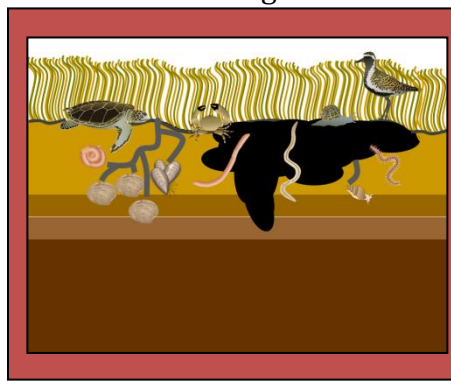


Title: *Losing It: Oiled Erosion*
Author: Brandon Coleman
Organization: Coastal Waters Consortium, GoMRI
Dept.: Marine Education

Background Information

Some coastal states have experienced erosion due to freshwater flow, turbulent coastal conditions, and soft substrate. Oil pollution has been known to exacerbate coastal erosion in some areas. The oil decays plant rhizosphere, and as a consequence, loosens the sediment held together by the plant's roots. When turbulent coastal conditions or increased freshwater flow comes in contact with coastal areas subject to coastal erosion, increased land loss may occur. 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: 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)

SE GLE: Identify and explain the limitations of models used to represent the natural world (SIM-A5)

Identify and give examples of pollutants found in water, air, and soil (SE-M-A3).

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

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)

LS GLE: Analyze the dynamics of a population with and without limiting factors (LS-H-D3)

Explain how selected organisms respond to a variety of stimuli (LS-H-F3)

ES GLE: Describe the abiotic and biotic factors that distinguish Earth's major ecological systems (SE-H-A1)

Cite and explain examples of organisms' adaptations to environmental pressures over time (SE-H-A8)

Give examples and describe the effect of pollutants on selected populations (SEH-A11)

ESS GLE: Examine soils to determine that they are often found in layers (ESS-E-A1).

Ocean Literacy Principles

Principle 1c: Throughout the ocean there is one interconnected circulation system powered by wind, tides, the force of the Earth's rotation (Coriolis effect), the Sun, and water density differences. The shape of ocean basins and adjacent land masses influence the path of circulation.

Principle 2c: Erosion—the wearing away of rock, soil and other biotic and abiotic earth materials—occurs in coastal areas as wind, waves, and currents in rivers and the ocean move sediments.

Principle 2d: Sand consists of tiny bits of animals, plants, rocks and minerals. Most beach sand is eroded from land sources and carried to the coast by rivers, but sand is also eroded from coastal sources by surf. Sand is redistributed by waves and coastal currents seasonally.

Principle 2e: Tectonic activity, sea level changes, and force of waves influence the physical structure and landforms of the coast.

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.

Time Requirement

This is an activity that requires minimal setup beforehand. Place all the materials on a table and explain the procedure; this should take no longer than 5 minutes. The students will have to create the activity by adding all the materials into the plastic cups. This should take about 5 minutes as well. Proceed with follow-up questions.

Materials

Clear plastic cups
Vegetable oil
Sand (craft stores)
Easter grass (craft store)
Small plastic pipettes
Plastic spoons



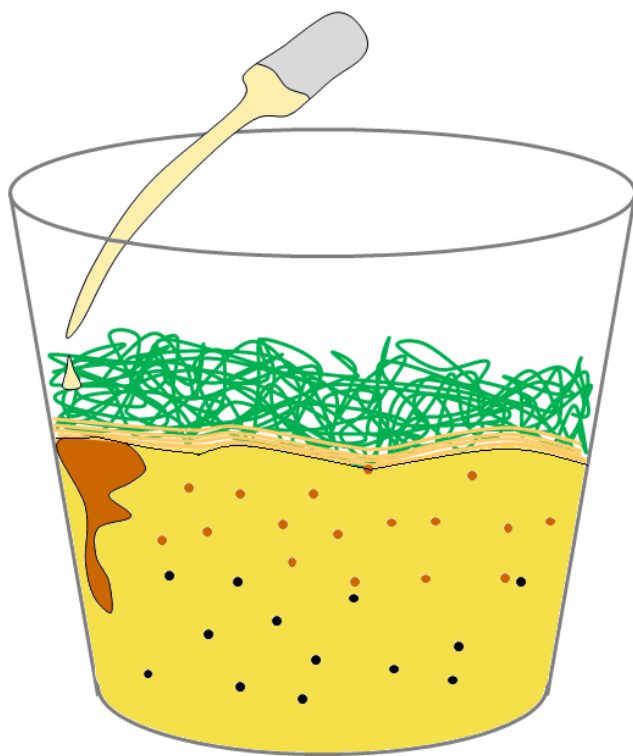
Lesson Description

Creating the Losing It: Oiled Erosion Project

1. Add sand into the plastic cups, until it reaches a little above the halfway point.
2. Add the Easter grass on top of that. Pack it down until it has the same volume as $\frac{1}{4}$ of the plastic cup.
3. Use the pipettes to slowly squirt oil onto the sides of the cups. Focusing on the sides of the cups will allow the students to easily see the interaction of oil and sand.
4. Permit students to use as many squirts it takes for the oil to finally reach the bottom of the plastic cup.
5. Instruct the students to use the spoon to scoop some *unoiled* sand. Tell them to compare the difficulty with scooping the *oiled* sand.

Methodology

Students will simulate oil contamination on a sandy substrate. The objective is to examine what happens to sand once oil mixes with it and how it is easier for aggregated masses of sand to be removed from the cup once mixed with oil. Afterwards, talk about how this is directly related to oil contamination intensifying coastal land loss. Have a healthy conversation about how the environment and organisms living within the substrate are affected by these occurrences. Ask students to keep a mental note about the amount of oil (i.e., in terms of full pipettes) it took to get to the bottom of the plastic cups.



Standard Evaluation (Student Deductions)

1. Does the oil immediately begin to appear in the sand? Why or why not?
2. If you study s typical salt marsh profile (i.e., Google), where would protection from oil contamination be the highest (exclude water level mark)?
3. What was the difference between scooping unoiled sand versus oiled sand? Do you know why? Do you think a muddy substrate would react the same way?
4. Mussels, clams, worms, birds, crabs, snails, and turtles live in or on these coastal marshes. How may oil contamination affect these organisms?

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