

An Expedition to the Crab Beach

Objective:

1. Discover the characteristics of the communities of coastal rocky and sandy littoral zones.
2. Review of the scientific method.

Learning Skills: Observation, identification, comparison, analysis, critical thinking, differentiation, and illustration

Materials: Pencils, field forms, drawing paper and a clipboard for each student.

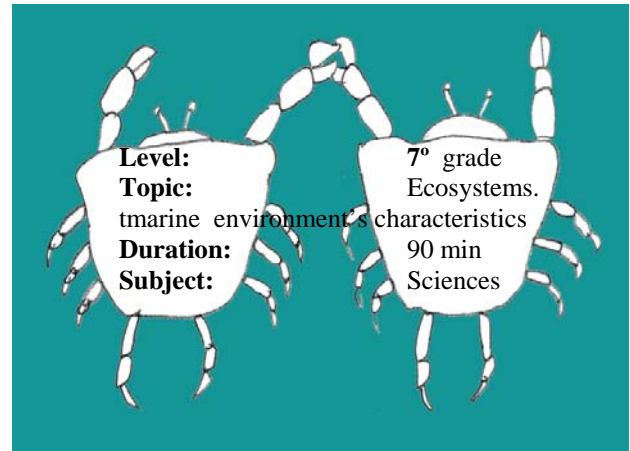
Information Base:

The littoral zone or beach is the section of the coast that is periodically covered by high tides and exposed during low tides. This zone is divided into: supralittoral, littoral, and sublittoral zone.

The **supralittoral** or splash zone (above high water) is the area that remains exposed the longest and whose inhabitants are only sprayed with water although during episodic "flooding" they are covered by the tide. The **littoral** zone or intertidal zone (between high and low water) can be divided into three sub-zones: high, middle and low. In the high zone the animals are periodically bathed with water and must adapt to long periods exposed. In the middle zone the organisms must adapt to being out of water for relative time periods which they use for foraging and reproducing (i.e. fiddler crabs). In the low zone the organisms can only survive short periods out of water.

The **sublittoral** or subtidal zone (below low water) is a band that is affected only during the negative tides which occur periodically throughout the year. Characteristic organisms of this region are algae, sponges, sea urchins, and clams.

We differentiate substrates into rocky, sandy, and mud flat coastal zones (we can also mention the mangroves as being a special system). Organisms are distributed according to their ability to withstand and/or adapt to being out of the water. The rocky littoral zones have caves, cracks, and tide pools which provide a refuge against waves. The organisms that live here use a system for **attachment** and have thick resistant exoskeleton (snails, barnacles, and limpets) or hide in the smallest cracks where they somehow



hold on and are protected from desiccation during low tides (sea cucumbers, anemones, and flat crabs). The **tide pools** are special temporary refuges. The animals that you find in them have the ability to adapt to changes in temperature and salinity during the low tides (hermit crabs, brittle stars, and sea slugs). Others, like small fish, remain trapped in them. The sandy littoral coast is formed from the accumulation of eroded material from rocks as well as biological materials and animal remains such as skeletons and shells that have been broken down by wave action. Between the sand grains there are spaces that allow organisms to **burrow** either for defensive or to survive low tides. Examples are ghost and fiddler crabs that are found in the littoral zone and tube worms and olives of the sublittoral zone.

Vocabulary: Marine ecosystem, habitat, littoral zone, rocky littoral, sandy littoral, tide pools, biotic and abiotic factors, biodiversity, adaptations, scientific method, flooding, negative tides.

Procedure:

1. After welcoming the students and introducing the docents, begin with the theme for the day: "What is science?"
2. Briefly review the steps in a Scientific Method (observation, hypothesis, experimentation, discussion) then begin the activity.
3. Observe the students during this period and decide whether they should work alone, in pairs or in groups (no larger than 5).
4. Provide the instructions for the activity. They must look for and observe organisms in different areas of the beach. When they find an organism they should ask themselves three questions: 1) What is it?, (2) What is it like?, (3) Where does it live? If they do not know what the animal is they must make notes on its characteristics and make a drawing so that they may identify it later using a guide.
5. At this point it is important we establish the time that we will remain on the beach. 30 minutes is sufficient time to visit the rocky and sandy shore.
6. The docents should encourage and guide the students toward answering their own questions.
7. Afterwards the students are taken to the classroom. We can begin by telling them a story about being a scientist making a survey of a beach that has never before been studied (this is the observation stage). Now they have in their hands very valuable information that they must analyze.



8. Ask: "Is the entire beach the same? What habitats could you observe?" Discuss the meaning of "habitat" concentrating on the rocky and sandy littorals.
9. Ask them to count the organisms they found on the beach and write them on the blackboard as they finish their counts. Encourage them to make two lists: organisms from the rocky shore and one from the sandy beach.
10. Once the lists are completed ask the students what conclusions can be obtained from them. Help them come up with answer: "In the rocky littoral zone we find more organisms".
11. "Why do we find a greater variety of organisms in the rocky littoral zone?" Promote ideas and write down the ones that make more sense. There will be many explanations that will describe abiotic factors for both the sandy and rocky areas as well as the organism's adaptations. Finally summarize the ideas in a conclusion. This is what we call the "hypothesis". Remind them that we must first experiment before we can be sure that our answers are correct.
12. At this time the students can define terms such as ecosystem, biotic/abiotic factors, adaptations, and diversity. Allow them to form their own definitions.

Suggestions for Docents:

- ◆ Ask: "How would you demonstrate that your hypothesis is correct? How would you count the animals?"
- ◆ Scientists are very curious people! "Do you think they will only ask one question? If you were scientists, what other questions would you have about the Crab Beach and its inhabitants?"

Suggested Classroom Activities:

Create a map of the Crab Beach placing the animals they found in their correct habitat and adding physical characteristics of each inhabited site.

Evaluation:

The definitions may function as our evaluation.

Reference:

Odum, Eugene. 1972. *Ecologia*. 3rd edition. Nueva Editorial Interamericana, Mexico.



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Group:

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Take notes of all the animals you see and the characteristics of where they live

#	What is it?	What is it like?	Where does it live?

