

Lesson 5: Lālākea Stream: Diversion and Restoration

Overall problem: To determine the impact of restoration of the Lālākea stream on stream flow, water quality, habitat and biota.

Lesson Context: Students learn the geography and history of Lālākea stream, including its diversion and restoration. They connect this historic event of full stream restoration as key to the overall scientific problem that they are studying. They gain an understanding of the multiple viewpoints and considerations that surround the significant decision of the Kamehameha Schools landowner to restore the stream's flow.

Time Frame: 1 class period

Objectives:

Student will be able to:

1. Locate and identify the key features of Lālākea Stream and diversion system.
2. Represent a particular viewpoint of an historical issue and understand how perspective affects interpretation of events and issues.
3. Create a presentation based on historical, cultural and scientific readings.
4. Identify the values and ethics that are at the heart of decisions about water use.

Procedure:

1. Ask students to locate Waipi'o Valley and Lālākea Stream on a map of the Big Island. If the map shows it, trace the stream from its origin to the sea.
2. Ask the student teams to go to the topographical map showing Lālākea Stream ("**TOPOZONE**") on the Student Resources page of the website. [link]
3. Ask the student teams to print out the map and then label the following features:
 - a. the *headwaters*, *estuary* and *mouth* of Lālākea stream
 - b. Hakalaoa Stream, which also runs over the falls
 - c. the outer boundaries of Waipi'o Valley (not marked on map)
 - d. the twin falls at the head of the valley
 - e. Hi'ilawe Stream, which is the continuation of Lālākea Stream in the valley
 - f. the three diversion dams, Lālākea ditch, and Lālākea reservoir
4. Ask the students to read the following brief history of the construction and use of the **Lālākea ditch system** (found under student resources):

The Lālākea Stream was used to irrigate sugar plantations in the Hamakua district above Waipi'o Valley . Hamakua Sugar was one of the last remaining sugar plantations. It had operated over 35,000 acres of cane land in the Hāmākua district of the northeast of Hawai'i island. It had become the largest sugar plantation in Hawai'i after forming in 1979 from a merger of two plantations. The company had

irrigated its sugar using the Lower Hāmākua Ditch system (which had opened in 1910) and the Lālākea Reservoir, built in 1920, which contained water that came from diversions of three streams: Lālākea Stream, Hakalaoa Stream, and a small tributary between the two. Water traveled from these diversions by tunnel to the reservoir.

5. Ask the students to pretend that it is **1998 and read the following scenario** (download file from student resources):

The year is 1998. Five years ago, in 1993, the Hamakua Sugar Company went bankrupt and shut down. A year later, Kamehameha Schools/Bishop Estate purchased the property that had belonged to Hamakua Sugar. This included the ditch system and Lālākea Reservoir which had been used to divert water from the stream to irrigate the thousands of acres of cane fields. Now that it is no longer necessary to irrigate the cane fields, others are claiming a need for the water. Taro farmers in the valley and small-scale farmers on the “upside” (above the valley) are claiming to need the water. Some say the diversion should be removed so that the stream can flow its natural course. Others feel that the diversion should be kept in place to provide water to new farming and aquaculture efforts near the reservoir. A complaint has been filed with the government by a community group of farmers in Waipi’o Valley claiming that the water is being wasted.

What should be done about the Lālākea stream and its diversion system?

NOTE: Both readings are found in the **Student Resources** page of the Stream Study Website.

6. Divide the students into teams and have each team assume a role, selecting from the following:
 - a. Taro farmer in Waipi’o Valley
 - b. A conservation biologist (a scientist working to conserve native ecosystems)
 - c. A farmer (small crop, not sugar) whose land is in the Hamakua uplands near the reservoir and depends on the ditch system for water
 - d. A *kupuna* whose genealogy traces back to Waipi’o Valley
 - e. An o’opu (native stream fish)
 - f. A retired executive from Hamakua Sugar Company
7. Ask students to imagine that, playing the role, they have been invited to present their viewpoint about the future of the Lālākea stream and diversion to a panel of officials from the State Water Commission. This is their chance to convince the authorities of the best course of action *in their opinion*.

Student teams work together to answer the questions listed below (found as “**Water Commission Presentation**” under student resources. The answers are formulated from the same readings as were used in Lesson 4. The team then develops a 5-10 minute presentation using creative formats (chants, poems, stories, powerpoint, legal argument, debate style, tv commercial) to persuade the panel of their recommendation.

What do you think should happen to Lālākea stream in the future? Should it be restored to its natural flow by removing the diversion? Why or why not?

How would you benefit by the action that you suggest? How would others benefit?

What would be the problems if another course of action is taken?
What history, knowledge or facts can you present to support your suggestion?

8. Ask the students to read two articles that tell the “real life” story of the Kamehameha Schools’ decision to restore Lālākea stream. They can be found on the Teacher Resource page
 - a. **Stream Restoration Announcement** *The story is excerpted from an article in “Environment Hawaii”, Vol. 12 No. 10 April 2002. It can be found on the Student Resources page of the Stream Study Website.*
 - b. **Stream Restoration Newspaper Article**
9. Ask one student to dramatically read aloud the statements made by Manabu Tagomori and Neil Hannahs of Kamehameha Schools land division to the State Water Commission. It can be found on the **Teacher Resources** page.

Manabu Tagamori:

“We have before you today, testimony that departs from all our actions that we have done up to date ... Kamehameha Schools will abandon its use of the Lālākea ditch diversions immediately. [The decision is based] upon Kamehameha Schools’ new vision, mission, guiding principles, goals and priorities of the [Strategic Plan]. KS has concluded that from the economic, education, cultural, environmental, and community perspective, the closure of the Lālākea Ditch system best serves the long-term interest of Kamehameha Schools.

Neil Hannahs:

“Our goal is to malama i ka ‘aina. This came from our stakeholders. What it means to them, and to us, is we need to target seeking a balance of return – involving environmental, cultural, economic and community considerations And those are mythological falls. They’re very important in our culture. Our desire to see those falls running again, flowing again, is in keeping with our culture and the cultural practices that occur in the valley.”

10. Ask the students to share their own feelings about the stream restoration decision.