

'Ewa 'Āina Education Initiative

Unit Plan: Restoring Coastal Ecosystems
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 'Ewa 'Āina Site: One'ula Beach, 'Ewa Limu Hui
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Curriculum Planning Menu

Hawaiian Culture-Based Lens	Cross Cutting Content	Instructional Design
<ul style="list-style-type: none"> • Pilina Kaiāulu: Community Integration informed by a Hawaiian sense of place • Mālama 'Āina: Land stewardship focusing on sustainability and a familiar connection • Kōkua Kaiāulu: Community giveback embodying a core Hawaiian value 	<ul style="list-style-type: none"> • 'Ōlelo Hawai'i • Human Interaction/Impacts • Networked systems - finding or creating connections 	<ul style="list-style-type: none"> • Design Engineering • Historical Inquiry • Debate/Perspective • Stewardship - Sustainability • Oral Presentation • Peer/'Ohana/Community Education-Action • Original Art/Graphic Design

Essential Questions

- 1) Why are coastal ecosystems important and what factors make coastal ecosystems dynamic?
 - Identify the importance of coastal ecosystems and explain why they are always changing.
- 2) What is the importance of various native aquatic and terrestrial producers in the One'ula aquatic and coastal ecosystem?
 - Describe the cultural and ecological significance of various aquatic and terrestrial producers in the 'Ewa O'ahu aquatic and coastal ecosystem
- 3) How have humans impacted the biodiversity in the One'ula area?
 - Identify and explain the anthropogenic impacts that have altered the biodiversity in the One'ula area

Target grade: 10th- 12th

Target subject: Plants and Animals of Hawai'i

Background Information

See 'Ewa Limu Project Background Information - <https://cutt.ly/EKPjLeJ>

- Coastal ecosystems possess a high amount of native plants and animals. This ecosystem serves as a transition and the literal connection of the land and ocean. It embodies the land/sea or mauka/ makai connection which has become an idiom in our local language.
- The plants in this ecosystem have unique adaptations to survive in a harsh environment that is characterized by strong winds, intense sunlight, high salt content in the air and water, and substrate that doesn't hold a lot of organic material or water. These selection pressures lead to common adaptations in these plants- hearty/thick leaves, waxy cuticles, growing close to the ground, white/gray trichomes on the leaves.
- This ecosystem is heavily threatened by human activity. Urbanization has led to the degradation of this habitat. Most of Oahu's coastal ecosystems have been lost and replaced with artificial structures like waste from construction projects, homes, roads, and man made beaches. (Map Exploration Activity) ([Wolanski 2009: http://archive.hokulea.com/pdfs/Wolanski,%20Martinez%20and%20Richmond%20ECSS%202009.pdf](http://archive.hokulea.com/pdfs/Wolanski,%20Martinez%20and%20Richmond%20ECSS%202009.pdf))
- Three coastal ecosystems in Leeward O`ahu: Ka`ena Point Natural Area Reserve (NAR), Piliokahe beach, and One`ula beach still stand, and represent coastal areas of varying protection/stewardship. Ka`ena Point is a heavily regulated and protected State NAR, Piliokahe is a popular beach and surf area that is cared for in part by community volunteers, and One`ula is currently being developed with the addition of new homes and a resort. Investigating and comparing these areas will allow students to formulate ideas about land use in their communities.
- Limu (marine algae) populations in the adjacent waters in the One`ula area have been dynamic. In the 80s-90s and early 2000s One`ula had a dominant limu population of differing species that was so thick that sometimes you could not even swim in the water. During low tide, limu would cover the intertidal regions and many fishermen have used the limu collected here to capture specific reef fish. At times, the limu was so plentiful that the area would smell as the beached limu would bake in the hot sun. However, the limu population has dramatically been reduced. Different reasons are proposed, with the general consensus being that the manipulation of the freshwater inputs has caused there to be less limu since limu thrives when there is a freshwater input. The likely culprit is the adjacent development which may have capped and diverted freshwater sources. Coastal plants may help the limu population because it can stabilize the sand and prevent the sand from eroding and ultimately shading whatever limu remains at One`ula (Ito, KUA Hawai'i: [`Ewa Limu Project: http://kuahawaii.org/limu-hui/](http://kuahawaii.org/limu-hui/))

Locations

- Ka`ena point is in the Kae`na and Keawa `ula ahupua`a of the Wai`anae and Waialua moku
- Piliokahe is located in the Nānākuli ahupua`a of the Wai`anae moku
- One`ula is in the Honouliuli ahupua`a of the `Ewa moku

Plant Names

- Terrestrial: `Ohai, Ma`o, Naupaka, Naio, `Akoko, Pā`ū o Hi`iaka, `Ohai, Pōhinahina, Pōhuehue, `Ilima, `Ākulikuli, `Aki `aki, Kauna`oa
- Aquatic: Limu `ele`ele, Limu kala, Limu koele, Limu a kohu, Limu huluhulu waena, Limu hina, Limu lipoa, Limu loloa, Limu manauea, Limu palahalaha, Limu wawae`iole, Pakaiea

Sequential Unit Plan Lesson Outline	
Lesson Title	Time Estimate in Hours
<p>Ka `ano nui o makālae kaiaola (The importance of Coastal Ecosystems)</p> <p>Students will learn about various coastal ecosystems on O`ahu, beginning with Ka`ena point, Piliokahe, and finally One`ula. They will look at the Oahu's coastal ecosystems and observe how many of them have been developed, and they will take a closer look at the</p>	<p>2 hours</p>

<p>ecology of a protected coastal ecosystem (Ka`ena Point). Each site represents varying degrees of protection, with Ka`ena being a NAR or Natural Area Reserve, Piliokahe with pockets of restoration by community volunteers, and One`ula which is in jeopardy of being destroyed by proposed development plans for that area.</p>	
<p>Coastal Plants of Hawai`i Students will learn about different coastal plants in Hawai`i. They will investigate the adaptations that allow those plants to survive on coastal ecosystems, and also will use images to practice kilo, where they will extrapolate why these coastal plants are very important for the reef ecosystems. Plants include but are not limited to: `Ohai, `aki `aki grass, pōhuehue, pā`ū o Hi`iaka, naupaka, pōhinahina, `ākulikuli, etc.</p> <p>If possible, students will grow plants (such as in a school nursery), learn about a specific one, draw it, and share it out with the rest of the class</p>	<p>3 hours</p>
<p>One`ula: Past Present and Future Students learn about limu (marine algae/seaweed) and how it was once more prevalent in Hawai`i. They will engage in learning about One`ula coastal ecosystem on site with leaders from the KUA: `Ewa Limu Project. Through a hands-on experience where students press limu of different varieties, students will learn about the history and current threats to the One`ula coastal ecosystem. In class, students will use what they learned to communicate the problems, and propose possible solutions to helping this ecosystem.</p>	<p>4 hours (4 hour site visit, 2 hours class)</p>
	<p>About 2 weeks Total</p>

<p>Unit Assessment Plan</p>
<p>Formative Assessment Methods Used On a Regular Basis Throughout Unit</p> <ul style="list-style-type: none"> ● Interactive notebook ● Plant drawing/presentations ● Cooperative joint lectures ● Flipgrid self reflections <p>Formative Assessment Methods Used On a Regular Basis Throughout Unit</p> <ul style="list-style-type: none"> ● Interactive notebook ● Plant drawing/presentations - https://cutt.ly/HKIRKqp ● Cooperative joint lectures ● Flipgrid self reflections
<p>Summative Assessments</p> <p>Coastal Plant Poster Presentation - Students create a digital poster on Google Slides/ Canva/ Adobe Photoshop or similar program. Each student is assigned a plant that they will research and create an infographic on. They will then present that poster to the class. While their classmates present, students will create flashcards for the different plants.</p>

Jamboard Presentations - In small groups, students will discuss, plan, compile, illustrate, and propose a potential solution to protect and conserve the One'ula coastal ecosystem. While the groups present, students will practice academic discourse, listening and questioning the speakers so that their ideas can be revised and polished. Members from KUA may be invited to view these presentations in person or virtually.

Coastal Ecosystems Quiz

Students will complete a quiz about the coastal ecosystem.