BEACH BUCKET SCAVENGER HUNT

FOR THE TEACHER
Discipline
Earth/Physical Science

Theme
Diversity, Patterns of Change

Key Concept
Objects found on the sandy beach can be grouped into: evidence of plant life, evidence of animal life, evidence of humans, and non-living material.
Sand is made up of tiny bits of everything that is found on the beach.

Synopsis
Students in small groups explore a simulated sandy beach in a plastic tub that is littered with beach drift and debris, and discover the differences between once living (biotic) and never living (abiotic) objects through cooperative small group work.

Science Process Skills
observing, organizing, communicating, comparing

Social Skills
sharing ideas and information, checking for agreement

Vocabulary
marine debris
beach drift
biotic/abiotic (optional)

MATERIALS

INTO the activities

For each student
• a picture of a beach organism, or a sandy beach with or without marine debris

For the Class
• globe
• chart paper
• marking pens
• masking tape

THROUGH the activities
For each group of 4-6 students
• a tub or dishpan at least 12 inches X 9 inches X 4 inches deep
• beach sand to fill each tub approximately 2 inches deep (you can purchase sand from hardware or building supply stores)
• pieces of beach drift and marine debris; **at least two from each of the following groups:**

evidence of plants: driftwood, twigs, leaves, seaweed, seaweed holdfasts attached to rocks (if you cannot collect seaweed from a beach, it is available dried in many grocery and health food stores and in Asian markets)

evidence of animals: shells; feathers; bones; dried fish parts; shark, skate or ray egg cases (often called "mermaids' purses"); crab parts; you can even draw tracks in the sand; etc.

Sidebar or box: There is a saying which says "Take only pictures and leave only footprints." This is a wise saying for learning about and enjoying the outdoors and leaving something for those who come later. However, many of our children do not have the opportunity to visit beaches and as teachers we can bring the ocean and an environmental ethic to them. When collecting for the classroom, take only a small amount of beach drift, the dead animals and plants and rubbish washed up on the shore. It is important that we tell our students why we collected our beach drift [many, many students will have the opportunity to learn from it], that we only collected drift (no living organisms) and when we are done with it we will return it to the beach where we found it. Nothing may be taken or collected from a reserve, preserve or National Seashore, not even beach drift. We suggest that you do not purchase shells and other dead animals such as sea stars because most are collected alive and reefs may have been dynamited to find them.

evidence of humans: cans, bottles, candy wrappers, six pack rings, plastic straws, bottle caps, juice boxes, fishing line, balloons, plastic toys, coins, chicken bones, etc.

non-living material: rocks, “beach glass” (broken glass worn smooth), plastic, metal.

For the class
• 1-3 sheets of chart paper
• marking pens
• "key concepts" written in large letters on strips of butcher or chart paper
• misc. posters or calendar pictures of beach scenes and/or beach animals (Optional, though especially helpful for language minority students).

BEYOND the activities
For each student
• large light-colored construction paper (11X17 inches is ideal)
• fine point marking pens or crayons

For each pair of students
• plastic garbage bags (optional)

INTRODUCTION
A sandy beach reveals evidence of nearly everything that has been to the beach or in the adjacent ocean. Look closely at the sand and you might see pieces of rocks that have broken free from the rocky seashore, cliffs, ocean floor and even from the distant mountains. There might be shells or shell fragments from animals that once lived on nearby reefs, bones from animals living in the ocean and on land, algae, coral fragments, glass, driftwood, plastics, feathers and much more. Waves and wind push sediment and "beach drift" from the ocean onto beaches around the world. Marine debris (garbage that ends up in the ocean or at the seashore) is carried from land by the millions of visitors to the world's beaches and dumped from the world's fleet of private, commercial and military boats and ships. Rocks and minerals are also carried from tall and distant mountains to beaches through streams and rivers. As waves crash against the shoreline, all these objects are ground into sediments and rough edges are progressively smoothed and rounded.

The things you find at the beach can be separated into many categories. You can find evidence of things that were once alive (or "biotic" materials), such as shells, bones, feathers, corals, egg casings, driftwood and seaweeds. Biotic material can be further subdivided into evidence of plants or evidence of animals. You can also find evidence of things that were never alive (or "abiotic" materials). A few common types of abiotic materials are rocks, glass, plastics and many types of sand. Evidence of people is another category, but these materials can be biotic (paper, pieces of lumber or chicken bones), or abiotic (plastic, glass, metal).

Beaches throughout the world are strewn with drift and debris, both natural and human-made. The human-made debris, mostly in the form of plastics, is often deadly to ocean and sandy beach inhabitants. It is important to

recognize the different types of drift and debris, and to be able to distinguish between those that should be removed for the safety of people and animals from those that should not. We can protect our beaches and keep them healthy through beach clean-up projects and prevention of littering in the first place.

INTO
THE ACTIVITIES

Planet Ocean Brainstorm
1. Ask students to brainstorm all the ways that people use and depend on the ocean. Hold up a globe and show a "traditional" map view of the world--that is with the continents highlighted and usually the Americas in the center. Then turn the globe to show the "Pacific Ocean view"--half of the world with almost no land showing. What does this view tell students about the world? Present the following introductory ideas:
• Most of the planet is covered by ocean.
• People get food and water from the ocean.
• Over half our oxygen comes from plants in the ocean
• Without an ocean our planet would burn up or melt during the day and freeze at night (the ocean moderates our climate).

Sidebar or box: The ocean is so vast that it is difficult to study or understand all of its parts at once. Many students will often have some prior knowledge of and experience with the sandy beach. By beginning with something familiar, such as a beach, it will help students later to understand new ideas and concepts about the ocean.

2. If you have more than one language spoken in your room, ask students the words in other languages for "water," "ocean," "beach," or "shore." What other related words do students know in another language? Write the words down and have everyone practice repeating them. Try to use these words as you teach the rest of the unit.

My Buddy Says
See the Teaching Strategies section for how to teach this activity.

1. Pass out a picture of a beach or a beach organism to each student. Use the following questions/prompts or others you design:
1) Close your eyes and imagine you are sitting on a beach. Look down the beach. Now open your eyes and describe what the beach looked like.
2) Where are some beaches that you have visited?
3) What are some things that you like best about beaches?
4) If you walked along a sandy beach looking very carefully, what types of things do you think you might find?

2. Spend some time discussing this last question with your students. Write down their responses on chart paper or a chalkboard, and organize the responses into categories. One strategy is to divide their answers into evidence of plants, evidence of animals, evidence of people and non-living things (e.g., rocks).

THROUGH THE ACTIVITIES

Beach Explorations

1. Tell the students that now they will have the chance to explore a beach right in their own classroom! Show the beach buckets you have prepared and remind the students to handle the items carefully.

2. Divide the class into clusters of four to six students. Ask the students to explore their "beach buckets." They can feel the sand and pick up pieces of debris to look at them more closely. Make sure to tell them to keep all the sand in their sandbox so the classroom will stay neat and clean!

3. Provide each cluster with a prepared beach and let them begin their observation.

4. Circulate among the groups and ask them questions to help them focus their observation. What colors do you see? What do the things on the beach feel like (fuzzy, rough, prickly, soft, etc.)? What are some of the shapes of objects in their beach buckets?

5. Ask the students to make general observations of the items, ask them to think about where the items came from. What evidence do they see in their beach bucket of living things? plant life? animal life? evidence that humans have been present? After they've made some observations, encourage them to sort or group the items into categories of their choice.

6. Have groups share one or two items from a few categories. Can anyone help identify the unknown items? Does anyone know where each item came from (the ocean, right from the shore, inland?). How did it get to the shore?

7. Now have students sort the items into the following four groups: evidence of plant life, evidence of animal life, evidence of humans, unknown items or items you can't agree about.

8. Have the groups share again, and record, if possible with simple drawings, the items groups share on chart paper divided into three columns headed by a simple icon drawing of a plant, animal or human. You can use one sheet of chart paper for each of the categories if you anticipate many responses.

Explain that everything in the first two categories is evidence of life (or biotic material).

9. Point out pictures or posters that show examples of the whole, live animals and plants from which the biotic material came. Are there any things left in their beach buckets that were never alive?

10. These things, such as rocks and most of the sand, are called abiotic materials. Are there items that could go in more than one category, e.g., a rock with seaweed attached, or a piece of beach glass (non-living and evidence of humans)? In general, things found at the beach are called "beach drift." More specifically things left by humans are referred to as "marine debris." Now explain that all of the items found at the beach will be pounded by wind, waves and tides and eventually will be ground into sand. Sand can be either biotic or abiotic, and is usually a combination of both.

11. In closing and wrapping up the activity, hold up the key concepts and have one or more students read them aloud. Briefly discuss how these statements review the important ideas from today's activities. Post the concepts on the wall near some beach posters or pictures for students to re-visit during the rest of the unit.

BEYOND THE ACTIVITIES

Mini-Book

See the Teaching Strategies section for how to teach this activity.

1. Tell students that they get to tell a story about visiting a beach by making a mini-book with pictures and words. They can title their books, "My Beach Book." Chapter titles can be as follows: Chapter 1 Plants & Animals; Chapter 2 People At The Beach; Chapter 3 The Best Thing About Beaches.

2. When completed, give the students time to share their mini-books informally with their cooperative group or partner.

Beach Clean-up

Take a trip to the beach or a local stream, river, pond or lake and do a clean-up project with your class. The MARE Guide to Marine Science Field Trips in the San Francisco Bay Area will give you some guidelines on organizing and carrying out a customized field trip experience.

Bring enough plastic garbage bags so that every pair of students can have one. Divide the pairs into three collection groups: 1) unbroken glass and cans; 2) plastic; 3) paper and other misc. trash. Have all pairs line up from the water's edge to the dune area and sweep a half mile section of beach. Remind

students that they are to collect only evidence of humans. Take all the debris they have collected and organize it into categories. Weigh or measure the volume of each. Discuss the differences between biodegradable and non-biodegradable, and recyclable and non-recyclable objects.

Point out any collected debris that is natural, rather than human-made. Ask students to redistribute any non-human debris so that you minimize your impact on the ecosystem.

For more information about the official Adopt-A-Beach program, contact the California Coastal Commission (415) 904-5200 or the Center For Marine Conservation (415) 391-6204.