

Creating a Rocky Shore

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Key Concepts

1. Each marine plant or animal has specific requirements for space, water conditions and food source.
2. Rocky shore organisms live in preferred zones determined in part by their tolerance for exposure to the air at low tide.
3. Each tidal zone is characterized by a typical grouping or community of organisms.



Background

For hundreds of years, people observed that plants and animals of the intertidal zone tend to occur in relatively distinct bands related to the amount of time an area is exposed to air.

Organisms, including those in the intertidal zone, have evolved special adaptations that allow them to survive in specific areas. These organisms, in turn, require certain things from their environment for survival. In other words, plants and animals live where they do because they find their essential needs met within the confines of that area.

The study of relationships among organisms and their environment comprises the field of study known as ecology. Fundamental to the science of ecology are the concepts of community, ecosystem, ecological niche and succession. A group of organisms living and interacting together is termed a “community”. An ecosystem is the basic functional unit of nature and describes the relationships between the organisms and between the organisms and their non-living environment. The living and non-living components of an ecosystem are intimately linked by a variety of biological, chemical and physical processes.

The place and function, or “role”, of an organism within an ecosystem is termed its niche. Communities and ecosystems change over time. The gradual replacement of one type of community or ecosystem by another is termed succession. Succession occurs in a definite sequence reflecting changes in environmental conditions.

Materials

For the class:

- craft materials such as: butcher paper, tissue paper, construction paper
- glue, tape, staplers
- scissors
- markers, crayons, pastels, paints
- “Creating a Rocky Shore” student pages (optional)
- intertidal animal reference books

Teaching Hints

“Creating a Rocky Shore” helps students integrate basic ecological principles and the concept of intertidal zonation. In this activity, students create a paper model of a rocky shore or of a piling. Next, they mark tide heights on their model, create representative piling animals, and place their animals in the correct zones. Students use a tide calendar to determine the number of hours each animal typically is exposed at extreme low tides. Finally, they add interpretive notes describing how the animals are adapted to survive low tide.

Consider displaying these creations in your school, at a local science fair, or elsewhere in the community so that students know they will have a real audience and, hence, must make attractive and accurate creations.

The student pages include a list of animals and tide ranges typical of intertidal areas along the Pacific Northwest coast. You may wish to alter the list to fit your area.

Divide the students into teams of 3 or 4. Group students with different skills together. If some members have researching and writing strengths, some have artistic ability, and some enjoy doing and making, the groups will have greater success.

Students may choose to do a two dimensional or three dimensional model of a beach or piling. Produce boxes from the grocery store work well as a setting for a beach scene. Students can wrap butcher paper around a weighted coffee can to make a three dimensional piling. Very often, the students come up with the best ideas.

Students will need access to reference books and may want pictures of the animals they will be creating. If you can provide access to computers and a word processing program, ask students to create their interpretive signs on computer. The labels will be more polished.

Key Word

zonation - in this case, the distribution of plants and animals in more or less distinct bands reflecting differences in environmental conditions

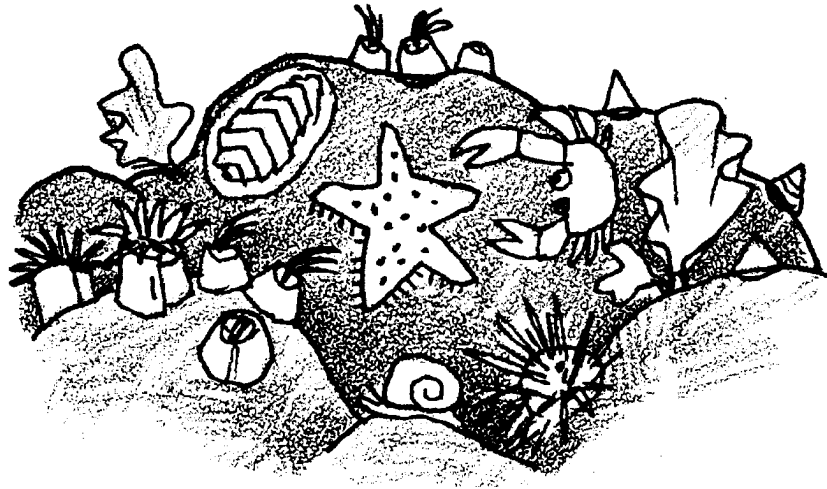
Extension

1. Organize a field trip to a rocky shore or dock so that students may have the experience of actually collecting zonation data. If possible, take the trip before you do the activity “Creating a Rocky Shore”. Have students collect data from simple transects on a piling or rock outcropping. Upon analysis of the data, models of pilings or rocky shores are constructed.

A simple way to collect zonation data at a dock uses a teardrop or circle (about 6" in diameter) made of wire which is held against the piling. Space students down the length of the pilings to the water line (or beyond, if possible). Have them all stand on the same side of the piling (toward the water or away) and count the organisms (barnacles, etc.) within their teardrops.

For rocky outcroppings, strip transects are useful. Have students extend a strip of cloth or plastic flagging (available in rolls and used by surveyors, etc.) from high to low tide and record the organisms they find next to the strip. Use a measuring tape to roughly indicate the locations at which the different organisms are found.

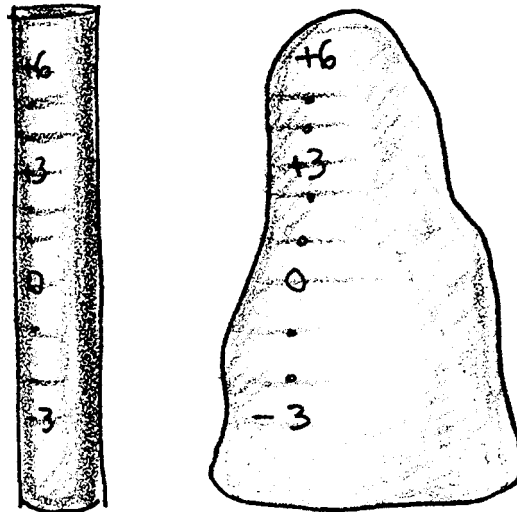
Creating a Rocky Shore



Want to go to the rocky shore, but can't? Why not bring the rocky shore to you? In this activity you will create a model of a rocky beach or a wharf piling. You can show how marine animals stay alive as the tides go in and out. You can also use the model to teach others about marine animals.

Here is what you will do:

1. Create a model of either rocks or pilings.
2. Mark the tide heights from -3 feet to +6 feet on the model.
3. Decide which animals would usually live on the type of rock or piling you have made.
4. Create realistic models of the animals.
5. Place the animals in the "right" tidal zones of your model. The "right" zones are those that correspond to those where the real animals live.



6. Finally, make a label for each type of animal. On the label include:
- the name of animal
 - the time that the animal is out of the water at the very lowest tides
 - structures or behaviors the animal uses to survive low tide
 - any other interesting stories you can find.
7. Display your rocky shore to teach others and for others to enjoy.

Look at the steps you need to follow. Think about the strengths of your team members. Assign each person on your team one of the following tasks. Each member will have a portion of the project to direct. Every team member will also assist with all aspects of the project.

Tasks

Habitat Creation Director _____

Animal Creation Director _____

Animal Placement Specialist _____

Interpretive Note Writer _____

Your habitat should include at least the following animals in the following approximate tidal ranges:

barnacles	0 to +5
limpets	0 to +5
snails	-2 to +3
sea anemones	below -3 to -1
chitons	-3 to 0
sea stars	-3 to 0
spongebelow	-3 to -3
mussels	-2 to +2
sea urchinsbelow	-3 to -2