

Pollution

http://www.scaquarium.org/curriculum/iexplore/sixth_eighth/units/pollution/poll_main.htm

Focus on Inquiry

The student will create models of a community to discover how watersheds get polluted.

Lesson Overview

Where does the pollution in watersheds come from? Students will learn about point source and non-point source water pollution by making and testing a model of a growing community.

Duration Three 50 min class periods	Setting classroom	Grouping Groups of 4-6 students	PTI Inquiry Subskills 5.2, 5.4, 5.7, 5.8, 7.3
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Lesson Components	Estimated Time	Inquiry Subskills Used	Technology Used	Level of Student Engagement	Brief Description
<i>Engage</i>	5 min	None	None	2	Engage students in a discussion on how land around rivers is developed by people and the different ways people use rivers and land surrounding them.
<i>Explore</i>	45 min	5.8	None	3	Students create a model of a community and observe how their community pollutes a watershed.
<i>Explain</i>	15 min	5.2, 5.4, 7.3	None	3	Students engage in a class discussion on how each model community polluted the water.
<i>Expand</i>	45 min	5.7	None	3	Students modify their models in ways that will lessen the amount and impact of their pollution.
<i>Evaluate</i>	30 min	5.2	None	3	Students write a Best Management Practices plan for the community they created.

Level of Student Engagement

1	Low	Listen to lecture, observe the teacher, individual reading, teacher demonstration, teacher-centered instruction
2	Moderate	Raise questions, lecture with discussion, record data, make predictions, technology interaction with assistance
3	High	Hands-on activity or inquiry; critique others, draw conclusions, make connections, problem-solve, student-centered

National Science Education Standards – Inquiry

Develop descriptions, explanations, predictions, and models using evidence.
Think critically and logically to make the relationships between evidence and explanations.
Communicate scientific procedures and explanations.



National Science Education Standards – Earth Science

Water is a solvent. As it passes through the water cycle it dissolves minerals and gases and carries them to the oceans.

Louisiana Grade Level Expectations – Inquiry

Gr. 8, Inquiry GLE#12 – Use data and information gathered to develop an explanation of experimental results (SI-M-A4)
Gr. 8, Inquiry GLE#14 – Develop models to illustrate or explain conclusions reached through investigation (SI-M-A5)
Gr. 8, Inquiry GLE#19 – Communicate ideas in a variety of ways (e.g., symbols, illustrations, graphs, charts, spreadsheets, concept maps, oral and written reports, equations) (SI-M-A7)



Louisiana Grade Level Expectations Earth Science

Gr. 8, GLE#20 – Describe how humans' actions and natural processes have modified coastal regions in Louisiana and other locations (ESS-M-A8)
Gr. 8, GLE#50 – Illustrate possible point and non-point source contributions to pollution and natural or human-induced pathways of a pollutant in an ecosystem (SE-M-A3)
Gr. 8, GLE#51 – Analyze the consequences of human activities on global Earth systems (SE-M-A4)

Materials List (per group)

- Watering can
- Measuring cup
- Clay (non-hardening)
- Clear plastic trays (tops to seedling trays)
- Wax paper
- Tape
- Vegetable oil
- A variety of spices
- Carpet or sponges cut up into small piece

Advance Preparation

1. Review the teacher background information on activity website for key points and main information needed to teach the lesson.
2. Obtain materials needed for students to complete the activity.
3. Teacher may want to print the activity procedures prior to conducting the lesson.

Other Information

Learning Objectives

The learner will...

- Identify different types and sources of water pollution.
- Define the terms point source and non-point source water pollution.
- Categorize types of water pollution as point source or non-point source pollution.
- Identify technologies designed to reduce the amounts of point source and non-point source water pollution.

Prior Knowledge Needed by the Students

Students need to have a basic understanding of watersheds.

Procedure

Engage

1. Ask students, “How is the land around rivers developed by people?” Have them list some different ways that people use rivers and the land around rivers. Use a local example if your town or city is located on or near a large river. *See Procedure #1 on activity website.*

Explore

1. Students plan and build a model of a community. The teacher then test to see how much pollution the community they designed might be producing by placing various amounts of spices, oil, etc into the models and pouring water onto the models to simulate rain. *See procedures 2-6 on activity website.*

Explain

1. The students orally explain what pollution entered the runoff, how much runoff and pollution the carpet (natural areas) held onto, and how they could improve their model to help with the pollution. *See procedure 6e of activity.*

Expand

1. Have students conduct a second trial of the experiment. This time with improvements to the models...
 - a. have the groups modify their models in ways that will lesson the amount and impact of their pollution
 - b. they can include water treatment plants, buffer zones of vegetation, collection pools, etc.
 - c. a chart can be created that shows the differences between the results of trial 1 and trial 2. *See procedure #7 of activity.*
2. Have students list things that they can do to lesson the amount of pollution they create in their daily activities.



Evaluate

1. Have each student write a Best Management Practices (BMP's) plan for the community they created in the activity. The BMP's should include the types of management practices they have chosen, what type of pollution these practices target, whether the pollution is point source or non-point source, and how the management practices will lessen the amount or impact of the pollution.
2. Refer to the *Assessment section* of activity website for additional evaluation suggestions.

Blackline Master

- None