

OIMB GK12 CURRICULUM

2nd Grade

45 minutes

SAND DUNES

Oregon Science Content Standards:

2.1 Structure and Function: Living and non-living things vary throughout the natural world.

2.2 Interaction and Change: Living and non-living things change.

2.3 Scientific Inquiry: Scientific inquiry is a process used to explore the natural world using evidence from observations.

2.3S.1 Observe, measure, and record properties of objects and substances using simple tools to gather data and extend the senses.

2.3S.2 Make predictions about living and non-living things and events in the environment based on observed patterns.

2.4 Engineering Design: Engineering design is a process used to design and build things to solve problems or address needs.

2.4D.1 Use tools to construct a simple designed structure out of common objects and materials.

Ocean Literacy Principles:

2. The ocean and life in the ocean shape the features of the Earth.

Goals:

- To remind students where sand comes from in Oregon and how it is moved (wind, waves, rain etc.)
- To get students to understand that sand dunes can be made by wind and stabilized by large rocks and plants
- To introduce two specific grasses that stabilize our dunes
- To discuss how European Beach Grass can alter the dune habitat in Oregon

Concepts:

- Once sand makes it to beaches it is moved by wind, rain, and the ocean.
- Dune grasses and large rocks help to trap and keep sand from blowing away, over time creating dunes.
- In Oregon, sand dunes change with the seasons, losing sand in winter storms and gaining sand in calmer summers
- There are two types of grasses on our dunes: American Dune Grass and European Beach Grass.
- European Beach Grass is introduced and causes more and more sand to build up on the foredunes (i.e. dunes closest to the ocean).

Materials:

Sand Dunes Data Worksheet

2 speed hair dryer

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2 flat pans
American Dune Grass clumps with roots
European Beach Grass clumps with roots
Stones
Sand
2 cardboard boxes
Clean up tools

Lesson Plan:

1. Begin with a modified KWL chart to see what students already know about sand dunes, asking questions about what sand dunes look like, how are they formed etc. to get out ideas. Also review previous sand lessons (such as MARE's Sandy's Journey to the Sea) that have introduced erosion and the origins of sand. Discuss wind as one source of moving sand. Ask why all the sand doesn't blow away with all the wind. Is there anything on a beach that may help keep the sand on the beach? Tell the students they will create sand dunes with wind. Have them make hypotheses about what will happen if the wind blows sand with or without grasses, rocks, trees etc. (see worksheet).
2. Have two trays, labeled A and B with sand in each. Place a cardboard box behind each to catch "windblown" sand and ease cleanup. In one pan (B) add stones and grass (actual dune grass) in different areas in the sand. Ask what the hairdryer represents? With the hairdryer on low speed, hold it at an angle, a few inches from one end of pan A for one minute. Have the student record what happens on their data sheet (results). Repeat with pan B. Have the students sketch what the sand looks like in each tray. Now repeat with the hairdryer on high or do it for 3 minutes. Have groups come up and report what they saw on the board or overhead. Discuss what differences having plants/rocks etc. made to dune formation. Discuss the differences in the wind (and rain) during winter storms (i.e. hair dryer on high) and calmer, but still windy summers (low speed hairdryer).
3. Ask what if you get too much sand or dunes that are too large? If your sand dunes are held down so well by plants or rocks will the winter storms be able to take the sand away? Bring out two good samples of the American Dune Grass and the European Beach Grass. Have the students in groups examine the two grasses and see if they can report any differences. They may notice a difference in the leaves (form and color) (see expected differences in Giles 2003). They may notice more extensive roots and underground stems (rhizomes) in the European Beach Grass. Ask them to make a hypothesis about which would hold onto sand better and why. Discuss how the European Beach Grass is better at holding sand in place and makes foredunes so big that sand cannot move back and forth to the dunes further from the beach. These inland dunes do not get new sand (draw picture of foredunes and inland dunes on board). Plus, this grass makes it easier for other plants to grow on the dunes and allow forests to take over the dune area. What plants and animals will be affected if we lose the dune habitat?

Assessment: experiment data sheets, reporting in front of class and discussion

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Sources:

Barb Hawkins, Wabaunsee East USD 330, Harveyville, KS created this lesson in 1994 called “Creating Sand Dunes” http://www.eduref.org/cgi-bin/printlessons.cgi/Virtual/Lessons/Science/Earth_Science/EAR0007.html

For ideas of follow up or pre lessons teachers could do see:

<http://www.nps.gov/archive/grsa/resources/curriculum/elem/lesson34.htm>

Background on dune formation, Oregon geology, and American Dune Grass versus European Beach Grass from Marty Giles (see background sources)

<http://www.wavecrestdiscoveries.com/natural.htm>

Reflection:

U.C. Berkeley’s MARE “Sandy’s Journey to the Sea” or some other lesson discussing sand formation, erosion, and transport to the sea would be a good previous lesson. This would include a discussion of sand being moved by wind, rain, streams/rivers, and the ocean.

Weather patterns could be tied into this lesson. Also, looking at wind directions in summer and winter and the ocean currents could give your students a more concrete way to see why we lose sand from the beaches in winter and regain sand in the summer.

A good pre or post discussion on the different situation on the East Coast of the U.S. where people are planting beach grasses and placing sand bags and rocks on the beaches to save the sand dunes that are eroding because of building and people walking on the dunes, hurricanes, etc. (There are good pictures online.)

Teacher leads discussion on why dunes are important and what sorts of animals live in sand dunes (turtle and bird nesting etc.) and what happens if those sand dunes are eroded away.

On the West Coast, if European Beach Grass makes dunes more habitable for coastal forests to encroach, what will happen? Is it a bad thing to lose the dune habitat? Also a discussion of introduced plants and animals could follow from this. How do introduced organisms get here? Why do people introduce things on purpose? How can this change the natural habitat?

Sand Dunes Data Sheet

Scientist

Hypothesis: Draw what you think will happen to Sand Dune A and Sand Dune B (2 drawings)

Dune A

Dune B (stones and grass)

Results: What happened to **Sand Dune A** and **Sand Dune B**?

Dune A

Dune B (stones and grass)

Conclusions:

Draw the American Dune Grass.

Draw the European Beach Grass.