

CONTENTS

Overview	1
Composting	4
FOG	8
Pollutants and Plant Growth	10
Recycling	13
Water Filtration	16





OUR SERVICES

The Baton Rouge Department of Environmental Services (DES) serves as one of the largest agencies within the City of Baton Rouge, Parish of East Baton Rouge (City-Parish) government and is tasked with overseeing the delivery of some of the most critical and visible public services provided to Baton Rouge residents. From taking a shower and brushing their teeth, to flushing a toilet or walking outside to find that their garbage and recycling has been collected, Baton Rouge Baton Rouge residents interact with the services we provide from the moment they wake up until the time they go to sleep.

In addition to daily oversight of all East Baton Rouge Parish sewer and wastewater system operations, DES is responsible for managing the continued implementation and completion of the Sanitary Sewer Overflow Program – one of the largest capital programs in East Baton Rouge Parish history focused on the rehabilitation of our parish-wide wastewater system, scheduled for completion in December 2018.

OUR MISSION

To serve and protect the community and environment in East Baton Rouge Parish by responsibly managing wastewater, solid waste, and recycling through our solution-oriented employees, who are committed to outstanding customer service.

OUR VISION

We deliver outstanding services to our citizens, as efficiently as possible, while maintaining pristine levels of regulatory compliance – all through innovative approaches to teamwork and service delivery.

WASTEWATER	GARBAGE	RECYCLING	ENVIRONMENTAL
Wastewater collection operations, pump stations	Twice-a-week garbage cart collection, once-a-week bulky trash collection	Once-a-week recycling cart collection, bulky recyclables collection	Regulatory compliance and oversight in the enforcement of parish-wide ordinances for wastewater, solid waste, and storm water
Management of the wastewater treatment plants and labs	Garbage cart maintenance and replacement	Recycling cart maintenance and replacement	Pretreatment program (reduction of harmful substances entering EBR wastewater system)
Sewer engineering support and management of outside contractors for special wastewater projects	North Landfill management and operations, located at 16001 Samuels Road	Recycling and sustainability outreach and education programs	Coordination with state and federal regulatory agencies
(225) 389-4865	(225) 389-4813	(225) 389-5194	(225) 389-5623

GET IN TOUCH:



Contact us any time Monday through Friday, 8:00 a.m. to 5:00 p.m., by calling the DES Director's Office at **[225] 389-4865**



Email us with general feedback, questions, or complaints at des@brgov.com

For service requests such as missed garbage or recycling collection, sewer back-ups, manhole issues and more, please contact our **311** Call Center by dialing 3-1-1, visiting **311.brla.gov**, or downloading our free **Red Stick 311** mobile app onto your Apple or Android device

IN FOCUS:

DES SCHOOL OUTREACH PROGRAM

DES' School Outreach Program helps the department maintain a broader reach in the community by partnering with elementary, middle, and high schools in various areas throughout Baton Rouge. The objectives of this program are to:

- Promote cooperation, shared resources, and the exchange of expertise and services between DES and East Baton Rouge Parish schools
- Improve academic outcomes by providing experiential, project-based learning activities
- Provide students with the opportunity to relate their studies to experience outside the school environment
- Acknowledge and support teachers in the STEM fields

To achieve these outcomes, DES employees regularly team up with partner schools across East Baton Rouge Parish to lead classroom activities, put on a recycling competition, host field trips at DES facilities, and facilitate presentations showcasing the operations of the department. For more information and for students, teachers, or school administrators interested in participating in the DES School Outreach Program, please call (225) 389-4865.

LESSON: COMPOSTING

INTRODUCTION

Composting is a process in which plant waste material such as grass clippings, leaves, and plant-based table scraps are decomposed into a material that resembles fresh soil and can be used to fertilize yards and gardens. In this activity, students will learn the basic procedure for starting and maintaining a compost pile with the goal of converting yard wastes and vegetable-based table scraps into an inexpensive and effective soil conditioner.

		_
	LESSON OVERVIEW	
	Length: 6-8 weeks	
	Objectives:	
	After completing this lesson, students will be able to:	
	1. Discuss how to setup and maintain a productive composting pile	
	or bin in order to convert yard wastes and other plant-based	
	material into compost for use as fertilizer.	
	2. Appreciate the importance of returning the nutrients remaining	
	in organic waste material back into the environment rather than	
	sending them to a landfill.	
	Materials Needed:	_
	Shovel or pitchfork	_
	Water source and hose	_
$\overline{}$	Soil thermometer	_
	Commercially manufactured compost bin	
	- Commercially manufactured composition	_
	OR:	
	- 4-3ft tall wooden or metal stakes	
	- 16ft to 20ft length of 3ft high wire fencing	
	- String or plastic tie wraps to attach fencing to stakes	_
	Assessment:	_
	Students will be assessed through the following activities:	
	1. Quality of record keeping.	
	2. Small group and class discussion.	
		_
		_

LESSON BACKGROUND

Information

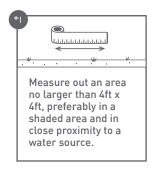
In order to facilitate the breakdown of organic material by bacteria and other organisms into compost, the right conditions must be maintained. The compost material should be kept moist throughout the process and never be allowed to completely dry out. Also, as the organisms decompose the organic material, the temperature within the compost will rise as high as 175°F, but as the organic material becomes less available, the temperature will drop back down to ambient temperature. In order to make sure that the decomposition is occurring constantly, the temperature will need to be monitored and the compost pile will need to be "turned over" frequently to ensure proper mixing and dispersion of food for the organisms within the pile.

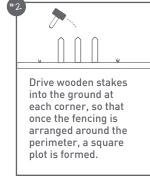
PROCEDURE

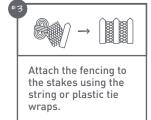
Getting Set Up

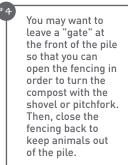
Composting can be successfully accomplished in a commercially manufactured compost "bin", or a simple, fenced-in compost pile, as long as the pile is not too large. Composting is an "aerobic" process, meaning that plenty of oxygen is needed for the organisms to efficiently metabolize the organic material. Commercial compost bins are usually ideal size, with holes in the side for ventilation. Fenced in compost piles should be small enough, usually no larger than 4' x 4', so that plenty of oxygen can reach the center of the pile.

MAKE YOUR OWN COMPOSTING AREA BY FOLLOWING THESE INSTRUCTIONS











Add Organic Material

Once your compost bin or fencing is set up, you can begin to add organic material to be composted. Yard wastes, such as dried leaves and grass clippings are ideal as well as small twigs, shredded straw or hay, and any vegetable-based scraps left over from food preparation. Manure and soil can also be added at the beginning and mixed in to help get the decomposition process started as these will contain some of the organisms required. Carbon and nitrogen are two very important elements required for microbial decomposition. As a rule of thumb, brown, carbon-rich material such as dried leaves should be mixed with green, nitrogen-rich material in a ratio of 2 to 1 to provide an ideal mixture for composting. Add new material to be composted for the first few weeks of the process. After 3-4 weeks, any new material to be composted should be added to a new compost pile in order to maintain a consistent texture within the compost. Avoid animal products such as meats and dairy products and any animal wastes.

Monitor and Keep Records

Check the compost daily, maintaining enough moisture so that the compost is slightly damp, like a wringed cloth, but not soaking wet. Take the temperature of the center of the compost and record it in a daily log book. When the decomposition is active, the temperature within the compost will be elevated well above ambient temperature (110°F – 150°F). When the temperature within the compost begins to steadily decrease, the compost should be mixed well to redistribute the food for the organisms within the pile. Keep a record of when the compost pile is mixed as well as the appearance of the compost as the decomposition progresses.

When is the Composting Complete?

When the temperature stops rising after the compost is turned, this means that most of the organic material has been metabolized and there is nothing left for the organisms to break down. The compost will have a dark color and a crumbly soil-like texture. Use the finished compost to fertilize plants and trees, help retain moisture in gardens, and help prevent weed growth.

DISCUSSION

What changes in the composting material did you observe over the course of the activity? How might less-frequent turning or less watering have changed the results? What do you think would have happened to the outcome if a different mixture ratio of green to brown items would have been used? How could the process be sped up or slowed down?

Extensions

Compile a report from the results of this activity and present them to the larger school community and beyond. Research and implement a community-wide composting effort. Package and sell the finished compost at a local farmer's market to raise funds for your school.

CONCLUSION

Discuss how organisms break down organic material and what role water, oxygen, and heat have in the process. How is composting similar to our own metabolism? Discuss how composting helps keep materials out of landfills by recycling nutrients back into the environment.

WORKSHEET 1



DAILY COMPOSTING RECORD

DAY	TIME	TEMPERATURE AT CENTER (°F)	MATERIAL ADDED	APPEARANCE

LESSON: FOG (FATS, OIL, AND GREASE)

INTRODUCTION

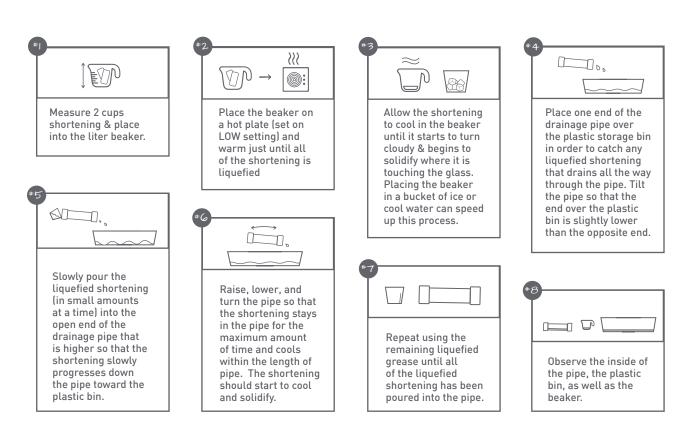
When water is drained from a restaurant sink, dishwasher, or clothes washer, that water can contain a variety of substances that can potentially cause major problems in a city's municipal sewer system. Fats, oils, and grease, (FOG) will flow like liquid when warm. But once cooled, these substances can harden within sewer lines, causing massive clogs that require personnel to find and remove the clogs so that wastewater can once again flow freely through the piping. In this lesson, students will investigate how a sewer clog is formed by fats, oils, and grease, as well as understand the importance of educating the public in order to prevent the release of substances that would normally clog a municipal sewer system from entering the system piping, maintaining a constant flow and preventing messy and potentially expensive sewer clogs.

LESSON BACKGROUND

Information:

Fats, oils, and grease are substances commonly used in cooking and with the increasing popularity of in-sink, food-grinding disposals, these substances are being disposed of in municipal sewer systems more frequently. When warm, fats and grease are usually in the liquid form and flow, along with the water, easily down the drain. But when these substances cool down, usually after they have travelled some distance down the drainage piping, they begin to solidify and trap other substances within the "grease ball", eventually causing a partial or even complete blockage within the city's sewer drain piping. This blockage can cause wastewater to back up into surrounding streets, yards, or even inside homes. City personnel must locate and remove clogs, a process that can be very expensive and time consuming. To demonstrate how a clog can form from cooling fats and grease within drainage piping, students can pour warmed grease down a length of piping and allow the grease to cool, observing the solid build-up that results.

PROCEDURE



DISCUSSION

- 1. What happened to the inside of the pipe and the plastic bin when the shortening was poured through? Was any of the shortening left in the beaker?
- 2. In your own words, describe how, over time, pouring grease down the drain could cause problems in the sewer drainage system.
- 3. How would other items such as hair or trash mixing with the grease affect the piping? Would it slow down or speed up the clogging process?
- **4.** Sending hot water down the drain could cause solidified grease to re-liquefy. Would this solve the problem, or just relocate it?

Extensions:

- 1. What steps could be taken to educate the public on this topic and discourage people from releasing FOG into the sewer system? Create a public service campaign to get the word out to your local community and help keep your municipal sewer system clear and flowing freely. Make a plan to present your ideas to your local city council.
- 2. Relate what you've learned about grease and pipes to what happens when we eat fatty foods and the grease and oils from the food is absorbed into our bloodstream. What effect could fatty deposits in our blood vessels have on the movement of blood throughout the body?

CONCLUSION

Fats, oils, and grease released into the city's municipal sewer system can cause major problems and have high costs in both man hours and tax-payer money to repair. Educating the public is essential to making the community aware of the potential hazards that FOG presents to sewer piping and equipment. Take what you learned from this lesson and start a discussion at home and in your local community about what should and shouldn't be introduced into the city's sewer system.

LESSON: SOIL POLLUTION & PLANT GROWTH

INTRODUCTION

Like animals, plants require certain substances in order to survive. Plants require nutrients from soil, sunlight, water and carbon dioxide for photosynthesis, as well as oxygen for respiration. Any shortage of any one of these substances or introduction of a different substance, such as a pollutant, can have negative effects on the plant's growth and survival. Pollutants can include a variety of chemicals mixed with the air, soil, or water. Different pollutants will affect plants in different ways. In this activity, students will explore the effects of a variety of pollutants on the growth and overall health of plants as they are exposed over a period of time.

LESSON OVERVIEW
Length: 1 – 3 weeks
Objectives:
After completing this lesson, students will be able to:
1. Discuss how exposure to various pollutants over time might affect
the growth and overall health of plants.
2. Appreciate the importance of removing potential pollutants from
wastewater prior to discharge into the environment.
Materials Needed:
Possible pollutants:
- Oil (petroleum based)
- Oil (vegetable based)
- Vinegar
- Table salt
- Coffee grounds
- Baking soda
2 1-gallon flower pots (for control)
2 1-gallon flower pots for each pollutant
Potting soil
Watering cans (one for each pollutant)
Sunflower seedlings (at least six inches tall)
Sufficient sunlight (or capable artificial lighting with timer)
Assessment
Students will be assessed through the following activities:
1. Small group and class discussion.

LESSON BACKGROUND

Information

Discuss with the class the general processes of photosynthesis and respiration as well as what plants need for normal growth. Highlight the importance of water and how water that might be polluted, such as wastewater or storm water runoff, may harm plant growth. Discuss different ways pollutants might be introduced into the environment and eventually may find their way into wastewater or storm water runoff which ultimately may end up in major waterways used for agriculture.

CONCLUSIONS

Did the assigned pollutant have any effect on the growth of the plant?

Were the results of the experiment consistent with what you may have predicted prior to the test? Besides being harmful to plants, how may pollutants affect the overall ecosystem in the area where the pollutant was introduced and beyond? Discuss ways that the public may be made aware of common household pollutants and their effects on the environment in order to keep these pollutants from being introduced to the environment through a municipal wastewater system or from storm water runoff from homes, farms, industry, businesses, etc. (Use a separate piece of paper if necessary.)



PLANT GROWTH OBSERVATION WORKSHEET

DAY	DATE	HEIGHT (CM)	CHANGES IN APPEARANCE

INTRODUCTION

As of January 2017, the population of the U.S. stood at 324,420,000 people. If each person averages four pounds of trash per day then, as a country, we generate in excess of 236 million tons of trash per year. This is more than any other country in the world and the majority of this trash ends up in landfills where it is buried over and over again and left to decompose for, in the case of some materials, centuries or even millennia. Recycling, the act of re-using materials instead of throwing them into landfills, could significantly reduce the amount of trash that is ultimately left to slowly decompose in landfills as well as reduce the need and energy required to produce the raw materials that many products are made of such as plastics and aluminum.

In this lesson, students will explore what materials are able to be recycled and the benefits of recycling instead of disposal in a landfill. Students will get a sense of the amount of trash they produce over the course of one week and how much of that trash can be recycled.

	LESSON OVERVIEW	
	Length: 1 week	
	Objectives:	
	After completing this lesson, students will be able to:	
	1. Discuss the benefits of recycling as well as what materials can	
	and cannot be recycled.	
	2. Appreciate the impact of reducing the amount of trash entering	
	the landfill.	
	Materials Needed:	
	 Kitchen trash bags or bins (2 - one for landfill trash, and one for recyclables). 	
	Record to keep track of trash produced daily (Worksheet 1)	
	List of items that can be recycled (Visit brgov.com/recycle to download list)	
U	List of items that cannot be recycled (Visit brgov.com/recycle to download list)	
	Bathroom scale (or other scale capable of weighing items up to	
	20 lbs)	
	Calculator	
	Assessment:	
	Students will be assessed through the following activities	
	1. Small group and class discussion	



LESSON BACKGROUND

Information:

Discuss with the class what it means to recycle materials instead of manufacturing them from scratch. Students should become familiar with the materials that are able to be recycled as well as the materials that should not be (see above hyperlinks in the materials section). Have students research the amount of energy that can be saved by recycling various materials such as glass, plastics, aluminum, and paper as opposed to producing new materials.

PROCEDURE

Note: This activity can be performed in the classroom, at the students' homes, or both locations at the same time.

- 1. Beginning with the first day of the test week, decide if items to be thrown away are going in the trash (destined for the land fill) or in the recycling container. Place them in the appropriate container depending on whether they are items that can be recycled or items that are destined for the landfill (trash).
- 2. Keep track of the weight of the trash and the recyclables generated in your household on a daily basis for one week by weighing both separately and recording the weights at the end of the day on Worksheet 1.
- 3. Keep track of the number of items from each recyclable category by placing a mark for each item in the appropriate space.
- **4.** At the end of the week, combine the totals from your household with the totals from the other students in the class to see how much material was sent to the landfill and how much material was kept out to be recycled.

DISCUSSION

- What percentage of the total trash generated in each household (as well as the class combined total) over the course of the week was found to be recyclable?
- Multiply each household's total weight for the week by 52 (the number of weeks in a year) to see how much trash and recyclables could potentially be generated by each household over the course of one year.
- Add the calculated total yearly weights for the class as a whole to see how much trash and recyclables would be generated by the class over the course of one year.
- Using the average amounts of energy expended to manufacture raw materials (researched in the previous section under lesson background), determine the amount of energy that could be saved each year, on average, by recycling daily.

Extensions:

- Using the results from this classroom activity, put together a presentation or printed document that can be used to educate the rest of the school and community about the benefits of recycling. Present the results to your city-council and urge them to start a recycling program in your community if there is not one already in place.
- Research the amount of time that it takes for the various types of recyclable materials to decompose in a landfill.
- Discuss other methods of recycling, such as composting, to recycle organic material back into soil that can be used to feed plants and produce vegetables.
- Visit a local materials recycling facility, or MRF, to learn more and experience first-hand how materials collected for recycling are sorted, packaged, and prepared to be recycled.

CONCLUSION

How did the results of this activity compare to what you may have expected going into the activity? Discuss how each individual household's results compare to the combined class results. Now, consider how those results would look if you took the entire population of the U.S. or perhaps the world into account. Do you think that recycling is becoming increasingly important as the world's population increases? What can you do to encourage your household, school, or local community to participate in recycling?



WORKSHEET A



Note: If possible, try to obtain a daily weight measurement. However, it may be necessary to wait more than one day before weighing trash or recyclables to build up an amount that will register a measurable weight on the scale.

DAY	WEIGHT OF TRASH (LBS)	WEIGHT OF RECYCABLES (LBS)	CONTENT: PLASTICS/ PAPER/CANS/GLASS

LESSON: WATER FILTERING

INTRODUCTION

This lesson will introduce students to the concepts of water pollution and access to clean water through class discussion and a water filtration experiment.

Note: The filtration methods used in this activity are a simple demonstration and the water should not be considered safe for drinking.

LESSON OVERVIEW	
Target Audience: High school	
Length: 1 class period	
Objectives:	
After completing this lesson, students will be able to:	
Understand the issues of water pollution and the importance of	
access to clean water.	
Experiment with filtering various substances from water by	
making their own simple water filters.	
Observe and draw conclusions based on their experiment.	
Materials Needed:	
Chalkboard or whiteboard (for the instructor)	
Empty 1-liter soda bottle (for each student or small group of	
students)	
- These should be pre-cut in half by an adult (see preparation	
instructions below)	
Filtration materials, such as:	
- Napkins	
- Sand	
- Cotton Balls	
(The students can choose the amount of each piece of filtration	
material needed)	
(CONTINUED ON NEXT PAGE)	

	LESSON OVERVIEW (CONTINUED)
	Materials to be used as "pollution," such as:
	- Sequins and Glitter (approximately two tablespoons per liter of pollution)
	- Food coloring (any color, two drops per liter of pollution)
	- Fibers (from shredded cotton balls)
	- Use any of the above, or any other materials you may have
	ose any of the above, of any other materials you may have
	(Pollution can be "pre-mixed" by instructor ahead of the activity to
	save time)
	Cup or other container (about 1 liter) for mixing the "polluted
	water." (Omit if pollution is "pre-mixed")
	Paper towels or napkins for clean-up
	Worksheet #1 – Water Filter Procedure (one for each student or
\bigcirc	small group of students)
	Worksheet #2 – Water Filter Lab Worksheet (one for each
	student)
	Assessment
	Students will be assessed through the following activities:
	Participation and contribution to class discussion
	Participation in Water Filter Activity
	Completion of Worksheet #2 – Water Filter Lab Worksheet

LESSON BACKGROUND

Relevant Vocabulary:

Pollution: Unnatural or harmful substances

Filtration: The process of removing matter from a liquid by means of porous media (materials with holes, various-sized)

Information:

Although Earth over 70% of Earth's surface is covered with water, only about 3% of the water on our planet is not salt water. Of this tiny amount of freshwater, much is locked up in ice and glaciers. Of the remaining water, less and less is available to humans because of rising populations and increased pollution. Everyone on Earth must share the same water continuously cycling through, and we are all connected by watersheds. Almost everyone in the United States is used to having clean water anytime, at the turn of a faucet. Most of the world's people are not so lucky, and must obtain water from a variety of sources. Many of these water sources contain pollution of some form, whether it is bacteria and microorganisms, chemicals, toxins, waste, litter, or other substances and materials.

Resources:

https://water.usgs.gov/owq/

http://www.earthday.org/

http://waterwatch.usgs.gov/wqwatch/

http://pbskids.org/zoom

Preparation:

- 5. Before the lesson, the 2-liter bottles should be pre-cut for each student or small group of students.
 - Cut circumferentially around the bottle about 1/2 or 1/3 of the way down.
 - Keep both pieces together and set aside for activity.
- **6.** To prepare pollution:
 - Mix a combination of approximately 2 tablespoons of glitter (large and small) and fibers from a shredded cotton l.
 - ball with one liter of water. Add two drops of food coloring and mix well.

PROCEDURE

Warm-Up: Water in Your Life

1. Begin this lesson by discussing with your class the importance of water in our daily lives. Have your students brainstorm how many times today they have used water, and write their answers on the board.

Examples: drinking, flushing the toilet, taking a bath or shower, brushing teeth, watering yard or garden, washing dishes, filling a pet's water dish or fish tank, cleaning, doing laundry, swimming, fishing, etc.

ACTIVITY ONE: WATER, WATER, EVERYWHERE?

Lead students in a discussion about the overall scarcity of clean water on our planet, and the impact this has on humans around the world:

- **a.** Although Earth is covered with water (over 70% of Earth's surface), only about 3% of the water on our planet is not saltwater. Of this tiny amount of freshwater, much is locked up in ice and glaciers, and of the remainder, less and less is available to humans because of rising populations and increased pollution.
- **b.** What are some sources of water pollution? Oil spills, bacteria and other organisms, toxic chemicals, litter, run-off from city streets, industrial waste, human waste, agricultural waste, etc.
- **c.** In the United States, we are lucky to have sources of freshwater, and sanitation facilities and water treatment plants to clean our water. We are also lucky that most of us have running water in our homes, schools and other buildings, and we can access clean water any time of day.
- **d.** What would you do if you turned on your faucet at home, and no water came out? Where would you find water? Think of nearby bodies of water in your area. Is there a stream or river? A lake? The ocean?
- e. What do these places look like? Could you drink the water? Cook with it? Bathe with it? Feed your pet?
- **f.** Many people around the world do not have running water in their homes, or even access to clean water. They must gather water from sources near their homes such as communal wells, sewers, rivers, streams, ponds, lakes or swamps. What do you think they find in this water? Fish, plants and other wildlife, trash, wastes, chemicals etc.
- g. Depending on where they live, there could be all kinds of things in their water.

ACTIVITY TWO: WATER FILTER ACTIVITY

- 1. Break students into small groups, and pass out Worksheet #1 Water Filter Procedure (one for each student, or one for each lab group) and Worksheet #2 Water Filter Lab Worksheet (one for each student). Distribute lab supplies to each station (2-liter soda bottle pre-cut in half, filtration materials, "pollution" materials).
- 2. Have students discuss within their groups about the types of pollution they discussed in the first activity. How could they represent these with the materials provided? Ask some of the groups to share their ideas aloud with the class.
- 3. Have each group follow the procedure outlined in Worksheet #1 Water Filter Procedure and complete Worksheet #2 Water Filter Lab Worksheet.
- 4. Clean up.

DISCUSSION

- 1. Have your students imagine again that they have no running water and no water treatment facilities, and they must collect water from sources near their homes. What might this water look like, taste like, smell like, etc? Would they like to use this water for drinking, cleaning, cooking, etc.?
- 2. Based on the water filter activity, how would they design a water filter to clean the water they would be using?
 - What pollutants would they need to filter out?
 - What materials would they use to filter each kind of pollutant?
 - Are there any pollutants that they were not able to filter out with their hand-made filters?
 - Even if the water looked clean, is it possible that the water was still undrinkable?
 - How might they remove contaminants from the water that cannot be filtered out?
 - Would they feel safe and comfortable using and drinking the water after using a homemade filter? Would they get sick?
- 3. Think about microscopic organisms that are too tiny to see and possibly too small to filter. Also, think about contaminants that are dissolved in the water and thus would be difficult to filter. How do water treatment plants and sanitation facilities solve this problem? (Example: They use chemical cleaners to treat the water.
- 4. Remind your students that, although most citizens in the United States generally have reliable access to clean water, many people around the world are not so lucky and must collect and clean their own water. In addition, conditions such as drought, pollution, increased population and unequal distribution of natural resources threaten Earth's water supply. This makes it necessary for each of us to conserve water and find ways to reduce our daily water usage.

Extensions: Building a Water Filter and Learning About Your Area's Water!

- 1. Have students design a water filter they would use if they had to, including drawings. How much would a filter like this cost? Would it be hard or easy to make? Do they have access to all of these materials?
- 2. Take a field trip to a water treatment facility! Find out more about the filtration process and other steps involved in purification.

CONCLUSION

After completing this lesson, students will be more familiar with the issues of water pollution and access to clean water. Through experimentation with a simple, handmade water filter, they will have an idea of some methods of filtration.

WORKSHEET #1 WATER FILTER PROCEDURE



Make Your Water Filter:

- 1. Place the top half of the soda bottle upside-down (like a funnel) inside the bottom half. (Make sure the cap is off). The top half will be the filter and the bottom half will hold the filtered water.
- 2. Layer the filter materials (sand, gravel, napkins, cotton balls, etc.) inside the top half of the bottle.

Observe Your Pollution:

3. Predict what type of "pollution" might be removed by each layer of the filter materials. Write down your predictions on your worksheet.

Filter Your Water and Make Observations:

- 4. Pour "half" the polluted water through the filter.
- 5. Observe what the filtered water looks like.
- **6.** Take apart your filter and look at each of the different layers. Can you tell what each material filtered from the water? Write down the results on your worksheet.

Try it Again:

- 7. Empty the bottle, throw out the filter materials, and wipe out the bottle.
- **8.** Try it again! See if you can make the filtered water even cleaner! Try putting materials in different layers or try using different amounts of each material.
- 9. What do you think you could do to improve your filter next time?

WORKSHEET #2 WATER FILTER LAB

Make Your Water Filter	
1. Draw and label the layers in your filter	in the space below:
Make Your Pollution	
2. Write your predictions of what type of " $ $	pollution" might be removed by each layer of the filter materials:
Filter Layer 1:	
Filter material	
Pollution filtered out	
Filter Layer 2:	
Filter material	
Pollution filtered out	
Filter Layer 3:	
Filter material	
Pollution filtered out	
Filter Layer 4:	
Filter material	
Pollution filtered out	

Filter Your Water and Make Observations

Write your observations of the filtered water here:
It looks:
Color:
Transparency:
Smell:
Does this water seem like it could be drinkable?: YES NO
Were your predictions about the filter layers correct? If no, why not? Explain below:
Filter Layer 1:
Filter Layer 2:
Filter Layer 3:
Filter Layer 4:
Try it Again:
3. What do you think you could do to improve your filter next time?



PREPARED BY:

