



Science Unit: *Marine Critters & Communities*

Lesson 2: *Animals & Plants of BC's Rocky Shore – Habitat Preferences*

School Year: 2007/2008

Developed for: L'École Bilingue, Vancouver School District

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Grade level: Presented to grades 2 - 3; appropriate for grades 1 – 6 with age appropriate modifications; Présenté au niveau de la 2e et 3e année; approprié aux niveaux de la 1re à la 6e année en y apportant les modifications nécessaires.

Duration of lesson: 1 hour and 20 minutes

Notes: This lesson was taught in a French immersion school.

Objectives

1. Learn about the BC Rocky Shore, especially the habitats created by tidal action.
2. Explore habitat preferences of intertidal plants and animals using a mural of the rocky shore.
3. Learn about the concept of a “biological community”.

Background Information

This lesson will introduce the biological community of BC rocky shoreline. This lesson (#2) and the next (#3) are based on a large mural of this ecosystem that the students help create. Students will first explore the physical aspects of this ecosystem, with a particular focus on the tides and the unique habitat zones the tides create: the spray zone (area above the high tide limit), the intertidal zone (area between high and low tides), and the subtidal zone (area below the low tide limit). Students will also be introduced to the concept of benthic and pelagic zones. Benthic organisms live on the seafloor (e.g. sea urchins), while pelagic organisms live swimming or floating in the water (e.g. jellyfish).

The three habitat zones (spray, intertidal and subtidal), along with the benthic and pelagic dichotomy, result in 4 zones that are depicted on the mural. The mural also depicts a gradient in temperature and salinity (introduced in Lesson #1). The temperature gradient is from high to low with increasing depth (y-axis of the mural), and the salinity gradient is from low to high with increasing distance from the shore (x-axis of the mural), as there is freshwater input from a river on the shore. See Worksheet #1 for a conceptual sketch of the mural zones. A selection of rocky shore animals and plants (16 species) will be introduced to the students. Each species has an associated “habitat fact sheet” explaining what type of conditions it likes to live in. Students will add species to the mural by selecting organisms and using the “habitat fact sheets” to determine where on the mural (i.e. in which of the 4 zones) to paste them.

At the end of the lesson, after all the plants and animals have been pasted onto the mural, there will be a class discussion about a “biological community” – i.e. all the organisms living in a certain place which interact with each other and their environment. The rocky intertidal community that we just created on the mural is ‘organized’ or ‘structured’ by the habitat preferences of the component species. In the next lesson students will explore how ‘biological’ interactions like predation also influence the structure of their rocky shore community.



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Vocabulary

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| Tide | The regular rise and fall in the surface level of the Earth's oceans caused by the gravitational attraction of the Moon and to a lesser extent of the Sun. |
| High tide | The tide when the water is highest |
| Low tide | The tide when the water is lowest |
| Spray zone | The area above the high tide mark, where the ocean periodically sprays on the land |
| Intertidal zone | The area along coastlines between the high and low tide |
| Subtidal zone | The area below the low tide mark, always underwater |
| Pelagic | The zone that begins at the low tide mark and includes the entire oceanic water column. Pelagic organisms live floating or swimming in the water column. |
| Benthic | The bottom of an ocean or lake. Marine benthic organisms live on the sea floor. |
| Habitat | The area or natural environment in which an organism normally lives. |
| Biological community | The collection of all organisms living in a particular place. These organisms may or may not interact. |

Materials

* note: all lessons in this unit require a scrap book that each student keeps for the duration of the 6-week curriculum (for pasting in their activity sheets, drawings etc.)

Materials For Activity 1

- Diagrams of mural species on separate sheets
- Names of mural species on separate sheets
- Tape
- Names of mural zone on separate sheet
- Organism fact sheets (1 per species)

Materials For Activity 2

- Base mural (already created before class by the teacher/scientist and hung up)
- Outlines of mural species suitable for coloring (see below for species names and abundances)
*note that the size of the organisms should reflect their relative sizes in real life. The size of the mural will dictate this.
- Crayons, coloring pencils
- Scissors
- Tape
- Organism fact sheets (1 per species)

In the Classroom

Introductory Discussion

1. HOOK: Begin with an animation of tidal action and explain the different zones tides create along rocky shores.
2. OTHER ITEMS TO REVIEW: Review concept introduced in Lesson #1 of animals and plants preferring to live in specific habitats. Extend this concept to include the simple habitat zones of rocky shores (spray, intertidal, subtidal) and benthic versus pelagic organisms. After Activity 1, review the 4 zones on the mural (Worksheet #1) and explain the two habitat gradients (salinity and temperature).



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3. BRIEF DESCRIPTION OF SCIENCE ACTIVITIES: The two major activities of this lesson are: (1) Marine critter matching game, where students match organism names to the appropriate picture, and (2) Creation of a mural of the BC rocky shore, where students color organisms and paste them in the appropriate zone on the mural. Both activities use the following species and habitat zones:

This is a list of plants and animals used in one mural. The species selection and species abundances can be modified depending on mural size and the preferences of the teacher. The activity descriptions below refer to the species, abundances and zones listed here.

Animals & Plants for the mural by zone (abundance in brackets)

ZONE 1: Spray Zone

1. sea asparagus (5)
2. green algae (3)
3. shore crab (2)

ZONE 2 : Intertidal A (benthic & pelagic)

1. anemone (3)
2. barnacles in clumps of 3 (5)
3. brown algae (2)
4. mussels in clumps of 8 (15)
5. sea stars (to be added in lesson #3)

ZONE 3 : Intertidal B (pelagic only)

1. jellyfish (5)
2. rock fish (4)
3. sea lion (1)

ZONE 4 : Subtidal Zone

1. sea urchin (20)
2. sea cucumber (6)
3. red algae (4)
4. sea otters (to be added in lesson #3)
5. bull kelp (to be added in lesson #3)

Habitat Description of Mural Zones

Spray zone – low salinity, high temperature

Intertidal A – medium salinity, medium temperature, benthic or pelagic

Intertidal B – high salinity, medium temperature, pelagic only

Subtidal – high salinity, low temperature, benthic or pelagic

Science Activity/Experiment

Activity 1: Marine Critter Matching Game

Purpose of the activity: To familiarize the students with the mural organisms and review organism names in French.

Methods & Instructions:

Set-up prior to the activity:

- a) Print names of mural organisms onto separate sheets
- b) Print diagrams of mural organisms onto separate sheets
- c) Select the correct number of name-diagram pairs for your class
- d) Print the names of the 4 different mural zones, each on a separate sheet of paper, and post each zone in one of the classroom corners
- e) Create and print the organism fact sheets for each of the 16 mural species.



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- f) For example, for a sea anemone include a picture and habitat facts such as: medium salinity, medium temperature, benthic organism. From this information, the students can deduce it lives in ZONE 2: Intertidal A.

In-class instructions:

- a) Divide the class into 2 groups.
- b) Each student in Group 1 receives a picture of a marine plant or animal, each student in Group 2 receives a name of the corresponding marine plant or animal.
- c) Explain to students that they must find their partner with the matching name or picture
- d) After students have found their correct partner, the pair then determines which "habitat" their organism lives in by looking at the organism fact sheets. They move to the correct corner of the classroom with the name of their habitat.
- e) Once all the students are in the right corners, the student pairs take turns showing their diagram to the class and saying the name of their species.

Activity 2: Create Rocky Shoreline Mural

Purpose of the activity: To learn about BC rocky shore organisms and the concept of habitat preferences.

Methods & Instructions:

Set-up prior to the activity:

- a) Scientist designs the base mural and hangs in appropriate place, including labels for different zones and the temperature and salinity gradients. A size that works well is 55 inches high by 160 inches long.
- b) Design and print off outlines of all 16 mural species, with the appropriate number of copies for each species (see abundance given above). Ensure the relative size of the species corresponds well to their size in real life. This means some species must be hand drawn or printed on a special printer since the size will be so large (i.e. sea lion, bull kelp).
- c) Optional to cut out the organisms, or have the students do this.
- d) Prepare habitat fact sheets for each of the 16 mural species, with picture of real organisms so students can color the mural species in realistic shades.

In-class instructions

- e) Each student selects 3 individual organisms to color (or more or less depending on your class size and total number of organisms).
- f) Students use the fact sheets to help them select appropriate shades/patterns for coloring.
- g) Students paste their organisms onto the mural, using the fact sheets to help them determine the correct zone.

Closure Discussion

After all the 13 species (75 individuals) have been added, have the class admire their work! End with a discussion about how the pattern of community structure that they see on the mural was created by the habitat preferences of the component species.

References

1. Sheldon, I. 1998. Seashore of British Columbia. Lone Pine Publishing, Vancouver, BC, Canada.
2. Harbo, R.M. 1999. Whelks to Whales, Coastal marine life of the Pacific Northwest. Harbour Publishing, Madeira Park, BC, Canada.
3. Niesen, T.M. 1982. The Marine Biology Coloring Book. Coloring Concepts, Inc. Oakville, CA, USA.

ZONES

- ① SPRAY ZONE
- ② INTERTIDAL A (Benthic + pelagic)
- ③ INTERTIDAL B (Pelagic only)
- ④ SUBTIDAL ZONE

RIVER INPUT

