

Finite Oceans: Teacher's Guide

Grade Level: 6-8

Curriculum Focus: Ecology

Lesson Duration: Two class periods

Program Description

How wide is the sea? Not wide enough. Not for all the pollutants we keep pouring into the oceans, anyway. Although humans have long assumed that the oceans are too vast to ruin, it is becoming clear that they cannot absorb, dissolve, and purify all that we produce. *Finite Oceans* wakes us up to the limitations of this once-unlimited resource as it explores new ways we can repair the damage that's already been done.

Onscreen Questions and Activities

- Pre-viewing question: Products that improve the quality of our lives, such as plastics, automobiles, and shampoos, could contaminate our drinking water. As you watch the program, note how these examples have brought short-term advantages but have caused long-term environmental damage.
 - Post-viewing question: According to the program, plastics and fuels made from crops biodegrade more rapidly than those produced from oil. Discuss how environmentally friendly products and fuels can be used to help clean up the oceans. What are some products you use that help keep our environment clean?
 - Activity: Choose one toxic element presented in the program. Then research its impact and the methods used to counter its effects on the environment. Present your findings to the class.
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Lesson Plan

Student Objectives

Students will understand:

- The threat to water ecosystems is a complex problem because many factors contribute to their pollution and destruction.
- The following factors all play major roles in the pollution and destruction of water ecosystems: PCBs, DDT, methylmercury chloride, sewer sludge, thermal effluents, radioactive wastes, destruction of marshlands, and beach erosion.

- There are methods to combat these factors, but more methods are being developed and need to be developed.

Materials

- *Finite Oceans* video and VCR, or DVD and DVD player
- Research materials about water ecosystems and factors that contribute to their pollution or destruction
- Computer with Internet access

Procedures

1. Ask students to name some water ecosystems. (They might mention oceans, rivers, ponds, lakes, marshlands.)
2. Now ask them to mention any factors they know of that contribute to the pollution and destruction of water ecosystems. List their suggestions on the chalkboard, making sure the list includes the following: PCBs, DDT, methylmercury chloride, sewer sludge, thermal effluents, radioactive wastes, destruction of marshlands, and beach erosion.
3. Divide your class into groups, and have each group research one of the factors you have listed. Groups should focus their research on how their factor affects water ecosystems, particularly those in your area, if applicable, and the methods that are being employed to counter it.
4. When their research is complete, each group should choose one water ecosystem that has been affected by the factor they have been assigned and prepare an environmental-impact statement about it. Each statement should include four elements:
 - a) a description of the current environmental status of the ecosystem
 - b) a description of the way or ways in which the factor affects the ecosystem
 - c) a description of the existing methods that are being used to combat the factor
 - d) suggestions for future methods of combating the factor
5. When the statements are complete, invite groups to share their findings with the class.

Discussion Questions

1. Discuss the relationship between population growth, advances in technology, and ocean dumping.
2. Discuss the ways in which the traditional uses of the ocean are changing.
3. Explain how toxic substances such as DDT, PCBs, and mercury enter the ocean and become incorporated into food chains.
4. Brainstorm "environmentally friendly" ways of generating electricity, cleaning up wastewater, producing fuel, and developing land.



5. Discuss alternatives to ocean dumping to prevent further contamination of wildlife habitats and commercial seafood.
6. Discuss why there must be international cooperation concerning oil drilling, fishing, and radioactive waste disposal for the ocean to be useful to the whole world.

Assessment

Use the following three-point rubric to evaluate students' work during this lesson.

- 3 points: Students' environmental-impact statement includes complete description of the current status of the ecosystem, accurate description of the way or ways in which the factor affects the ecosystem, clear description of methods being used to combat the factor, reasonable suggestions for future methods.
- 2 points: Students' environmental-impact statement includes adequate description of the current status of the ecosystem, acceptable description of the way or ways in which the factor affects the ecosystem, vague description of methods being used to combat the factor, unrealistic suggestions for future methods.
- 1 point: Students' environmental-impact statement includes vague description of the current status of the ecosystem, unsatisfactory description of the way or ways in which the factor affects the ecosystem, inadequate description of methods being used to combat the factor, no suggestions for future methods.

Vocabulary

biodegrade

Definition: To break down, especially into innocuous products, by the action of living things.

Context: Plastics and fuels biodegrade more rapidly when they come from crops.

petrochemicals

Definition: A commercially used chemical derived from petroleum or natural gas.

Context: We can use crops as substitutes for petrochemicals.

synthetic

Definition: Produced by artificial processes.

Context: Much of what we make employs synthetic molecules that never existed in nature before we created them.

toxic

Definition: Acting, or likely to act, as a poison.

Context: Humans are devastating the seas with toxic chemicals.



Academic Standards

Mid-continent Research for Education and Learning (McREL)

McREL's Content Knowledge: A Compendium of Standards and Benchmarks for K-12 Education addresses 14 content areas. To view the standards and benchmarks, visit

<http://www.mcrel.org/compendium/browse.asp>.

This lesson plan addresses the following national standards:

- Technology: Understands the relationships among science, technology, society, and the individual.
- Science – Earth Science: Understands atmospheric processes and the water cycle.
- Science – Life Science: Understands relationships among organisms and their physical environment.
- Science – Nature of Science: Understands the scientific enterprise.

National Academy of Sciences

The National Academy of Sciences provides guidelines for teaching science in grades K-12 to promote scientific literacy. To view the standards, visit this Web site:

<http://books.nap.edu/html/nses/html/overview.html#content>.

This lesson plan addresses the following national standards:

- Earth Science: Structure of the earth system
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Support Materials

Develop custom worksheets, educational puzzles, online quizzes, and more with the free teaching tools offered on the Discoveryschool.com Web site. Create and print support materials, or save them to a Custom Classroom account for future use. To learn more, visit

- <http://school.discovery.com/teachingtools/teachingtools.html>
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