**Limu and Coral Reefs**

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(Photograph: A. Napua Barrows)

**HCPS Science Standards Addressed:** 1.2, 2.3, 2.5 & 2.12

**Grade Level:** K–3

**Project Time Span:** 1–2 weeks

To the Teacher:

This lesson forms part of a larger unit that aims to help students learn about the area they live in. As a Hawaiian Studies resource teacher, I teach Hawai‘i Nei ("everything Hawaiian") to K–3 students at Waihe‘e school. My goal is to help our children relate to the Hawaiian culture and language. I encourage you to seek out na kupuna and use them as valuable resources. Find out what they know and how they can enrich your lessons. This will enhance learning, and will underscore the key role of the kupuna in disseminating knowledge of Hawaiian language and culture. Most importantly, let your school know that you value and respect the kupuna’s knowledge, and that you feel it is important for this knowledge to be passed down to the children.

Note: this lesson should follow a lesson on the water cycle.

**Goals of the Lesson:**

- To identify native and invasive *limu*, and a variety of Hawaiian marine life
- To become accustomed to hearing the Hawaiian language, and to learn a typical greeting
- To learn about our natural resources (what they are, why we value them, and how to conserve them)

**Student Learning Objectives (Benchmarks):**

This lesson addresses Grade K–3 benchmarks for HCPS Science Standards:

1.2 *Living the Values, Attitudes, and Commitments of the Inquiring Mind.*

Students apply the values, attitudes, and commitments characteristic of an inquiring mind.

- Ask “wondering” questions.
- Ask questions and describe the wonderings about the world around us.

2.3 *Mālama I Ka ‘Āina: Sustainability.* Students make decisions needed to sustain life on Earth now and for future generations by considering the limited resources and fragile environmental conditions.
Identify ways in which the natural resources can be conserved.

2.5 Interdependence. Students describe, analyze, and give examples of how organisms are dependent on one another and their environments.

- Identify and give examples of the various interactions within a local environment.

2.12 Learning and Human Behavior. Students explain what influences learning and human behavior.

- Explain how people can learn from each other by telling and listening, showing and watching, and imitating what others do.

Resources and Materials:

Resources
- Appendix 1: Uluwehi O Ke Kai (The Plants of the Sea)
  http://www.geocities.com/~olelo/s-kauluwehoikekai.html

Materials
- Posters of coral and limu
- coral pieces (cauliflower coral, lace coral, mushroom coral)
- native limu (maunawea, wai`wai`ole, limu kohu)
- invasive limu (acanthophora spicifera)
- wax paper, glue and card stock (for limu press)

Instructional Procedures:

A. Opening (Hawaiian protocol)
- Teacher: Hui. Aloha kakahiaka na haumana (Good morning students)
  (or) Hui. Aloha awakea na haumana (Good afternoon students)
- Teacher: Pehea kakou i kēia lā? (How are all of you today?)
- Students: Aloha kakahiaka maika`i no makou. Mahalo a ʻoe? (Good morning we are fine. Thank you for asking and how are you?)

B. Review previous lesson (on the water cycle), and tie in today's topic to what the students have already learned. Start today's lesson by asking:
- What are some examples of natural resources? [Fresh water, ocean, sun, plants, marine life, land]
- Where do natural resources come from? [They occur naturally.]
- How do natural resources play an important part in our lives? [We swim in the ocean, we need fresh water to drink, we need the sun to warm the Earth, fish need the ocean to live]
- Why do we need to conserve our natural resources? [So they don't run out, so the ocean stays clean]

Tying in what the students contributed, ask focused questions, such as:
• How do natural resources interact with each other? *[Plants need water and sun in order to grow; plants provide shade and food for people, etc.]*
• How can we take care of the natural resources upon which we depend? *[Don't throw rubbish because it ends up in the rivers and ocean; take only as much limu or fish as you need]*

C. Coral
• Show the students a poster of coral reefs, and have them identify the marine life, such as:
  
<table>
<thead>
<tr>
<th>Coral Life</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>a`ama</td>
<td>crab</td>
</tr>
<tr>
<td><code>ako</code>ako</td>
<td>coral</td>
</tr>
<tr>
<td>he`e</td>
<td>octopus</td>
</tr>
<tr>
<td>kala</td>
<td>surgeonfish</td>
</tr>
<tr>
<td>kikakapu</td>
<td>butterfly fish</td>
</tr>
<tr>
<td>limu</td>
<td>seaweed or algae</td>
</tr>
<tr>
<td>oipihi</td>
<td>limpet</td>
</tr>
<tr>
<td>puhi</td>
<td>eel</td>
</tr>
<tr>
<td>`ula</td>
<td>lobster</td>
</tr>
<tr>
<td>wana</td>
<td>urchin</td>
</tr>
</tbody>
</table>

• Share coral samples with students. Have them touch the coral, share what they know, and ask wondering questions. Explain how most of the beach sand on Maui (and Hawai`i in general) comes from broken down coral.
• Share some of the interactions that occur in a coral reef ecosystem. For example, coral reefs protect our island and provide food and habitat for marine life, which, in turn, get eaten by us. We also use the coral directly (medicine, cosmetics, jewelry).
• Ask students how people damage coral reef, and what do people need to know to protect the reef *[that pollution, run-off, over-harvesting, dropping anchors and dragging them across the reef damages the coral]*

D. Limu
• Show the students a poster of native and invasive limu.
• Share limu samples with students. Have them touch the limu, eat it, share what they know about limu and ask wondering questions.
• Ask the students where they have seen native and invasive limu. *[Native limu is found at Waihe`e. Invasive limu is found at Kahului harbor, Kihei, Lahaina]*
• Share some of the interactions that occur with limu:
  o Native limu (such as maunawea, wai`wai`ole and limu kohu) provides food for people, and provides food and habitat for marine life. It also has important uses as medicine and in cultural ceremonies. Limu needs fresh water, lots of nutrients, some wave action and low salinity to thrive. If the limu does not have these conditions, it will start to become depleted. If we allow pollution, run-off and overpicking to occur, these conditions will also deplete
the native *limu*, which can have serious knock-on effects on the environment (loss of habitat for benthic marine life, less food for fish (*kala*), etc.). Native *limu* is scarce in Waihe‘e, due to all of the conditions mentioned above.

- Alien, invasive *limu* (such as acanthophora spicifera) is not from Hawai‘i. It came here on the hulls of ships; some was also intentionally brought in. They flourish under Hawaiian conditions, so they take over the habitat and threaten our native species to extinction.

- Teach students how to press *limu* and make a card
  - Take a piece of wax paper (about 8" x 10") and fold it in half.
  - Insert a piece of *limu*; pat it dry with a paper towel.
  - Put this folded wax paper (with the *limu* inside) between the pages of a telephone book. Weigh down with other heavy books. Leave overnight.
  - During the next class period, glue the pressed *limu* and some coral sand to card stock. Write the correct name of the *limu* species. Later, they will use this card for special occasions.

E. Teacher and students sing a song about *limu* (*Uluwehi O Ke Kai* by Edith Kanaka‘ole; see Appendix 1), and learn to dance to it. If you don’t know the song or dance, seek out *na kupuna*.

F. Sharing with their families
- For homework, students will be asked to share with their families what they learned in class today. They will ask their parents what they know about *limu*, how they prepare *limu* and where they harvest *limu*.

G. Closing (Hawaiian protocol)
- Teacher: *Mahalo. Aloha a hui hou e na haumana.*
  (Thank you. Good bye until we meet again, students)
- Student: *Mahalo. Aloha a hui hou e ke Kupuna.*
  (Thank you. Good bye until we meet again, teacher)

Assessment:
- Students will orally identify the names of *limu* and marine life.
- Students will draw a picture using all the natural resources, and showing how they interact.
- Students’ knowledge of Hawaiian will be assessed through participation in the opening protocol, knowledge of vocabulary words of marine life and the *limu* song.

Extension:
- Teachers are encouraged to become involved with *limu* restoration. Experts at Waihe‘e or Ewa Beach *limu* restoration project can teach you how to make *limu lei*, and how to plant them to help restore native *limu*. 
This would be a great field trip! Contact A. Napua Barrows at abarrows@hawaii.edu for information.

Evaluation of Lesson:

- At the next class, I will ask students what they shared with their families about this lesson and how their parents responded. This will tell me if the lesson was successful.
Appendix 1: Ka Uluwehi O Ke Kai (The Plants of the Sea)

Written and translated by Edith Kanaka`ole, from her LP: Hi`ipoi I Ka `Āina Aloha
(http://www.geocities.com/~olelo/s-kauluwehiokekai.html)

He ho`oheno ke `ike aku
Such a delight it is to see
Ke kai moana nui la
The great big ocean
Nui ke aloha e hi`ipoi nei
So familiar and very cherished
Me ke `ala o ka līpoa
With the fragrance of the līpoa

He līpoa i pae i ke one
It is līpoa which washes ashore
Ke one hinuhinu la
Onto the shiny white sand
Wela i ka lā ke hehi `a`e
Hot from the heating sun as you step on it
Mai mana`o he pono kēia!
Don't think that this is fun!

Ho`okohukohu e ka limu kohu
How enticing is the display of limu kohu
Ke kau i luna ō nā moku la
Atop the rocks in the ocean
`O la maku `ula la e hō
Enticing one to pick them
`Oni ana i `ōi `anei
As they sway to and fro

Ha`ina mai puana
Let the story be told
Ka līpoa me ka limu kohu
If the līpoa and the limu kohu
Hoapili `oe me ka pāhe`e
Close companions of the pāhe`e
`Ānoni me ke līpalu
Intermingled with the līpalu