

Title: *Oil Extraction: A Slippery Slope*
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Background Information

Petroleum is formed from the remains of plant and animal communities (i.e., organic matter) that have been subject to immense pressure, heat, and chemical reaction over prolonged periods. Petroleum is usually found deep within the lithosphere under layers of land or water. Deep sea or offshore drilling has become a more common and sometimes controversial alternative to retrieve petroleum sources. The most recent and notable offshore drilling incident was the BP Deepwater Horizon oil spill which was responsible for releasing millions of barrels of oil into the Gulf of Mexico and the surrounding coast.



Louisiana State Standards (Grade-Level Expectations)

SI GLE: Predict and anticipate possible outcomes (SI-E-A2).

Design, predict outcomes, and conduct experiments to answer guiding questions (SI-M-A2).

Write and defend a conclusion based on logical analysis of experimental data (SI-H-A6) (SI-H-A2).

SI GLE: Express data in a variety of ways by constructing illustrations, graphs, charts, tables, concept maps, and oral/written explanations as appropriate (SI-E-B4).

Construct, use, interpret appropriate graphical representations to collect, record, and report data (e.g., tables, charts, circle graphs, bar and line graphs, diagrams, scatterplots, symbols) (SI-M-A4).

Choose appropriate models to explain scientific knowledge or experimental results (e.g., objects, mathematical relationships, plans, schemes, examples, role-playing, computer simulations) (SI-H-A4).

SI GLE: Pose questions that can be answered using students' own observations and scientific knowledge (SI-E-A1)

Generate testable questions about objects, organisms, and events that can be answered through scientific investigations (SI-M-A1).

Describe how investigations can be observation, description, literature survey, classification, or experimentation (SI-H-A2)

SI GLE: Use a variety of appropriate forms to describe procedures and express ideas about demonstrations or experiments (e.g., drawings, journals, reports, presentations, exhibits, portfolios) (SI-E-A6).

Record observations using methods that complement investigations (e.g., journals, tables, charts) (SI-M-3).

Plan and record step-by-step procedures for a valid investigation, select equipment and materials, and identify variables and controls (SI-H-A2).

PS GLE: Identify forces acting on all objects (PS-M-B3).

Compare the characteristics and strengths of forces in nature (e.g., gravitational, electrical, magnetic, nuclear) (PS-H-E1).

SE GLE: Analyze positive and negative effects of human actions on ecosystems (SE-H-A7).

Give examples and describe the effect of pollutants on selected populations (SE-H-A11).

SE GLE: Determine the interrelationships of clean water, land, and air to the success of organisms in a given population (SE-H-C1).

Describe how accountability towards the environment affects sustainability (SE-H-D5).

Ocean Literacy Principles

Principle 6b: From the ocean we get foods, medicines, and mineral and energy resources. In addition, it provides jobs, supports our nation's economy, serves as a highway for transportation of goods and people, and plays a role in national security.

Principle 6e: Humans affect the ocean in a variety of ways. Laws, regulations and resource management affect what is taken out and put into the ocean. Human development and activity leads to pollution (such as point source, non-point source, and noise pollution) and physical modifications (such as changes to beaches, shores and rivers). In addition, humans have removed most of the large vertebrates from the ocean.

Principle 6g: Everyone is responsible for caring for the ocean. The ocean sustains life on Earth and humans must live in ways that sustain the ocean. Individual and collective actions are needed to effectively manage ocean resources for all.

Time Requirement

Once the teacher builds the oil extraction activity, it will be a relatively short project for the students. The teacher will need 20 minutes to set up the oil extraction activity prior to classroom use. Once the project is underway, students must compete against time and the volume of water that will leak into the tank once the cling wrap is punctured (i.e., five minutes).

Materials

Small fish tank or clear, plastic tub

Plastic pipette

2 small beakers or small glass vials



COASTAL WATERS CONSORTIUM

Oil Extraction: A Slippery Slope
Activities for Educators

Cling wrap
Tape
Large beaker or graduated cylinder
Gravel, mud, or dirt
Vegetable oil

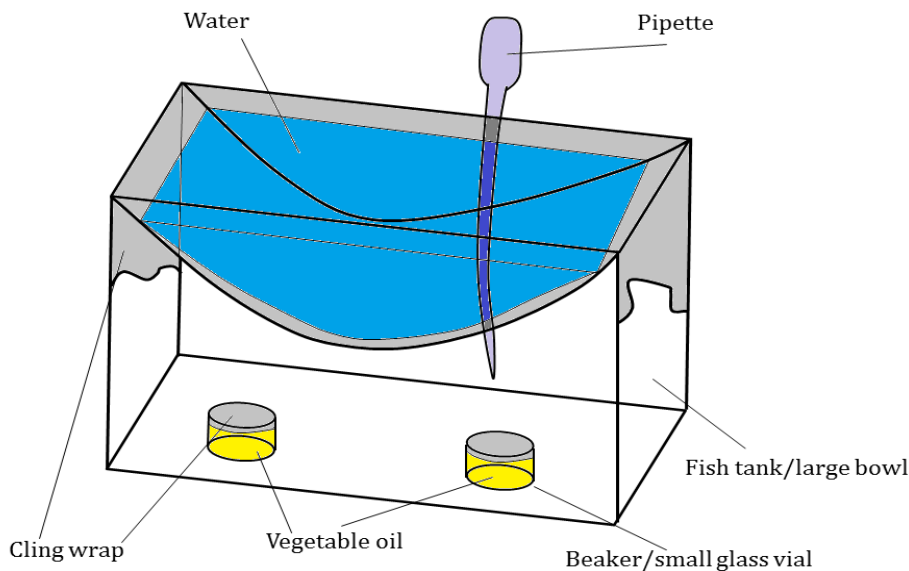
Lesson Description

Creating the Oil Extraction Project

1. Add 30 ml of oil into each of the 2 beakers/glass vials and cover them with cling wrap. Place them both at opposite ends of the tank.
2. Surround the 2 beakers/glass vials with gravel, mud, or dirt.
3. Place multiple layers the cling wrap inside the tank, so that it makes a concave barrier within the tank. Use the adhesive to tape down the layers of cling wrap along the outside of the tank.
4. Pour water slowly into the tank. Do not fill water to the top of the tank.

Methodology

Students will insert the pipettes into the water and puncture the cling wrap-barrier to gain access to the oil deposits. The objective is to repeatedly withdraw as much oil as possible before all the water drains out. The extracted oil can be placed into a large beaker or graduated cylinder to be measured once the process is complete. Students will calculate their efficiency by dividing the oil extracted with the 30 ml of oil into each of the beakers/vials. Remind students to keep proper notes of everything that occurs throughout this project.



Standard Evaluation (Student Deductions)

1. Implications for water quality?
2. Implications for marine life?
3. Implications for benthic structures?
4. Possible improvements to the oil extraction process?
5. What drives our need for fossil fuels?
6. Are there any other alternatives that can be taken?
- *7. Have students create improvements to the project.

The evaluation can be in the form of a test, essay, questions and answers worksheet, or any other mode of measuring retention or comprehension of material.