Science Field Trip

Watery Earth

Responding to an Oil Spill

“Investigating a Way to Clean Water”

Selections from the digital Teacher Lesson Manual

Science Companion Field Trips
A “Science in Real Life” Series

Come on a virtual field trip matching module sample lessons with special places or current events!
May is National Wetlands Month. Sadly, it’s also a time when the whole world is waiting to see what happens after the big oil spill in the Gulf of Mexico.

On April 20, 2010, an oil rig in the Gulf of Mexico exploded and oil began leaking out of an underground well on the ocean’s floor.

Many ecosystems could be damaged by this spill.

Like the edges of the great wetlands in Florida, the Everglades.

And like this mangrove swamp

As well as beaches and barrier islands

And coral reefs
Many kinds of fish

Like sea turtles

Many kinds of fish

Birds like Brown Pelicans

And bottle-nosed dolphins

Scientists are exploring many ideas about how to stop the spill and clean up the oil that is already in the water, hoping that they can save these special places and keep plants, animals, and people healthy.

Some resources to check out:
(just click on the title to automatically link to the webpage...)

- Ranger Rick & the National Wildlife Federation Talk About the Spill...
- Pet Hair to Capture Oil???
- Suggest Your Ideas!

Turn the page to find out some ways you can clean up water...
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* Indicates a core lesson

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Philosophy

Almost anyone who has spent time with children is struck by the tremendous energy they expend exploring their world. They ask “why” and “how.” They want to see and touch. They use their minds and senses to explore the things they encounter and wonder about. In other words, children are already equipped with the basic qualities that make a good scientist.

The goal of the Science Companion curriculum is to respond to and nourish students’ scientific dispositions by actively engaging their interests and enhancing their powers of inquiry, observation, and reflection. Learning by doing is central to this program.

Each Science Companion lesson incorporates interesting and relevant scientific content, as well as science values, attitudes, and skills that children in the elementary grades should begin to develop. These “habits of mind,” along with science content knowledge, are crucial for building science literacy and they are an integral part of the Science Companion program. Be aware of them and reinforce them as you work with students. With experience, students will develop the ways they demonstrate and use the following scientific habits of mind.

Habits of Mind

Wondering and thinking about the natural and physical world
Students’ curiosity is valued, respected, and nurtured. Their questions and theories about the world around them are important in setting direction and pace for the curriculum. Children are encouraged to revise and refine their questions and ideas as they gain additional information through a variety of sources and experiences.

Seeking answers through exploration and investigation
Students actively seek information and answers to their questions by trying things out and making observations. They continually revise their understanding based on their experiences. Through these investigations, children learn firsthand about the “scientific method.” They also see that taking risks and making mistakes are an important part of science and of learning in general.

Pursuing ideas in depth
Students have the opportunity to pursue ideas and topics fully, revisiting them and making connections to other subjects and other areas in their lives.
Observing carefully
Students are encouraged to attend to details. They are taught to observe with multiple senses and from a variety of perspectives. They use tools, such as magnifying lenses, balance scales, rulers, and clocks, to enhance their observations. Students use their developing mathematics and literacy skills to describe, communicate, and record their observations in age-appropriate ways.

Communicating clearly
Students are asked to describe their observations and articulate their thinking and ideas using a variety of communication tools, including speaking, writing, and drawing. They learn that record keeping is a valuable form of communication for oneself and others. Children experience how working carefully improves one’s ability to use one’s work as a tool for communication.

Collaborating and sharing
Students come to know that their ideas, questions, observations, and work have value. At the same time, they learn that listening is vitally important, and that exchanging ideas with one another builds knowledge and enhances understanding. Children discover that they can gain more knowledge as a group than as individuals, and that detailed observations and good ideas emerge from collaboration.

Developing critical response skills
Students ask, “How do you know?” when appropriate, and are encouraged to attempt to answer when this question is asked of them. This habit helps develop the critical response skills needed by every scientist.
Investigating a Way to Clean Water

A QUICK LOOK

Overview
Students explore using water filters to clean water they pollute with different substances. They learn about filters, consider other ways to treat water, and debate the definition of “clean” water.

Key Notes
• Allow two sessions for this lesson.
• Make sure you have a set of two empty 2-liter bottles for each pair of students. Cut each bottle in half (see illustration on page 234) and wash them out completely so there is no residual liquid or odor.
• After introducing this activity to the whole group, you may prefer to set up the materials in your Science Center and allow pairs of students to conduct their investigations over the course of one or more days. When every pair has completed the activity, hold the sharing and synthesizing discussions.
• For more information about the science content in the lesson, see the “Pollution and Clean-up” section of the Teacher Background Information on pages 320–322.
Standards and Benchmarks

As students discuss water pollution, they develop their understanding of Science in Personal and Social Perspectives Standard F (Changes in Environments): “Changes in environments can be natural or influenced by humans. Some changes are good, some are bad, and some are neither good nor bad. Pollution is a change in the environment that can influence the health, survival, or activities of organisms, including humans.”

As they design their water treatment investigation, they apply Science as Inquiry Standard A (Understandings About Scientific Inquiry): “Scientific investigations involve asking and answering a question and comparing the answer to what scientists already know about the world.” They will also likely learn more about The Nature of Technology Benchmark 3B (Design and Systems): “There is no perfect design. Designs that are best in one respect (safety or ease of use, for example) may be inferior in other ways (cost or appearance).”

Lesson Goals

1. Conduct a simple investigation to answer a question.
2. Recognize that water is easy to pollute but difficult to clean.
3. Understand that different pollutants require different treatment strategies.
4. Learn there are many ways to define “clean” water.

Assessment Option

Based on their contributions to group discussions and their observations in their science notebook on pages 47–49, determine how well the students understand criteria B and C on Assessment 4.
# Materials

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ExploraGear</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coffee filters</td>
<td>1 package</td>
<td>To filter water.</td>
</tr>
<tr>
<td>Condiment cups, 100 ml (3.25 oz)</td>
<td>2 per pair</td>
<td>To hold pollution samples.</td>
</tr>
<tr>
<td>Measuring cup, 1 C</td>
<td>1</td>
<td>To measure water.</td>
</tr>
<tr>
<td>Plastic cups, 375 ml (12 oz)</td>
<td>2 per pair</td>
<td>To hold water and pollutant mixture.</td>
</tr>
<tr>
<td>Plastic cups, 375 ml (12 oz)</td>
<td>1 per pair</td>
<td>To hold water to compare with polluted water.</td>
</tr>
<tr>
<td><strong>Classroom Supplies</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bowls, 4+ cups capacity</td>
<td>2</td>
<td>To hold 3 cups of pollutant.</td>
</tr>
<tr>
<td>Colander</td>
<td>1</td>
<td>Example of a filter.</td>
</tr>
<tr>
<td>Cotton fabric, 30 cm × 30 cm</td>
<td>15–20 pieces</td>
<td>To filter water.</td>
</tr>
<tr>
<td>Food coloring, blue</td>
<td>1 bottle</td>
<td>To tint vinegar.</td>
</tr>
<tr>
<td>Food coloring, red</td>
<td>1 bottle</td>
<td>To tint water.</td>
</tr>
<tr>
<td>Lint screen from clothes dryer</td>
<td>1</td>
<td>Example of a filter.</td>
</tr>
<tr>
<td>Newspaper</td>
<td>Multiple sheets</td>
<td>To cover tables.</td>
</tr>
<tr>
<td>Paper pieces, small</td>
<td>750 ml (3 C)</td>
<td>To pollute water.</td>
</tr>
<tr>
<td>Paper towels</td>
<td>15–20 sheets</td>
<td>To filter water.</td>
</tr>
<tr>
<td>Pitchers, jars, or bottles</td>
<td>3</td>
<td>To hold liquid pollutants.</td>
</tr>
<tr>
<td>Plastic bottles, 2-liter</td>
<td>2 per pair</td>
<td>To create filter apparatus.</td>
</tr>
<tr>
<td>Plastic gloves</td>
<td>1 pair per student</td>
<td>To protect hands while working with white vinegar.</td>
</tr>
<tr>
<td>Plastic spoons</td>
<td>2 per pair</td>
<td>To mix water and pollutants.</td>
</tr>
<tr>
<td>Potting soil</td>
<td>750 ml (3 C)</td>
<td>To pollute water.</td>
</tr>
<tr>
<td>Rocks or sticks, small</td>
<td>Several pieces</td>
<td>To pollute water.</td>
</tr>
<tr>
<td>Safety goggles</td>
<td>1 pair per student</td>
<td>To protect eyes while working with white vinegar.</td>
</tr>
<tr>
<td>Vegetable oil</td>
<td>750 ml (3 C)</td>
<td>To pollute water.</td>
</tr>
<tr>
<td>Water</td>
<td>500 ml (2 C) per pair</td>
<td>To be polluted and filtered.</td>
</tr>
<tr>
<td>Water</td>
<td>1 pitcher</td>
<td>To be available in case students need more water for filtration investigations.</td>
</tr>
<tr>
<td>White vinegar</td>
<td>750 ml (3 C)</td>
<td>To pollute water.</td>
</tr>
<tr>
<td><strong>Previous Lessons</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family Link “Empty Bottles”</td>
<td></td>
<td>From Lesson 7.</td>
</tr>
<tr>
<td>List of pollutants</td>
<td></td>
<td>From Lesson 12.</td>
</tr>
<tr>
<td><strong>Curriculum Items</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Watery Earth Science Notebook</em>, pages 46–49</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Watery Earth Assessment 4 “Water Conservation and Pollution”</em> (optional)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**SAFETY NOTE:** The vinegar used in this lesson is a common household item and is not hazardous if used with care. While working with vinegar, students should use safety goggles and plastic gloves to protect their eyes and hands. A Material Safety Data Sheet (MSDS) is included that provides information about any hazards and describes how to safely handle, use, and store the vinegar. Please check with your supervisor about OSHA or state regulations regarding laboratory practice and chemical storage and use caution with this material so you and your students are safe in the classroom.

**Preparation**

- Decide on an area, such as a large table, to set up a pollution station where students collect the materials for the filtration investigation.

- Collect some common household filters, such as a colander, a lint screen from a clothes dryer, or a furnace filter for use in the introductory discussion.

- Prepare a cup of clean water for each pair of students. Collect a pair of safety goggles and a pair of plastic gloves for each student.

- Gather two sets of the following materials for each pair of students:
  - Pre-cut and washed 2-liter bottle
  - Plastic cup containing 250 ml (1 C) of water
  - Condiment cup to hold the pollutant of their choice
  - Plastic spoon

**Teacher Note:** Each pair will complete two filtration investigations and they will need a clean set of the above materials for each one.

- Arrange the different types of filters:
  - 15–20 coffee filters
  - 15–20 paper towels
  - 15–20 30 cm × 30 cm pieces of fabric
Prepare and label jars, bottles, or pitchers of the following pollutants:

- 750 ml (3 C) of vegetable oil
- 750 ml (3 C) of white vinegar tinted with blue food coloring
- 750 ml (3 C) of water tinted with red food coloring

Prepare and label bowls of the following pollutants:

- 750 ml (3 C) of potting soil
- 750 ml (3 C) of small paper pieces
- 750 ml (3C) of small rocks and sticks

Teacher Note: You and your students will probably think of more ideas for pollutants and filters. Modify these materials to meet the needs and ideas of your class.

Find and post the list of pollutants that the class generated in Lesson 12 to refer to during the introductory discussion.

Vocabulary

filter ................. A device that blocks some pollutants from getting into water or removes some pollutants from water.
Teaching the Lesson

SESSION 1

Engage

Introductory Discussion

1. Show the students common household examples of filters. Tap into their existing knowledge of filters with the following questions:
   - What is the purpose of these filters? How do they work?
   - Can they think of other types of filters that they use around their house? (water filters, shower drains, aquarium filters)

2. Post the list of pollutants the students compiled in Lesson 12. Encourage them to think about how filters may or may not be a useful tool for removing these pollutants from water by addressing the following:
   - Do they think these pollutants can be removed once they enter the water supply? Can they be filtered out, or would another removal method need to be used?
   - Does it seem like some of the pollutants would be easier to remove than others?
   - Thinking back to Lesson 9, were filters used in the treatment process for their local drinking water or their local wastewater? What kinds of pollutants did those filters remove?

Explore

Safety Note: Remind students to wear their safety goggles and plastic gloves at all times during this exploration.

Investigating Water Filters

1. Tell the students that they are going to determine how well filters can remove different types of pollutants.

2. Direct their attention to the pollution station and show them the variety of materials they may use to conduct this investigation. Point out that some pollutants have been dyed to make them easier to see.
3. Divide the class into pairs. Review with the class the materials and procedure for the investigation on science notebook page 46.

4. Distribute one cup of clean water to each pair. Have each pair of students gather their remaining materials and return to their workspace to consider the investigative question and conduct their investigations. When they have completed their investigations, have them answer questions 1 through 3 on science notebook page 47.

5. Instruct each pair to gather new materials and do a second filtration investigation in which they change either their filter or their pollutant. Before they begin, help students focus on what they want to vary this time and what they hope to learn, with the following questions:
   - If they use the same type of pollutant and change the filter, which filter do they think will work better? Why?
   - If they use the same type of filter and change the pollutant, do they think it will filter both pollutants equally well? Why or why not?

6. Have students answer question 1 on science notebook page 48.

   **Teacher Note:** Many of the materials can be washed and reused in the Science Center, including 2-liter bottles, cups, spoons, pitchers, bowls, and fabric filters.

7. When students have completed their second investigation, instruct them to answer questions 2 and 3 on science notebook page 48.

8. Have students draw conclusions about the investigations by answering the questions on science notebook page 49.
SESSION 2

Reflect and Discuss

Sharing
1. Select a few pairs of students to share their water filter observations from science notebook pages 47 and 48. Aim to have a variety of types of pollutants and filters represented in the class’s discussion.

2. Encourage the students to share some of the successes and challenges that they encountered while designing their filters.
   - Which pollutants were the easiest and hardest to remove?
   - Which filters were the most and least effective?

3. Help the students draw some conclusions about the uses and limits of water filters by addressing the following:

   TEACHER NOTE: Have students refer to their conclusions on science notebook page 49 during this discussion.

   - What types of real-life pollutants is filtration particularly good at removing? (Different types of debris such as paper or soil)
   - What types of real-life pollutants might not be addressed very well by filtration? (Microscopic organisms, chemicals that dissolve in water)
   - Can they think of other water treatment methods that might have worked better? (Refer back to the information students learned about water treatment in Lesson 9. If necessary, remind them that drinking water is treated chemically—usually chlorinated—in addition to being filtered.)
   - Can they be sure the water is clean just by looking at it and smelling it? Why or why not?

Big Idea
Water resources are limited. It is important to protect and conserve water.
**Synthesizing**

**Teacher Note:** The goal of the following questions is to encourage critical thinking and lively discourse rather than to reach definitive answers. The students are likely to realize that there are many ways to define clean water, depending on the situation and what the water is used for.

1. Invite the students to debate the definition of clean water with the following thought-provoking questions:
   - How can they tell when water is clean?
   - When is water clean enough? How clean does water have to be for people to drink, plants to grow, or animals to live in? Is the water that is best for one organism necessarily best for a different organism?
   - Is filtration usually sufficient to get water clean enough? Why or why not?
   - How clean do they think their tap water is?

2. Help the students make the connection between pollution and the water cycle by raising the following points:
   - Why is it important to keep water as clean as possible? *(Polluted water can be difficult to clean.) Can we make new water? (No.)*
   - How could water pollution spread? *(Pollutants can travel from one body of water to another, seep into groundwater, and affect animals, plants, and people.)*
   - What can we do to clean up pollution that has already occurred (locally or globally) and keep from adding any new pollution? Are these things possible? *(You could mention government departments charged with keeping water clean, such as the Environmental Protection Agency, private groups that monitor water quality locally and globally, national clean-water legislation, and the importance of individual awareness.)*
Ongoing Learning

Science Center

Set up the pollution and filtration materials in the Science Center for further, independent investigations. Encourage the students to try new things, including:

- Use more than one filter and pollutant at a time
- Introduce other filters (cotton balls, pieces of mesh screen, grass) and pollutants (soap, salt) of their choice
- Repeatedly pour the same sample of polluted water through new filters until it appears as clean as possible

Suggest that they record their discoveries and questions in the journal section of their science notebook.

Planning Ahead

For Lesson 14

To prepare for the next lesson, read the case studies in Chapter 12 of the student reference book about how people protect and conserve water resources.

For the Protecting Water Resources Project

To familiarize yourself with the project’s objectives and to consider options for planning, read the article “Planning the Protecting Water Resources Project” on pages 56–59 and the Lesson 15 on pages 250–265.

Materials: Bowls, coffee filters, cotton fabric, food coloring, newspaper, paper towels, pitchers, plastic bottles (2-liter), plastic cups (medium and large), plastic spoons, potting soil, small pieces of paper, vegetable oil, water, and white vinegar
Polluting and Cleaning Water

Exploring a Water Filter

**Investigative Question:** How well do filters remove pollutants?

**Materials:**
- One Julep bottle cut in half
- One plastic cup containing water (to act as pollution sink)
- One plastic cup containing water (to compare with polluted water)
- One spoon
- One container cap
- One pollutant
- One filter

**Procedure:**
1. Observe the color and smell of the clean water. Record your observations on the table on the next page.
2. With your partner, select one pollutant and one filter. Fill the container cup half full with the pollutant you have chosen. Then, record your observations of this mixture (polluted water) on the table.
3. Take the top half of the bottle and place it upside down, in between both halves of the bottle. Place the filter in the top half of the bottle. Cover the opening. Push the filter down slightly into the bottle opening.
4. Carefully pour the water and pollutant mixture through the filter. Watch what happens.
5. When all the water has drained into the bottom of this bottle, record your observations of the filtered water on the table.
6. Repeat this procedure using a clean 2-liter bottle and a different type of pollutant or filter. Record your observations on page 48.

---

Water Filter Observation 1

<table>
<thead>
<tr>
<th>Pollutant type</th>
<th>Filter type</th>
<th>Color</th>
<th>Small</th>
<th>Other Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clean Water</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pollutant</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polluted Water</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Filtered Water</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Once all the water has been filtered, take a close look at the filter and the water and answer these questions:

1. Has some, or all, of the pollutant been stopped by the filter? How can you tell? You may want to compare the used filter to an unused one and note any differences.
2. Compare the filtered water to a sample of clean water. Do you think the filtered water is completely clean? Why or why not?
3. Can you think of any ways to improve your filter?

---

Water Filter Observation 2

<table>
<thead>
<tr>
<th>Pollutant type</th>
<th>Filter type</th>
<th>Color</th>
<th>Small</th>
<th>Other Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clean Water</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pollutant</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polluted Water</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Filtered Water</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Once all the water has been filtered, take a close look at the filter and the water. Has some, or all, of the pollutant been stopped by the filter? How can you tell? You may want to compare the used filter to an unused one and note any differences.

3. Compare the filtered water to a sample of clean water. Do you think the filtered water is completely clean? Why or why not?

---

Polluting and Cleaning Water

**Conclusion:**
1. Were you able to remove all pollutants from water? If so, explain how you did it. If not, explain why not.
2. How are you able to tell if you have removed all pollutants from water?
3. Do you think all pollutants can be removed from water in the same way? Why or why not?
4. Can you treat water to clean just by looking at it and smelling it? Explain.

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Science Notebook page 46
Science Notebook page 47
Science Notebook page 48
Science Notebook page 49
## Watery Earth Assessment 4: Conservation and Pollution

As you evaluate students’ responses and work, determine how well they understood the following:

<table>
<thead>
<tr>
<th>Assessment Criteria</th>
<th>Students’ Names</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. <em>Conservation</em> is defined and personal behavior can alter the natural environment and end.</td>
<td></td>
</tr>
<tr>
<td>B. Pollution starts from a variety of sources.</td>
<td></td>
</tr>
<tr>
<td>C. Monitoring water quality can be challenging, but data is collected through consistent monitoring activities.</td>
<td></td>
</tr>
<tr>
<td>D. Controlling water pollution is important because water is a valuable and limited resource.</td>
<td></td>
</tr>
</tbody>
</table>

### Assessment Criteria:

- **A. Conservation** is defined and personal behavior can alter the natural environment and end.
- **B. Pollution** starts from a variety of sources.
- **C. Monitoring** water quality can be challenging, but data is collected through consistent monitoring activities.
- **D. Controlling** water pollution is important because water is a valuable and limited resource.
The Wonder of Water

In one drop of water are found all the secrets of all the oceans.

—Kahlil Gibran

In the developed world, water is almost always available when we need it. That, combined with the fact that water plays a part in just about every aspect of our lives, may be a reason why we tend to take it for granted. We drink water; we need it to grow our food; we use it to satisfy myriad household and hygienic wants and needs; we use it for recreation, transportation, and exploration; we even use it to create energy. The list goes on and on.

In this unit, students explore the various ways that water impacts their lives. They learn that water is an essential resource for all living things. They compare the ways they need and use water and discover that most people use a lot more water than they actually need. They learn the many places where water on Earth is located. They discover that there is a limited amount of water on Earth and model how that water moves through the water cycle. Finally, they discover why they should protect and conserve water and investigate methods to take care of this essential resource.

Water Is Life

Water has no taste, no color, no odor; it cannot be defined, art relished while ever mysterious. Not necessary to life, but rather life itself. It fills us with a gratification that exceeds the delight of the senses.

—Antoine de Saint-Exupery

Water is all around us and inside of us. The water contained in the oceans, inland seas, polar ice caps, glaciers, rivers, lakes, streams, ponds, and other visible forms, makes up around \( \frac{2}{3} \) of the Earth's surface. Water is above and around us, in the atmosphere. We see it as clouds and feel it as humidity and precipitation. Water is below us, percolating through the ground. And although you can't tell by looking at us, humans are about 70 percent water.

These facts about the abundance of water belie its preciousness. For although it is true that Earth's surface is mostly water, most
Pollution and Clean-up

A river is more than an amenity, it is a treasure.

—Justice Oliver Wendell Holmes

Water has the unique capacity to dissolve a number of different substances and to hold them in solution. This is one reason why it is much easier to pollute water than to clean it up. And to confound the problem, the ways water has been polluted are often not obvious. Therefore, as a rule of thumb, it is safer and more cost effective to keep water from becoming contaminated in the first place.

There are a variety of ways to pollute water. Some of the major culprits are industrial, agricultural, and domestic waste. The following are some of the most common types of contaminants that cause pollution:

- Agricultural—Pesticides, fertilizers, herbicides, and livestock wastes
- Industrial—Chemical waste, waste heat, petroleum storage tanks, mining sites, oil spills, and leaks
- Domestic—Lawn care products, septic tank leaks, household cleaning and maintenance products, and vehicular oil leaks

Students investigate ways that water can become polluted, as well as ways to clean water, in Lessons 12 and 13.

What Is Water Pollution?

To identify or prevent water pollution, it helps to define it. Although the definition is subject to interpretation, the one used in this unit is: The addition of harmful substances that causes water to become unhealthy. With that definition in mind, it is possible to examine our daily lives to determine the ways we contribute to and can prevent water pollution.

Whether a given contaminant causes water pollution depends a great deal on the concentration of that contaminant. In other words, one needs to consider the amount of a contaminant as well as the type and size of body of water the contaminant is released into. For example, if a small amount of oil is released into a large body of water, it is not likely to cause problems. However, if a large amount of oil is released into a small body of fresh water, the contaminant could reach levels high enough to create unhealthy water conditions. Aquatic environments can handle small amounts of many types of pollutants but too much of anything can overwhelm their capacity to recover from the introduction of contaminants. The adage “dilution is the solution to pollution” holds up well in many instances.
Preventing Water Pollution

The following table provides examples of some things an individual can do to prevent water pollution:

<table>
<thead>
<tr>
<th>Contaminant</th>
<th>Pollution Prevention Strategies</th>
</tr>
</thead>
</table>
| Household cleaning or maintenance products | • Dispose of hazardous household cleaning products, paints, and other unwanted chemicals at a hazardous waste collection site. Don’t pour products down your household drains.  
• If possible, wash your car at an approved car wash. This ensures that the waste products will go to the sewer, not a storm drain. If you wash your car at home, do it on gravel, or grass. This helps to filter the waste water before it eventually reaches the water table. |
| Yard care products                       | • Choose pest resistant plant varieties. This minimizes the “need” for insecticides.  
• Spray harmful insects with a strong shot of water, rather than a shot of insecticide.  
• Encourage birds and friendly insects to come into your yard to help rid the area of harmful pests.  
• Re-seed thin areas in your lawn to crowd out weeds.  
• Avoid using “weed and feed” type products.                                                                                     |
| Automobile products                      | • Purchase a more fuel efficient automobile.  
• Reduce the number of car trips you take by consolidating errands, carpooling, walking, and using public transportation.  
• Maintain your car with regular tune-ups and check for leaks.  
• Dispose of used motor oil and anti-freeze properly.                                                                             |
| Other                                    | • Pick up all trash.  
• Clean up after your pet when out walking and in your yard.                                                                             |

Wastewater Treatment

One of the surest ways to prevent water pollution is to ensure proper clean-up of the water we use in our homes and workplaces. Humans have developed complex and effective systems for treating wastewater before release back into the water cycle. In a typical treatment system, the water cleaning process might follow this scenario:

• Preliminary treatment—Remove large items such as toilet paper.

• Primary treatment—Allow the wastewater to settle in large pools. Skim the surface to remove floating debris. Pump out the remaining water leaving behind solid waste that has settled to the bottom.

• Secondary treatment—Use a naturally occurring bacteria to digest most of the remaining solid wastes.

• Disinfection and discharge—Use a disinfectant such as chlorine to kill any potentially harmful bacteria. Then dechlorinate the water before release into the water cycle.
In many wastewater treatment facilities, some of the products of the treatment process are reclaimed and reused. The following are some ways the products can be reused:

- Solids left behind during the primary treatment can be treated and reused in agriculture or forestry.
- Reclaimed wastewater, if treated sufficiently, is often used for irrigation.
- Some of the by-products of the treatment process can produce methane, which can then be used to generate power at the treatment plant.

Students explore their wastewater treatment systems in Lesson 9 of the Watery Earth Unit.

**Natural Pollution Control**

Humans spend a great deal of money and effort keeping water clean, but there are also natural water purifiers. Wetlands, areas that are part land and part water, such as marshes, swamps, and bogs, are one of those natural purifiers. Wetlands are able to filter pollutants and can turn chemical and organic wastes into less harmful substances. They also offer a number of other benefits to the environment. They provide habitat and breeding grounds for wildlife, can help regulate the water cycle since they are able to absorb a large amount of water, and can help prevent soil erosion and flooding. Since many wetlands were destroyed in this country due to development, industry, and agriculture before their value was recognized, the federal government has sometimes stepped in to created policies to help stop their demise.
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**Rubric 4: Conservation and Pollution**

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Water resources are limited and personal behavior can affect the amount of water conserved and used.</td>
<td>Pollution comes from a variety of sources.</td>
<td>Minimizing water pollution can be challenging, but can be accomplished through personal and community action.</td>
<td>Conserving water and reducing pollution are important because water is a limited yet essential resource.</td>
</tr>
</tbody>
</table>

**4 - Exceeds Expectations**
Explores content beyond the level presented in the lessons.

- Understands at a secure level (see box below) and takes action to personally conserve water and limit the amount used.
- Understands at a secure level (see box below) and attempts to educate others about pollution problems.
- Understands at a secure level (see box below) and takes action to personally limit any behavior that results in water pollution.
- Understands at a secure level (see box below) and applies protection and conservation actions towards organisms, in addition to themselves.

**3 - Secure (Meets Expectations)**
Understands content at the level presented in the lessons.

- Understands that water resources are limited and that personal behavior can affect the amount of water conserved and used.
- Understands that pollution comes from a variety of sources.
- Understands that minimizing water pollution can be challenging and that personal and community action can help accomplish these challenges.
- Understands that conserving and protecting water resources is important because water is a limited yet essential resource.

**2 - Developing (Approaches Expectations)**
Shows an increasing competency with lesson content.

- Knows that water resources are limited but does not relate conserving those resources to personal actions.
- Knows what pollution is, but has an incomplete understanding of where it comes from.
- Knows that there are many ways to reduce water pollution but does not know how personal behavior plays a role.
- Knows that it is important to reduce water pollution and conserve water but cannot explain why.

**1 - Beginning**
Has no previous knowledge of lesson content.

- Does not know that water resources are limited or that they need to be conserved.
- Does not know what pollution is or where it comes from.
- Does not know it is possible to reduce water pollution.
- Does not think that it is important to reduce water pollution or to conserve water.
Opportunities Overview: Conservation and Pollution

This table highlights opportunities to assess the criteria on Rubric 4: Conservation and Pollution. It does not include every assessment opportunity; feel free to select or devise other ways to assess various criteria.

<table>
<thead>
<tr>
<th>Pre and Formative Opportunities</th>
<th>Performance Tasks</th>
<th>Summative Opportunities</th>
<th>Quick Check Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lesson 11:</td>
<td>Lesson 12:</td>
<td>Taking Care of Water Resources Cluster</td>
<td>Taking Care of Water Resources Cluster</td>
</tr>
<tr>
<td>- Science notebook pages 26 and 43</td>
<td>- Family Link “Water Pollution”</td>
<td>Comparing Water Use, page 38</td>
<td>Pages 50-51: items 1, 7</td>
</tr>
<tr>
<td>- Reflective discussion</td>
<td>- Science notebook pages 44-45</td>
<td>Children Protecting Natural Resources, page 41</td>
<td>Taking Care of Water Resources Cluster</td>
</tr>
<tr>
<td>Lesson 14:</td>
<td>- Reflective discussion</td>
<td>Protecting Water Resources Project, page 42</td>
<td>Page 50: item 1</td>
</tr>
<tr>
<td>- Introductory discussion</td>
<td>Lesson 13:</td>
<td>Cool Clear Water, page 39</td>
<td></td>
</tr>
<tr>
<td>- Exploration</td>
<td>- Introductory and reflective discussions</td>
<td>Water Pollution, page 40</td>
<td></td>
</tr>
<tr>
<td>- Reflective discussion</td>
<td>Lesson 12:</td>
<td>Cool Clear Water, page 39</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Reflective discussion</td>
<td>Water Pollution, page 40</td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>- Science notebook pages 51-53</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Reflective discussion</td>
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</tbody>
</table>

Quick Check Items
Cool Clear Water
Taking Care of Water Resources Cluster (Lessons 11-15)

If someone handed you a clear cup of water taken from a stream, would you drink it? Explain your answer.

TEACHER NOTE:
Use this assessment after teaching Lesson 13.

EVALUATION GUIDELINES:
When evaluating student answers, consider whether they include the following elements in their written explanations:

- Students should indicate that they shouldn’t drink the water because they don’t know if the water is clean.

- It is difficult to tell if water is “clean” just because it looks clear. Streams often contain microscopic organisms that are too small to be seen.

- Students might also mention that dissolved chemicals in the stream would be hard to see. Chemical matter that is not visible could be in the water.
Water Pollution
Taking Care of Water Resources Cluster (Lessons 11-15)

The following table describes two scenarios that could result in water pollution. Read each one carefully and answer the question below.

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>One day Maddie went to recycle her cans and paper. On the way to the recycling center, a few cans and some paper blew out of the truck and landed in the river.</td>
<td>Each year, David gets the oil changed in his car. This year, David and a friend decided to do it on their own. After they drained the old oil from the engine, they decided to pour the oil out into a nearby stream.</td>
</tr>
</tbody>
</table>

Which scenario results in the worse kind of water pollution?

**TEACHER NOTE:**
Use this assessment after teaching Lesson 12.

**EVALUATION GUIDELINES:**
When evaluating student answers, consider whether they include the following elements in their written explanations:
- Both scenarios result in water pollution, but oil is much more difficult to remove from water so it is considered the worse kind of water pollution.
- Large solid materials (such as cans and paper) are easier to remove from water, and rarely leave residue in the water.
Taking Care of Water Resources Cluster

Quick Check Items

**TEACHER NOTE:** The following questions relate to the Taking Care of Water Resources cluster. Use them after teaching the entire cluster, or select the applicable questions immediately following each lesson. You can also compile the Quick Check items into an end-of-unit assessment.

1. (Lesson 11) True or False? If false, rewrite the statement to make it true.
   
   Conserving water is important because water is a limited resource.
   
   *true*

2. (Lesson 12) Circle the type of pollutant that causes the most harm to the environment.
   
   a. glass bottle
   
   b. gum wrapper
   
   c. aluminum can
   
   d. *oil*

3. (Lesson 12) Which of the following contributes to water pollution? (There may be more than one answer.)
   
   a. *animal waste*
   
   b. *industrial waste*
   
   c. *human waste*

4. (Lessons 12 and 13) True or False? If false, rewrite the statement to make it true.
   
   You cannot tell if water is clean by smelling it.
   
   *true*
5. (Lesson 13) Which of the following pollutants could easily be removed from water by using a coffee filter? (There may be more than one answer.)
   a. dirt
   b. small sticks
   c. bacteria
   d. white vinegar

6. (Lessons 12 and 15) Which of the following does not reduce water pollution?
   a. picking up litter
   b. getting rid of dangerous or harmful liquids in the proper containers
   c. using chemicals to remove or kill weeds
   d. recycling paper, glass, metals, or plastics

7. (Lessons 11 and 15) Which of the following is not a way to conserve water?
   a. watering your lawn during the hottest time of the day
   b. turning off water when you brush your teeth
   c. filling up your washing machine each time you use it
   d. taking short showers a few times a week
Cool Clear Water

If someone handed you a clear cup of water taken from a stream, would you drink it? Explain your answer.
Water Pollution

The following table describes two scenarios that could result in water pollution. Read each one carefully and answer the question below.

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Which scenario results in the worse kind of water pollution?
Taking Care of Water Resources

Quick Check Items

1. True or False? If false, rewrite the statement to make it true.
   Conserving water is important because water is a limited resource.

2. Circle the type of pollutant that causes the most harm to the environment.
   a. glass bottle
   b. gum wrapper
   c. aluminum can
   d. oil

3. Which of the following contributes to water pollution? (There may be more than one answer.)
   a. animal waste
   b. industrial waste
   c. human waste

4. True or False? If false, rewrite the statement to make it true.
   You cannot tell if water is clean by smelling it.
5. Which of the following pollutants could easily be removed from water by using a coffee filter? (There may be more than one answer.)
   a. dirt
   b. small sticks
   c. bacteria
   d. white vinegar

6. Which of the following does not reduce water pollution?
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   b. getting rid of dangerous or harmful liquids in the proper containers
   c. using chemicals to remove or kill weeds
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   b. turning off water when you brush your teeth
   c. filling up your washing machine each time you use it
   d. taking short showers a few times a week
# Watery Earth Assessment 4: Conservation and Pollution

As you evaluate students’ discussions and work, determine how well they understand the following:

<table>
<thead>
<tr>
<th>Students' Names</th>
<th>Assessment Criteria:</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>A. Water resources are limited and personal behavior can affect the amount conserved and used.</td>
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<tr>
<td></td>
<td>B. Pollution comes from a variety of sources.</td>
</tr>
<tr>
<td></td>
<td>C. Minimizing water pollution can be challenging, but can be accomplished through personal and community action.</td>
</tr>
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<td>D. Conserving water and reducing pollution are important because water is a limited, yet essential, resource.</td>
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<td>27.</td>
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<td>28.</td>
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</tbody>
</table>
Polluting and Cleaning Water
Exploring a Water Filter

Investigative Question: How well do filters remove pollutants?

Materials:
- One 2-liter bottle cut in half
- One plastic cup containing water (to mix pollutant into)
- One plastic cup containing water (to compare with polluted water)
- One spoon
- One condiment cup
- One pollutant
- One filter

Procedure:
1. Observe the color and smell of the clean water. Record your observations on the table on the next page.
2. With your partner, select one pollutant and one filter. Fill the condiment cup halfway with the pollutant you chose. Write the pollutant type and filter type on top of the table.
3. Record your observations of the pollutant on the table.
4. Mix the pollutant with the water in a plastic cup. Record your observations of this mixture (polluted water) on the table.
5. Take the top half of the bottle and place it, upside-down, in the bottom half of the bottle.
6. Place the filter in the top half of the bottle so it covers the opening. Push the filter down slightly into the bottle opening.
7. Carefully pour the water and pollutant mixture through the filter. Watch what happens.
8. When all the water has drained into the bottom of the bottle, record your observations of the filtered water on the table.
9. Repeat this procedure using a clean 2-liter bottle and a different type of pollutant or filter. Record your observations on page 48.
Date: ________________________________

**Water Filter Observation 1**

Pollutant type: ______________________  Filter type: ______________________

<table>
<thead>
<tr>
<th></th>
<th>Color</th>
<th>Smell</th>
<th>Other Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clean Water</td>
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<td></td>
<td></td>
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<tr>
<td>Pollutant</td>
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<tr>
<td>Polluted Water</td>
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<tr>
<td>Filtered Water</td>
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</table>

Once the water has been filtered, take a close look at the filter and the water and answer these questions:

1. Has some, or all, of the pollutant been trapped by the filter? How can you tell? You may want to compare the used filter to an unused one and note any differences.

2. Compare the filtered water to a sample of clean water. Do you think the filtered water is completely clean? Why or why not?

3. Can you think of any ways to improve your filter?
1. **What is the one change you made in this second water-filtering investigation? Why did you decide to make this change?**

<table>
<thead>
<tr>
<th>Pollutant type:</th>
<th>Filter type:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Color</th>
<th>Smell</th>
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<td></td>
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<tr>
<td>Pollutant</td>
<td></td>
<td></td>
</tr>
<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>Filtered Water</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. **Once all the water has been filtered, take a close look at the filter and the water. Has some, or all, of the pollutant been trapped by the filter? How can you tell? You may want to compare the used filter to an unused one and note any differences.**

3. **Compare the filtered water to a sample of clean water. Do you think the filtered water is completely clean? Why or why not?**
Polluting and Cleaning Water

Conclusion:

1. Were you able to remove pollutants from water? If so, explain how you did it. If not, explain why not.

2. How are you able to tell if you have removed a pollutant from water?

3. Do you think all pollutants can be removed from water in the same way? Why or why not?

4. Can you be sure water is clean just by looking at it and smelling it? Explain.
Polluting and Cleaning Water

Exploring a Water Filter

Investigative Question: How well do filters remove pollutants?

Materials:
• One 2-liter bottle cut in half
• One plastic cup containing water (to mix pollutant into)
• One plastic cup containing water (to compare with polluted water)
• One spoon
• One condiment cup
• One pollutant
• One filter

Procedure:
1. Observe the color and smell of the clean water. Record your observations on the table on the next page.
2. With your partner, select one pollutant and one filter. Fill the condiment cup halfway with the pollutant you chose. Write the pollutant type and filter type on top of the table.
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8. When all the water has drained into the bottom of the bottle, record your observations of the filtered water on the table.
9. Repeat this procedure using a clean 2-liter bottle and a different type of pollutant or filter. Record your observations on page 48.
Water Filter Observation 1

Pollutant type: ___________________  Filter type: ___________________  Answers vary.

<table>
<thead>
<tr>
<th>Color</th>
<th>Smell</th>
<th>Other Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clean Water</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pollutant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polluted Water</td>
<td>Answers and results for each cell in this table vary, but you might note the level of detail in students’ observations and use questions to probe for more detail if students have not been very descriptive.</td>
<td></td>
</tr>
<tr>
<td>Filtered Water</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Once all the water has been filtered, take a close look at the filter and the water and answer these questions:

1. **Has some, or all, of the pollutant been trapped by the filter? How can you tell?** You may want to compare the used filter to an unused one and note any differences.
   
   *Results vary, but most students will probably have trapped some pollutant in their filters.*

2. **Compare the filtered water to a sample of clean water. Do you think the filtered water is completely clean? Why or why not?**
   
   *Answers vary.*

3. **Can you think of any ways to improve your filter?**
   
   *Answers vary. If students don’t test their ideas in the next part of this lesson, you might want to give them an opportunity to do further experimentation at a later time.*

Water Filter Observation 1 (Lesson 13)
Water Filter Observation 2

1. What is the one change you made in this second water-filtering investigation? Why did you decide to make this change?

   Answers vary, but check whether students understood and followed the guideline of changing only one variable (the pollutant or the filter).

   Pollutant type: ____________  Filter type: ____________

   Color | Smell | Other Observations

   Clean Water

   Pollutant

   Polluted Water

   Filtered Water

   Answers and results for each cell in this table vary, but you might note the level of detail in students’ observations and use questions to probe for more detail if students have not been very descriptive.

2. Once all the water has been filtered, take a close look at the filter and the water. Has some, or all, of the pollutant been trapped by the filter? How can you tell? You may want to compare the used filter to an unused one and note any differences.

   Results vary, but most students will probably have trapped some pollutant in their filters.

3. Compare the filtered water to a sample of clean water. Do you think the filtered water is completely clean? Why or why not?

   Answers vary.
Polluting and Cleaning Water

Conclusion:
1. Were you able to remove pollutants from water? If so, explain how you did it. If not, explain why not.
   Answers vary.

2. How are you able to tell if you have removed a pollutant from water?
   Answers vary, but students may mention that they could see some pollutant on the filter, that the water looked cleaner after being filtered, or both these results.

3. Do you think all pollutants can be removed from water in the same way? Why or why not?
   Answers vary, but students should realize that different pollutants require different treatments. If students seem confused about this even after the reflective discussion in Lesson 12, you might want to give them the opportunity to repeat some filtration experiments with different pollutants and filters. Talk with them about some of the discussion points on page 235 of the teacher lesson manual in conjunction with their experimentation.

4. Can you be sure water is clean just by looking at it and smelling it? Explain.
   Answers vary. You might revisit some of the ideas from page 236 in the teacher lesson manual with any students who seem to have overly simplistic ideas about clean water.
What Is Water Pollution?

Water becomes polluted when enough harmful materials build up to make it unhealthy for plants, animals, or their environments.

Imagine you are swimming in a lake and you look down at its bottom. What types of pollutants do you think you might see? Chances are you would see a glass bottle or two, some metal cans, or some plastic.
Now imagine you’re wearing “pollution goggles” that allow you to see even the tiniest pollutants. What pollutants do you think you might see now? You might see little drops of oil. You might see tiny specks of chemicals. Or you could even see harmful bacteria.

Unfortunately, pollution goggles haven’t been invented yet. If we had them, it would be easy to identify pollutants. Since we don’t, scientists must work really hard to determine when water is polluted.

Causes of Water Pollution

A number of human activities cause water pollution. For example, we pollute water when we throw our cans, bottles, plastic bags, paper wrappers, and other waste directly into surface water. We can also pollute water when we litter on land. During rainfall, litter on land may wash away into nearby bodies of surface water.
Our automobiles also cause water pollution. For example, automobile engines leak gas and oil onto roads and parking lots. Rain can wash these pollutants into local bodies of water or onto land where they can contaminate groundwater.

Products that we use at home can also contribute to water pollution. People often use chemical pesticides and herbicides in their yards. They also may use chemicals to clean and fix up their homes. These chemicals can wash into bodies of surface water, or contaminate groundwater supplies.
Electronic products, such as computers, batteries, and cell phones can add pollution to the water cycle. Electronic equipment sometimes contains materials, such as heavy metals, that can be very harmful to organisms that live in or around the water. When the electronic gadgets break open, these harmful materials are released into surface water or groundwater.

A number of these pollutants can enter the water cycle via storm drains. In many cities, water drains directly into bodies of water with little or no treatment. During periods of heavy rain, storm drains can overflow. The overflowing water can flow down the street, picking up pollutants, and enter either the groundwater or local bodies of water. In areas where there are no storm drains, such as rural areas, rainwater can pick up pollutants and flow directly into local bodies of water.
Any polluted water that flows through this drain goes directly to a stream.

What do you think would happen to these fish if they lived in polluted water?
Since groundwater can become polluted in a number of different ways, people who use it for drinking must have their water tested from time to time to make sure it is clean and healthy. Also, if polluted groundwater travels through an aquifer, it can then pollute a river or stream, a lake, or even the ocean. Animals and humans can come in contact with dangerous waste that may have entered the water cycle many miles away.

**Industries Cause Water Pollution**

Industries can release toxic chemicals into surface water, onto the land, or into the air. Chemicals released into surface water can damage the habitats of the animals that live there. Chemicals dumped onto land can seep into the ground and contaminate groundwater. Toxins released into the air can enter the water cycle by combining with the water that is in the air. When these chemicals fall to Earth as precipitation they can enter and contaminate bodies of surface water or ground water.

The air pollution from this oil refinery can eventually lead to water pollution.
Many factories are located near bodies of surface water.
Farms Cause Water Pollution

Our farms can cause water pollution by releasing toxic pest- and weed-control chemicals into the environment. These chemicals sometimes end up in nearby surface water. They can also soak into the ground and contaminate groundwater. If the chemicals build up too much in one spot, they can cause harm to organisms that depend on the water.

“Crop-dusters” spray pest and weed control chemicals on many farms.

Farms also accumulate bodily waste from cattle, pigs, and other livestock. The waste can end up in nearby surface water. When it builds up too much in one spot, it can release dangerous chemicals and bacteria into the water. These chemicals can harm organisms that depend on the water.
How Harmful Is Water Pollution?

It is not easy to figure out how harmful a pollutant is to the water supply. Not every pollutant harms water in the same way. Some pollutants, such as glass, do very little damage to water. Other pollutants, such as heavy metals, can do much more damage. Here are the ways that some of the major types of pollution are harmful:

- Paper, plastic, most metal, glass: These pollutants are not normally too harmful to water. They are easy to see and remove. They are also not likely to pollute the water enough to be harmful to most organisms.

- Automobile leaks: This pollution is easy to see but hard to clean up. The more pollutants that build up, the more harmful it is to the water supply. Exhaust from cars can also cause rain water to pollute the water supply.

- Chemicals: Fertilizers and chemical pest and weed killers are difficult to see and remove from water. If a large amount of one chemical builds up in the water supply, it can be harmful to an organism or its environment.

- Electronic waste: Batteries, old computers, cell phones, and other electronic equipment contain certain types of metals that can be harmful to living organisms if concentrations are high enough. The materials need to break open in order for their dangerous contents to be released. Once this happens, the hazardous materials are very difficult to observe and remove. In high concentrations, they can pose great risk to an organism or its environment.
How Can We Prevent Water Pollution?

One simple thing you and your families can do to reduce water pollution is to dispose of waste in its proper place. The following are suggestions for disposing of a few common types of waste.

- Paper, plastic, most metal, or glass—Recycle if possible, otherwise put it in with regular garbage
- Chemicals—Always dispose of them at a special hazardous waste site and never dump down storm drains
- Electronic waste—Recycle if possible. If not, dispose of it at a special hazardous waste site and never dump in or near the water.
- Pet waste—Pick it up from outdoor areas so its bacteria doesn’t enter a body of water.

Another important way to reduce pollution is to develop good water habits. For example, you and your families should try to reduce the use of herbicide and pesticides, or search for less toxic natural alternatives. You might also replace your household cleaning products with less toxic varieties.