

## LESSON TITLE

# Loko I‘a: Hawaiian Fishponds, 800 Years of Engineering for Sustainability

## LESSON OVERVIEW

In this lesson students will learn about the different types of fishponds and how traditional engineering can serve as a model for modern sustainability. There are three parts to the lesson:

- **BEFORE THE EXPEDITION:** Students will imagine how a 100 acre fish pond could be built without modern tools.
- **DURING THE EXPEDITION:** Students will make connections between what they imagined and what they are actually seeing during the virtual tour.
- **AFTER THE EXPEDITION:** Students will conduct research on different types of fishponds and create a Tour Builder connecting the different types of ponds to actual pond locations throughout Hawaii.

Students will have a chance to publish their Tour Builder publicly to serve as a resource for the community.

## LESSON BACKGROUND

**Grade(s):** 4 and up

**Subject(s):** ELA, Social Studies, Science

**Number of Students:** Whole class

**Objectives:** For students to create an original resource for others to learn about the ingenuity of Hawaiian fishponds and engineering in traditional cultures, and understand the differences and similarities between the types.

**Vocabulary:** N/A

**Place in Unit of Study:** Beginning / Middle / End

**Grouping:** Whole Class / Small Group

**Google Apps Used:** Google Slides, Google Search, Google Expeditions, Google Tour Builder

## STANDARDS ADDRESSED

### CCSS Anchor Standards

### CCSS ELA Capacities

### ISTE Standards for Students

#### Reading

[CCSS.ELA-LITERACY.CCRA.R.1](#)  
[CCSS.ELA-LITERACY.CCRA.R.2](#)  
[CCSS.ELA-LITERACY.CCRA.R.7](#)

#### Writing

[CCSS.ELA-LITERACY.CCRA.W.2](#)  
[CCSS.ELA-LITERACY.CCRA.W.3](#)  
[CCSS.ELA-LITERACY.CCRA.W.4](#)  
[CCSS.ELA-LITERACY.CCRA.W.5](#)  
[CCSS.ELA-LITERACY.CCRA.W.6](#)  
[CCSS.ELA-LITERACY.CCRA.W.7](#)  
[CCSS.ELA-LITERACY.CCRA.W.8](#)

#### Speaking & Listening

[CCSS.ELA-LITERACY.CCRA.SL.1](#)  
[CCSS.ELA-LITERACY.CCRA.SL.2](#)  
[CCSS.ELA-LITERACY.CCRA.SL.3](#)  
[CCSS.ELA-LITERACY.CCRA.SL.4](#)  
[CCSS.ELA-LITERACY.CCRA.SL.5](#)

[They build strong content knowledge.](#)

[They respond to the varying demands of audience, task, purpose and discipline.](#)

[They comprehend as well as critique.](#)

[They value evidence.](#)

[They use technology and digital media strategically and capably.](#)

[They come to understand other perspectives and cultures.](#)

[Empowered Learner A, C, D](#)

[Digital Citizen C](#)

[Knowledge Constructor A, B, C](#)

[Creative Communicator A, B, C, D](#)

[Global Collaborator A, B, C](#)

## EXPEDITION PREP

**Selected Expedition:** Loko I'a: Native Hawaiian Fishpond

**Selected Points of Interest:** All

**Additional videos / resources:** [www.lokoea.org](http://www.lokoea.org), [Project Kāhea Loko](#), [Pani Ka Puka](#), [kuahawaii.org/huimalamalokoia/](http://kuahawaii.org/huimalamalokoia/)

## BEFORE THE EXPEDITION

Discussion Questions & Student Activity (*How are students building background knowledge to prepare for the expedition?*)

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### Imagining Life in a Subsistence Society

In this activity students will start imagining what life would be like in a traditional subsistence society - where everything you eat, wear, and use is harvested and made by hand from the tools provided to you in nature. Specifically, students will be thinking about how a hundred-acre fishpond could be built without modern materials. Before the Expedition, have students break into groups of 3 or 4. Share a Google Slide with the entire class and make sure everyone has editing privileges. The first page should include a [photograph of a Hawaiian fishpond](#), so the students can see what it is. You can make a copy of the sample presentation by clicking the icon on the right.



**Step 1:** Tell students they are going to go on a tour of a real Hawaiian fishpond, which was once the primary source of fish and seaweed in the Hawaiian diet - it is often referred to as the “refrigerator” of Old Hawai‘i. One healthy fishpond can feed hundreds of people year-round, and were first built almost a thousand years ago, without the aid of modern materials such as concrete or bulldozers. This is different than ocean fishing, where catching fish is subject to weather and other environmental conditions. Ask them to work together to come up with ideas of what kind of materials and systems might have been used to build and maintain these gigantic fishponds in Hawaii. On their designated slide, have groups record the questions they brainstormed.

**Step 2:** Have groups take turns presenting their questions to the rest of the class. Teachers should try and redirect group questions back to the class to see what some possible answers could be. A possible discussion might sound like:

**Student from Group 2:** *Our group wants to know how the water didn’t get stagnant or rotten if everything gets trapped in the fishpond?*

**Teacher:** *David, what do you think kept the water from getting stagnant?*

**David:** *I think it probably had something to do with being close to the ocean and streams, where the water could keep flowing in and out. And the holes in the wall because the rocks are stacked but there’s no cement to bind it all together and close the holes. But then, how did it stay together when the waves came in?*

Once students have had a chance to imagine how a Hawaiian fishpond could have been built and maintained, it is time to lead them through a tour of the Loko I‘a: Hawaiian Fishpond expedition.

## **DURING THE EXPEDITION**

Discussion Questions & Student Activity (*How are students recording and processing what they learn from the expedition?*):

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### **Connecting Imagination to Reality**

The Loko I‘a Expedition has questions and content embedded within each panorama. The teacher should look for opportunities within the Expedition to answer some of the student questions from the first exercise. A possible discussion might sound like:

*The class is touring the areas surrounding Big Pond and see the wall, ditches and gates that lead from the ocean to the pond.*

**Teacher:** *Group 2, now that you have seen the wall of Big Pond, does that help to answer your question?*

**Student from Group 2:** *Yes! The auwai kai lets new ocean water come into the pond, and the streams bring new fresh water to the pond. The new water mixes with the old to help the pond remain healthy. But we still don’t understand how the walls keep their shape if there is no cement to hold it all together, especially when the waves come crashing in!*

As students begin to find answers to their questions the teacher should pause the Expedition to give them time to fill in the answers on the shared Slide deck. While not all questions will be answered they should have enough to understand how fishponds are built, used and maintained.

## AFTER THE EXPEDITION

Discussion Questions & Student Activity (*How are students synthesizing and analyzing what they learn from the expedition?*):

### What kind of fishpond works best?

Explain to students that Hawai'i fishponds are unique in all the world, and there are 6 different types of Hawaiian fishponds. Have students conduct research to identify the 6 types of fishponds, including which ones were built and used in which kinds of environments, and research where examples of each type of pond were actually found in the islands. You can make a copy of a sample of what that research might yield by clicking the icon on the right.



Students will leverage the basic structure of the 21st Century Literacy Cycle to complete this project.



### Research

During this phase students will start researching the 6 different types of Hawaiian fishponds. It is important they make connections between what they learned by touring the Loko Ea Fishpond to think about unique features of fishponds in different environments. Students should read easier articles [like this one](#), or more scholarly publications [like this one](#) to find out more about why and how Hawaiian fishponds were built and functioned. Videos such as [this one](#) can help students get a feel for what it takes to build and maintain a fishpond, hundreds of years after it is originally built.

### Plan

During this phase, students will plan how they will represent this knowledge in a way that answers the big question: "What kind of fishpond works best, and why?". Students will need to consider how the explanations related to environmental conditions (proximity to ocean, proximity to streams or springs, proximity to reef or bays) can best be conveyed to an audience.

Tour Builder is an effective tool for students to create a way to show others where each type of pond can be found, include descriptions of what unique environmental features made this the best pond for this location, such as proximity to shorelines and streams for different kinds of farming. You can access a sample of a Hawaiian Fishpond Tour Builder by clicking the icon to the right.

Tour  Builder

### Write

Once they have organized their research findings, they can begin writing the content for their Tour Builder. Even if students collaborated on the research, they should work independently as they write. Students should create their own Google Doc so they can share during the Peer Review stage of the cycle.

To get students thinking about how to craft their narrative they can use the [6 + 1 Writing Traits](#) to guide them. Using these as a guide will help them in both the Writing and the Peer Review stages because it provides them a lens from which to critique other student work. Teachers can also use the [6 + 1 Writing Traits Rubric](#) to assess student work at the end of the Cycle.

### *Peer Review*

Once students have written their first drafts they can share them with another student to engage in the Peer Review process. Peer Review will not only help improve the quality of writing for the student being reviewed but it will also help the reviewer to assess their own writing in the context of the other student's.

Students can use the Insert Comment feature in Google Docs to leave their thoughts and recommendations about how to improve the narrative. Remind students to think about the 6 + 1 Writing Traits as they review. When they are finished give students time to reflect on the comments in their documents and to make the corrections and improvements to their letters.

### *Publish*

The act of making student work public inherently improves the quality of work. There are a number of ways students can publish their letters using Google tools. Some ideas include but are not limited to:

- Post the Hawaiian Fishpond Tour Builder to a student or class Site or Blog
- Create videos about fishponds and subsistence living, using the information they gathered about fishponds as voice-over. The teacher can then publish to YouTube.

Another creative way to share the information gathered is to have students build a demonstration model of a fishpond or several types of fishponds, and share their Tour Builder or narrative as part of a public display.

### **Publishing to the Hawaii Expeditions Student Gallery**

Have some cool student projects you want to share? We would love to see them! As more and more students use Expeditions and these lesson plans we will be building a Student Gallery where students can have their work published for the world to appreciate. Just click on the Google Form to the right and send us a link!



**NOTE:** The Form has information on how to protect student privacy so you can share their work safely and appropriately.

Find more Expeditions lessons at [www.moonshotincubator.com/expeditions](http://www.moonshotincubator.com/expeditions).