Science Unit: *Aquatic Ecosystems*
Lesson 8: *Seaweed Identification*

School Year:	2010/2011
Developed for:	Sir Guy Carleton Elementary School, Vancouver School District
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Grade level:	Presented to grades 4; appropriate for grades 2 – 7 with age appropriate modifications.
Duration of lesson:	2 hours
Notes:	This activity can be done before, after, or during a fieldtrip to the intertidal zone.

Objectives
By the end of this lessons students will be able to:

1. Identify a seaweed as green, red, or brown.
2. Identify the different parts of a seaweed.
3. Explain the different morphologies of seaweeds using appropriate terminology.
4. Use a biological key to identify a seaweed.
5. Explain the results of an experiment in terms of the hypothesis.

Background Information

This exercise not only familiarizes students with the photosynthetic organisms in the intertidal zone, but it also introduces them to taxonomy and classification of organisms. Many organisms live in the intertidal zone. Seaweeds can be broadly categorized based on colour: browns, greens, and reds. This is not always accurate as reds can range from greenish to black.

Dichotomous keys are used to identify organisms. Once the students are familiar with the structures and vocabulary they will identify seaweeds by using a key. It is like a puzzle. One chooses between two couplets (see page 4) until one arrives at the name of the organism.

Vocabulary

Blade:	Flattened part of a seaweed
Habitat:	Place where a plant or animal lives (its home).
Holdfast:	Base of a seaweed that attaches it to a rock
Intertidal Zone:	Area of shore between the highest and lowest tide levels.
Marine:	Of or from the sea, or for use on the sea
Seashore:	Where the land meets the sea
Seaweed:	Properly known as algae, plants which grow in the sea, and do not have true roots, stems or leaves.
Splash Zone:	Uppermost part of the beach, splashed by waves, but never covered by the sea.
Stipe:	Stalk of a seaweed between holdfast and blade
Tide:	The daily rise and fall of sea level along a shore

Materials:

- Large trays to view seaweeds
- Marine water – enough to fill the large trays below and float the seaweed. You can also use reconstituted salt water sold in aquarium shops
- Collection of seaweeds
- Seaweed Guide (Druehl or Sheldon, see references)

Collect algae from local rocky beaches. The best time to collect is at low tide (check tide tables: http://www.dairiki.org/tides/monthly.php/van). There is often good material in the drift that is left behind as the tide recedes.

Possible Algae to collect from the beaches around Vancouver:

Green:
Ulva – sea lettuce
Enteromorpha – green tubes

Browns:
Saccharina (formerly Laminaria)
Nereocystis (bull kelp) – with bulb
Fucus (rock weed) – with little bumps on swollen tips

Reds:
Filamentous (lots of different ones)
Sparlingia – (holey)
Mazaella – smooth blade (purplish)
Porphyra (nori) – thin brown
Cryptopleura – small lobed blade
Neoagardhiella (spaghetti)
Mastocarpus (small blades – bumpy when older)
Chondrocanthus (Turkish towel)
Palmaria – frilly red

Two trays (tanks) are set up for two different activities.
Activities can be done as one large group or in smaller groups.

In first tank:
Diversity Display: a selection of reds, greens, and browns
Students categorize the seaweeds based on:
(a) colour: red, brown , or green
(b) growth form: filamentous, bladed
(c) morphology/structure:
holdfast and blade (in reds and greens)
holdfast, stipe, blade (in browns)
Nereocystis (a brown) has a bulb for flotation

In Second tank:
- Use the dichotomous key on page 4 to identify at least one red, green, and brown

Class Observations:
As students investigate the algae they can write their observations such as textures and make labeled drawings.

Closure Discussion

1. How are seaweeds important in the ecosystem? They are primary producers so generate oxygen for other organisms. They serve as habitat and food.

2. The organisms in the intertidal zone are subject to drying out. How do these organisms overcome desiccation? (students will have noticed that they are slimy – they have polysaccharides that absorb and retain water)

3. Why is it important to be able to identify an organism?

References

1. Parker, Steve. 2004. Eyewitness Seashore. Dorling Kindersley. London.

2. Sheldon, Ian. 1998. Seashore of British Columbia. Lone Pine Publishing. Vancouver.

3. Druehl, Lious. 2001 Pacific Seaweeds. Harbour Publishing, Madeira Park, Canada

4. Lamb, Andy and Bernard Hanby. 2005 Marine Life of the Pacific Northwest: A Photographic Encyclopedia of Invertebrates, Seaweeds and Selected Fishes. Harbour Publishing, Madeira Park, Canada

Extension of Lesson Plan

1. Constructing a dichotomous key can be a fun exercise where students have a collection of items (animals, rocks, etc)

DICHOTOMOUS KEY TO THE SEAWEEDS OF VANCOUVER

1a Alga is green.....2
1b Alga is not green.....3

2a Green alga is a blade.....*Ulva* (sea lettuce)
2b Green alga is stringy..... *Enteromorpha*

3a Alga is brown.....4
3b Alga is red or with thin blade 6

4a Alga has stipe.....5
4b Alga with little bumps on swollen tips, no stipe..... *Fucus* (rock weed)

5a Alga has bulb..... *Nereocystis* (bull kelp)
5b Alga doesn't have bulb..... *Saccharina* (sugar kelp)

6a Alga has hard crusty exterior.....Coralline alga
6b Alga without hard crusty exterior.....7

7a Alga is not a blade..... 8
7b Alga is a blade..... 9

8a Alga is like spaghetti..... *Neoagardhiella* (spaghetti)
8b Alga is filamentous..... *Filamentous Red Algae*

9a Blade with many holes..... *Sparlingia*
9b Blade without holes..... 10

10a Blade very thin and purplish brown..... *Porphyra* (nori)
10b Blade red.....11

11a Blade large.....12
11b Blade small.....13

12a Blade smooth..... *Mazaella*
12b Blade bumpy..... *Chondrocanthus* (Turkish towel)

13a Blade dark and thick (sometimes bumpy)..... *Mastocarpus*
13b Blade pink.....14

13a Blade lobed..... *Cryptopleura*
13b Blade frilly..... *Palmaria*