface tension. Cohesion is when the same type of molecules are attracted to each other (this is how water can defy gravity in plants). Adhesion is when molecules of different types are attracted to each other. Surface tension is a measure of how difficult it is to stretch or break the surface of a liquid (Jesus lizards). Water has a higher surface tension than most other liquids (this is why you can slightly overfill a glass and not have it spill over).

Water can also absorb and release more heat than almost any other substance; this is known as a high specific heat. Specific heat means that the temperature of water changes less compared to other materials when the same amount of heat is added. Because of this property, tropical oceans absorb heat which then moderates the effect of sudden and drastic temperature changes in the Earth's climate.

Lab part 1

Materials: paper clip, plastic beaker full of water, tweezers, paper towel

Procedure: Make sure the paperclip is dry and then use the tweezers to gently set the paperclip on the water. Observe what happens and answer the questions. Take the paperclip out and set it on the paper towel.

1.) Which properties allow the paper clip to sit on top of the water?
2.) A.)What other things do you think you could get to "float" on top of water?
B.) What did you observe when you did this?

Lab part 2

Materials: penny, dropper, small beaker of water

Procedure: FIRST, make a prediction (this is #3) about how many drops of water will fit on the penny before it spills over the edge. Counting the drops as you go, use the dropper to carefully add drops of water to the top of the penny. Add drops until water spills over the edge. Record the number of drops (answer questions below)

3.) How many drops of water did you predict would fit on the penny?
4.) How many drops actually did fit on the penny?
5.) Which property of water did this section demonstrate?

Lab part 3
Materials: food coloring, 2 test tubes, 2 10-ml graduated cylinders, water in beaker, oil in beaker
Procedure: measure and add 3 ml of water to one test tube and 3 ml of oil into the other test tube. Then add 2 SMALL drops of food coloring to each test tube. Do not shake the test tubes. Answer the following questions based on your observations. Rinse out test tube with water into the sink and pour the one with oil into the trash can.

6.) What did you observe in this section of the lab?
7.) Would you consider food coloring polar or nonpolar? (remember: water is a polar substance & so water can easily dissolve other polar molecules)

Lab part 4
Materials: wax paper, dropper, water in a beaker
Procedure: Using a dropper, form small puddle about the size of a dime on the wax paper. Place the tip of the dropper in the center of the puddle and slowly drag the tip of the dropper around the wax paper. When finished dump the water back into the beaker.

8.) What property of water was shown in this part of the lab?
9.) Do you think that other substances would behave the same way?

Lab part 5
Materials: water, 2 containers of water, pepper, soap/detergent, alcohol, and glass rod
Procedure: sprinkle pepper all over the surface of the beaker of water. Then, drop a small drop of soap onto the surface in the middle of the peppered area. Record what happens in question #10. Take the second container of water and sprinkle pepper all over the surface. Then, drop 2-3 drops of alcohol onto the middle of the peppered area. Record what happens in question #11.

10.)What happened when you placed a drop of soap onto the peppered surface of water?
11.)What happened when you placed a few drops of alcohol onto the peppered surface of water?
12.) Which parts of the lab demonstrated the property of cohesion?
13.) Which parts of the lab demonstrated the property of adhesion?
14.) Which parts of the lab demonstrated the property of surface tension?
15.) Draw the structure of the water molecule.

Name:_____
Date:_____
Period:____

Water Quality Test Kit Lab

Data Collection:

pH=
Total Alkalinity=
Total Chlorine=
Total Hardness=
Free Chlorine=
Chloride=
Sulfate=
Total Nitrate=
Nitrate=
Copper=
Iron=
Bacteria=
Hydrogen Sulfide=
Lead=
Pesticide=

Results and Conclusions:

1. Where did you collect your water sample from?

2. What is your reaction to the results of your water sample?

3. Will the results of your water sample and the samples of your classmates change where you will drink your water from in the future?

Water Conservation Power Point Presentation

SC.D.2.4.1	The student understands the interconnectedness of the systems on Earth and the quality of life.
SC.G.2.4.4	The student knows that the world ecosystems are shaped by physical factors that limit their productivity.
SC.G.2.4.6	The student knows the ways in which humans today are placing their environment support systems at risk (e.g. rapid human population growth, environmental degradation, and resource depletion).
SC.H.3.4.2	The student knows that technological problems often create a demand for new scientific knowledge and that new technologies make it possible for scientists to extend their research in a way that advances science.
SC.H.3.4.3	The student knows that scientists can bring information, insights, and analytical skills to matters of public concern and help people understand the possible causes and effects of events.
SC.H.3.4.6	The student knows that scientific knowledge is used by those who engage in design and technology to solve practical problems, taking human values and limitations into account.

Directions for Power Point Presentation:

*Individual Project and Presentation Grade.

*Minimum of six (6) slides with the following information:

1) Title page: (title, student name, graphic or picture)
2) Facts:
3) Ways to Conserve:
4) Personal Water Use Information:
5) Chart/Graph:
6) Lab Results: (discuss results and information from a lab)

*Be creative!

*Ask questions!

*Use information from your Binders to help you!

*See Rubric for Grading Criteria on the Power Point Presentation.

*Have a classmate check your slides and presentation.

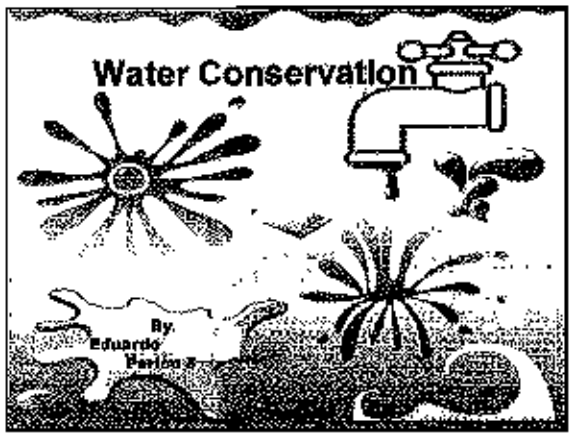
*Your teacher needs to give the final approval prior to your presentation!

Rubric for Water Conservation Power Point Presentation

Power Point Presentation – 4 Grades			
Slide Content:	**0 Points**	**5 Points**	**10 Points**
Slides:	Less than 5 slides	---------	5 slides or more
Title Page:	-Missing "Title" page	-Missing Information: title, student name and/or graphic/picture	-All Information Present: Title, student name, and graphic or picture
Facts:	-Missing "Facts" Page	-Includes minimal information on Water Conservation "Facts" and/or missing picture or graphic	Includes specific information on Water Conservation "Facts" and includes picture or graphic
Ways to Conserve:	-Missing "Ways to Conserve" Page	-Includes minimal information on "Ways to Conserve" and/or missing picture or graphic	-Includes specific information on "Ways to Conserve" and includes picture or graphic
Personal Water Use Information:	-Missing "Personal Water Use Information" Page	-Includes minimal information on "Personal Water Use" and/or missing picture or graphic	-Includes specific information on "Personal Water Use" and includes picture or graphic
Chart/Graph:	-Missing "Chart/Graph" Page	-Includes minimal information in a "Chart and/or Graph" on Water Conservation	-Includes specific information in a "Chart and/or Graph" on Water Conservation
Lab Results:	-Missing "Lab Results" Page	-Includes minimal information about "Lab Results" and/or missing picture or graphic	-Includes specific information about "Lab Results" and includes picture or graphic
Appearance of Slides: Fonts and Colors	-Fonts and colors are difficult to read and have a plain/generic appearance	-Fonts and colors can mostly be read and have some creativity in appearance	-Fonts and colors are easy to read and have an attractive and creative appearance
Presentation:	**0 Points**	**5 Points**	**10 Points**
Clearly spoken/ Pronunciation:	-Mumbling -Too low to be heard -Most words incorrectly pronounced	-Mostly understood -Some words incorrectly pronounced	-Clearly understood -Correct pronunciation of words
Eye contact:	-No eye contact	-Some eye contact -Reading all information from screen	-Strong eye contact with various members of the audience -Minimal reading or glancing at screen

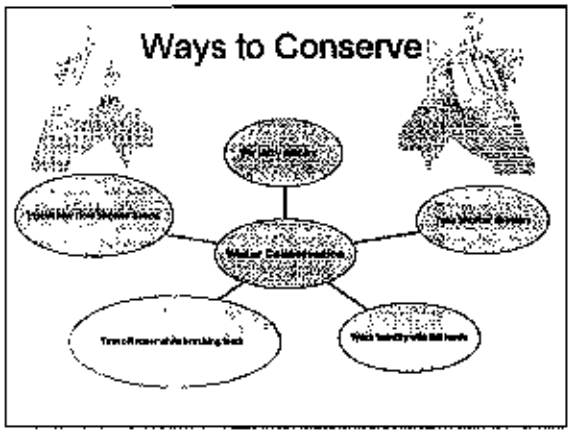
Power Point Presentation Grading Scale

(100 possible points)	
A	90-100 points
B	80-89 points
C	70-79 points
D	60-69 points
F	Under 59 points



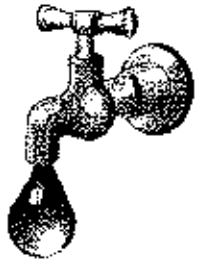
FACTS

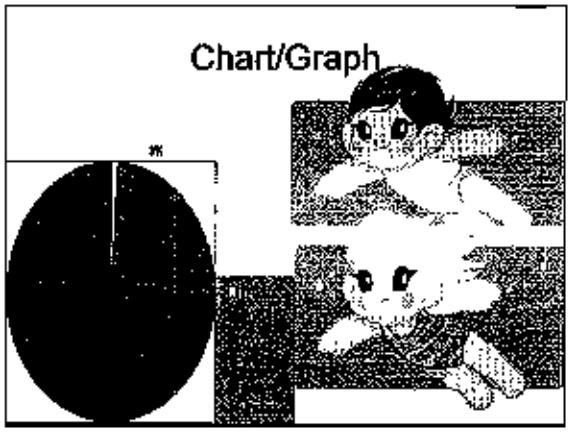
- There are a number of ways to save water, and they all start with you.
- Adjust your watering schedule each month to match seasonal weather conditions and landscape requirements.
- When you are washing your hands, don't let water run while you lather.
- When doing laundry, match the water level to the size of the load.
- Turn off the water while brushing your teeth and save 25 gallons a month.
- When you save water, you save money on your utility bills too. Saving water is easy for everyone to do.



Personal Water Use

After a week of recording how much water I use, I was surprised to find out that I use a total of 888.75 gallons of water a week. Taking a shower every day for a week was 350 gallons. Washing just two cars is 100 gallons. The least amount of water I used was my brushing teeth with the water turned off and it was 1.75 gallons.





Lab Results

Water has many amazing properties due to hydrogen bonding between water molecules. Cohesion, Adhesion, and Surface tension are some of the ones we found out about. Cohesion is when the same type of molecules are attracted to each other. Adhesion is when molecules of different types are attracted to each other. Surface tension is a measure of how difficult it is to stretch or break the surface of a liquid. In one of our labs that we did we found out how each one works and got really surprising results.