

Oil Spill! Clean it Up!!!!

Document Overview:

- Lesson Overview
- Video Clip Links
- Student Handout

Minnesota State Science Standards:

9.1.1.2.1 Formulate a testable hypothesis, design and conduct an experiment to test the hypothesis, analyze the data, consider alternative explanations and draw conclusions supported by evidence from the investigation.

9.1.1.1.4 Explain how societal and scientific ethics impact research practices.

9.1.2.2.1 Identify a problem and the associated constraints on possible design solutions.

9.1.3.1.2 Identify properties of a system that are different from those of its parts but appear because of the interaction of those parts.

9.3.4.1.2 Explain how human activity and natural processes are altering the hydrosphere, biosphere, lithosphere and atmosphere, including pollution, topography and climate.

9.4.4.1.2 Describe the social, economic and ecological risks and benefits of changing a natural ecosystem as a result of human activity.

Objectives:

- Students will explore an environmental disaster, the BP Oil Spill of 2010, by viewing video clips, reflecting, and discussing.
- Students will research at least 3 ways to clean up an oceanic oil spill.
- Students will design a lab in which they create and attempt to clean up an oil spill based on the method that they think will be the most effective.
- Students will listen to a talk given by Kathleen Dean Moore called, “It’s Wrong to Wreck the World,” and reflect on their moral obligation to preserve the planet.

Type of Activity: Inquiry-based Lab

Duration: 2: 50-55 minute periods

Connection to Nobel speakers:

Environmental philosopher Kathleen Dean Moore writes about moral, spiritual, and cultural relationships to the natural world. In 2000 she founded the Spring Creek Project at Oregon State, which brings together the practical wisdom of the environmental sciences, the clarity of philosophy, and the emotive power of the written word to re-imagine humankind’s relation to the natural world. In addition to her philosophical writing for professional journals, Moore is the author of several books of nature essays, including *Wild Comfort: The Solace of Nature*; *Riverwalking*; and *The Pine Island Paradox*, winner of the Oregon Book Award.

A graduate of Wooster College (1969), Moore earned her M.A. (1972) and Ph.D. (1977) from the University of Colorado, Boulder, in the philosophy of law, with a focus on the nature of forgiveness and reconciliation. At Oregon State, she teaches environmental ethics, the

philosophy of nature, and a variety of courses for OSU's new master's program in environmental leadership. She is also co-author of a new Environmental Humanities Initiative, which integrates science and humanities to provide leadership for complex times.

Although Ms. Moore may not speak about oils spills directly, this activity will give students a hands-on look into one of the ways that humans have impacted the Earth. They will likely feel an element of frustration and helplessness as they attempt to clean up their oil spill and realize that there is no perfect way to erase the devastation. As they listen to Ms. Moore's talk, they will explore the emotions they are feeling as a result of this topic.

Materials:

- Computer/Internet Access for Video Clips/Research
- Student Handout
- Household Lab Supply Suggestions:
 - Vegetable oil
 - Cake pan/pie tin (Smaller is more manageable)
 - Liquid Measuring Cups
 - Dry Measuring Cups
 - Human Hair (from hair salon)
 - Feathers (from hobby shop)
 - Sponges
 - Turkey Basters
 - Tongue Depressors or Popsicle Sticks
 - Dawn Dish Soap for Cleanup

**I recommend having students bring in their own supplies from home to clean up the oil spill. As they think about which method they would like to try, they have the freedom to put together whatever materials they feel will be helpful. It will make the activity that much more engaging for them.*

**Note: You can order a bioremediation kit (bacteria that eat oil) from a number of companies, including <http://sciencekit.com/bioremediation-by-oil-eating-bacteria-kit-dna-depot/p/IG0019373/>. I recommend setting this up in advance and conducting it as a demo for the students while they work on other methods.*

Description of activity:

In this lesson, students will be exposed to one of the worst environmental disasters in history, the BP Oil Spill (2010). In doing so, students will explore one of the negative impacts that humans have had on the environment. After researching methods of how to clean up an oil spill, students will design and carry out an inquiry-based lab by first creating an oil spill and then testing their chosen method to clean it up. Students will conclude by listening to a talk given by Kathleen Dean Moore (Nobel Conference Speaker 2012) while reflecting in their notebook about their impact on Earth, and their role in protecting the planet.

**Note: The teacher may use this lesson as an introductory inquiry-based lab at the beginning of the school year, with their ecology unit, or while discussing human impact on the environment.*

Teacher Tips:

1. My initial suggestion would be to peruse the video clips and choose those that will be the most effective, that will fit best within the schedule, and within the teaching style.
*Carl Safina's "Ted Talk" is highly recommended for two reasons. First, because he is a Nobel Conference speaker this year; and second, because he conducts an oil spill during his talk, and introduces natural components to the problem, such as waves and wind (by stirring up his oil spill).
2. Following an introduction to the topic, allow students time to research (at home or during class).
3. I recommend showing the SNL clip the day of the lab, either before or after if there is time.
4. The lab can be assigned with varying degrees of inquiry and teacher instructions depending on comfort level and teaching style.
5. Students may work in partners, groups, or individually.
6. When adding food coloring to the oil to represent how chemicals in the oil react with the water, the food coloring "balls up" at first, but then begins to leach out as the system is being agitated. This is very effective, although it may hinder students' ability to see how much oil remains in their system. Perhaps it is best done as a demo by the instructor.
7. Follow up the lab by playing a clip of Kathlee Dean Moore (or a portion of it) so that students may see the tie to the conference.
8. I recommend having students journal all parts of the activity from their research to their lab to their reflection. Students may bring their journal to the conference to reflect on as they listen to the talks.

Video Clips:

- **4:33** **BP Oil Spill Gulf OF Mexico 2010 Footage and Images**
<http://www.youtube.com/watch?v=BEWMqK5H4Z0&feature=related>
- **44:44** **Oil Disaster The Rig That Blew Up 2010**
<http://www.youtube.com/watch?v=So--O0g2860&feature=related>
- **7:54** **BEYOND PETROLEUM ~BP~ OIL EATING MICROBES~GULF CLEAN-UP 6 WEEKS** –Connection to Bioremediation
<http://www.youtube.com/watch?v=18AKWCvGqGI>
- **Variable** **NY Times: Interactives/Video Clips-**
 - Where Oil is in the Gulf

- Where Oil Has Made Landfall
 - Efforts to Stop the Leak
 - Effects on Wildlife
 - Investigating the Blowout
 - Final Moments on the Rig
- <http://www.nytimes.com/interactive/2010/05/01/us/20100501-oil-spill-tracker.html>
- **2:18 Oil Spill Heartache**
<http://planetgreen.discovery.com/videos/philippe-cousteau-oil-spill-heartache.html>
 - **2:26 Saturday Night Live Skit-BP Oil Spill Cold Open** (to add a bit of humor)
<http://lockerz.com/d/8409331> (May also be found at www.nbc.com)
 - **9:59 2009 Edelman Lecture: Kathleen Dean Moore**
<http://www.youtube.com/watch?v=e3JziKJv0dg>
 - **59:59 “It’s Wrong to Wreck the World” A talk by Kathleen Dean Moore**
<http://www.ecoshock.info/2012/05/httpbit.html>
 - **19:56 Carl Safina: The oil spill's unseen culprits, victims: Another Nobel Speaker!**
http://www.ted.com/talks/lang/en/carl_safina_the_oil_spill_s_unseen_culprits_victims.html

Recommended Prior Knowledge for Students:

None

Student Handout:

Oil Spill Lab

In your notebook, research at least 3 methods that can be used to clean up an oceanic oil spill. Choose the method that you think will be the most effective and brainstorm how you will model that method in the classroom. Write your lab in the following format:

Purpose: What is the effect of _____ (chosen method) on the amount of oil that can be removed from the water?

Hypothesis: If _____ (chosen method) is used, then _____ (amount) of the oil will be removed from the water.

*For some methods, it may be difficult to quantify the exact amount of oil removed. If possible, quantify your methods, by squeezing/dumping the collected oil into a measuring cup. Note the amount of oil that is sitting at the top. If this is not possible, use thorough, qualitative observations.

Materials: (A bulleted list of EVERYTHING needed to do the activity)

Procedure: (Numbered, Step by step)

* Use vegetable oil rather than motor oil. Although motor oil may give a more accurate representation of what happens in the ocean, it is difficult to properly dispose of.

*Be very specific in the quantities of substances you use, including how much oil you add to the water.

Data: (Include a labeled data table and graphic representation (graph, picture, etc.)

*Consider the number of trials needed to make the experiment valid.

Results: Restate data in paragraph form. Do not analyze until conclusion.

Conclusion: Answer original purpose

Support or refute hypothesis

Address at least 2 possible sources of error

Recommend ways to fix those sources of error.

Analysis Questions:

1. Explain how the oil behaved as you tried to clean it up. For example, did it spread out or cling to substances?
2. Was the oil easy to remove from the water? Explain.
3. What new ideas do you have for how you might clean up the oil spill?
4. Because a body of water is a closed system, why is it important to keep the oil out?
5. What is the impact of oil spills on animals? How does the oil impact hair, feathers, etc?
6. How do you feel knowing that our oceans are being affected in this way? How can you help?

These questions can be explored on the web. For example, for impact on animals (question 5) have the students go to <http://images.google.com/> and enter “oil covered bird” in the search engine.