My Sand is Fine, How About Yours? [ME]

Adapted from NJ Sea Grant Consortium and New Wave of Learning

Grades: 3-5
Time: 45 minutes to 1 hour

Goals: To understand that sand feels and looks different across a beach and to differentiate the zones found on a barrier island.

Objectives:
Students will be able to: identify sand from different zones of a local beach based on particle size, shape, and texture; compare these samples to beach sands from different parts of the country and world; and create a sand wheel representing these specific zones.

Materials:

Sand samples from dunes, backshore, foreshore, and nearshore
Dissecting microscopes
Petri dishes (or other divided dish)
Glue
Permanent markers
White paper
Pens/colored pencils
Laminated photos of sands from other locations

Procedures:

1. Pre-Activity (introduction): Begin with an overview of a local beach: describe the zones and the sand found at each of them. Explain that you can see more of what sand is actually made up of by exploring the grains under a microscope. Emphasize that many factors shape sand particles and include water/wave action, wind, animals, and people. You can even give examples of being on a beach during a wind storm and getting pelted by sand as it is blown around.

2. Activity: Divide the class into teams of "microbiologists" and instruct them that they are going to explore the microscopic world of sand. Using their glue, they are to take small samples of sand from each of the zones of the beach and glue them into their petri dishes, making sure they label each zone with the permanent markers. If there are enough dishes, students can create one wheel for each zone instead of dividing their dish. Under the lens of the microscopes, have the students examine their sand samples, drawing and describing what they see on their white paper.

3. Post-Activity (review): Instruct the students to describe what they have seen under the microscope and write their descriptive words on the board. Differentiate between local sand and sand found in different areas of the country and world. Provide photos of examples from Florida (coral/shell deposits), Hawaii (black and volcanic), Maine (coarser from boulders), England ("white cliffs of Dover" and limestone), or Australia (finer from cyclone activity).

Key Words:

Dunes	Backshore	Foreshore
Nearshore	Erosion	Quartz
Coralline	Volcanic	Limestone

Background Information:

Adapted from Science Museum of Minnesota

Sand grains do not begin as small grains, but are actually larger rocks that have been weathered down both from the coastal sea and from the inland mountain rivers. Weathering is the process in which wind, waves, temperature, and pressure will slowly chip away at sedimentary rock to eventually reduce them in size from large boulders to pebbles to fine sand grains.

Depending on the size of the sand grains, they can be easily picked up by wind and waves and moved to a new location. This is apparent when we look at sand grain size in the dune systems. If you have ever been on the beach during a heavy wind storm, you will feel the small sand grains pelting your skin as they are picked up and moved around the beach. Heavier, coarser sand can still be pushed and moved by wave action, but it is not light enough to be moved by wind. These sand grains tend to stay closer to the water's edge. If you have ever been to the beach during an unusually low tide, you will see this coarse sand mixed with pebbles that have not yet been eroded by the waves and currents. From the rivers, boulders and pebbles are tumbled as they make their way downstream, causing them to break apart until they are sand grains at the mouth of the river. Depending on how much weathering occurs, heavy sedimentation can occur where rivers meet estuaries.

Sand grains come in many different shapes and sizes, depending on where they originated from and what they are made up of. Some beaches are uniform, having one type of sand, whereas some beaches are more complex, having several types of sand grains mixed with fragments of once-living species. Grains can be tumbled into smooth, rounded shapes or they can be pushed around into more angular shapes. Some sand grains are mixed with minerals, which gives them a metallic gleam or a distinctive color. Quartz is the most common mineral and gives sand grains the appearance of being tan or clear. Green sand grains are mixed with olivine; black grains are mixed with basalt or magnetite.