Reading Activities for
“Water Power in Hawai‘i: Wai”

1. **Group Read & Share** – in small groups read aloud one section of these pages:
   - Group A – read page 1 & 2 (1st 4 paragraphs)
   - Group B – read page 2 & 3 (middle 3 paragraphs)
   - Group C – read page 4 (last 4 paragraphs)

   After reading aloud, talk about your reading and prepare to share your reactions, questions and information with the class:
   a) give a synopsis of main ideas in your paragraphs
   b) share personal stories or reactions the reading brought to mind
   c) state new vocabulary &/or concepts found in the reading and their meanings
   d) pose at least 2 interesting questions for the class to consider related to the reading

2. **Class Discussion** – as each group shares their reading responses with the whole class, listen carefully (you may take notes as well) to prepare for the next activity, a debate on water rights. Try to see the issue from many different perspectives, and prepare to debate from any of these points of view.

3. **Class Debate** – Water rights has been a contentious issue in Hawai‘i for over 100 years. Continue the class discussion by examining possible solutions to either the Waiāhole Irrigation System issue or a similar water rights issue in your community. You and a partner will be randomly assigned one of the following positions to debate from:
   a) a Hawaiian cultural expert who holds traditional values & beliefs about fresh water use
   b) a lo‘i farmer who needs fresh water for his crops
   c) a real estate developer who wants to build more housing for local families
   d) an environmentalist who wants to protect fresh water habitats
   e) a business representative whose golf course & resort provides jobs and income from tourists to Hawaii’s economy
   f) a law professor who believes the state must manage natural resources responsibly for all public interests

   Conduct your debates and allow the class to decide on the winner.

4. **Wrap Up** – write a paragraph to summarize important things learned today.
Water Power in Hawai‘i: Wai

The earliest settlements now known in Hawai‘i are on the northeast side of the island of O‘ahu. The oldest site excavated — its earliest parts dated between 300 and 600 A.D. — lies along this windward coast on land now occupied by Bellows Air Force Base. The first Hawaiians preferred locations like this which furnished ample water for their crops and other uses. Recently uncovered walls of lo‘i (pondfields) indicate that wetland kalo was grown on lands mauka (toward the mountains) of Kawainui.

Kapahu Farm, East Maui

At a site in Hanalei Valley, Kaua‘i, that has been dated to approximately 610 A.D., archaeologists have uncovered the first known instance of lo‘i fed by an ‘auwai (irrigation ditch). This irrigation method became extremely important in later years as the population grew and spread throughout the islands. ‘Auwai ranged from simple to elaborate in construction, but all shared a basic design: at the head of the ditch, water was diverted
into the ‘auwai from springs, streams, or pools and was led down the lo‘i very gradually, with the result that the water moved slowly and its passage did a minimum of erosive damage. The ‘auwai were lined with carefully fitted rock, at least near their heads, and were routinely maintained in order to prevent soil and debris from filling the ditch and impeding the flow of water.

The engineering of the ‘auwai was excellent. With only the simplest tools, Hawaiians modified natural stream flows and devised new routes that systematically exploited the slope of the terrain to carry water into their fields with great efficiency. These aqueducts, some of them very elaborate, are considered the finest in the Pacific islands. So well designed were they that later, when Western engineers planned irrigation flumes for commercial sugarcane production, they often followed these channels laid out by the Hawaiians of old.

Though ‘auwai were principally for irrigation, they also served to furnish water to some house sites. Since water belonged to the gods and was therefore valued beyond human terms, no one could claim its ownership or rights to its sole use. There are few records of quarrels over water use until foreigners came, bringing with them different concepts of water rights.

Engineering Waiāhole Ditch & Tunnel System

The first sugar cane irrigation ditch (the Rice Ditch) was built on Kaua‘i in the mid-1850s. In 1905, the first engineer was commissioned to investigate the feasibility of developing water in the Ko‘olau Range on O‘ahu, but it took until 1913 to venture such monumental construction by the newly formed Waiāhole Water Company. When completed a little more than 3 years later, the system included a large number of tunnels ranging in length from 280 feet to the 2.76-mile long main trans-Ko‘olau tunnel.

Excavation in those days was far from predictable. Access road and trail construction in the rugged terrain was especially difficult and the workers had to contend with voluminous flows of water as the first dike was pierced. Initially, supplies had to be moved by mule but eventually a 10-mile railroad and ocean pier made the task more efficient.
Waiāhole Ditch & Tunnel System Today


Agribusiness Development Corporation’s **water systems manager**, Vernon Pico supervises a crew of five who maintain the Waiāhole Irrigation System. After graduating from Campbell High School in Ewa, Pico furthered his education at Leeward Community College in a carpenter apprentice program. He started work as a carpenter making repairs to the system, then was promoted to his current position.

July 30, 2007 - Waterflow along the Waiāhole Irrigation System is controlled partially by a series of gates. Earlier this month, Gate No. 31, located in a tunnel drilled on the Windward side of the Ko’olau range, was not responding to phone commands, so water systems manager Vernon Pico had to trek up to the site and manually open the gate to let more water go through. Pico’s vast worksite is shown in the graphic below.

**Photo by DENNIS ODA / DODA@STARBULLETIN.COM**

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Waiāhole Water Rights Issues

Hawaiian taro farmers, Daniel Bishop & Charles Reppun (left) as well as attorney Kapua Sproat (right) have active interest in where Waiāhole water goes

Photos by Bruce Asato, The Honolulu Advertiser & www.earthjustice.org/about_us/offices_staff

Nearly a century ago, water vital to taro farmers, streams, and the estuary on O'ahu's east side was diverted to sugar plantations. The plantations are gone now, and Earthjustice represents farmers and Native Hawaiians in an effort to restore the water to where it belongs.

The Waiāhole case arose from the efforts of small family farmers and Native Hawaiians, led by citizen groups (Hakipu'u 'Ohana, Ka Lahui Hawai'i, Kahalu'u Neighborhood Board, Makawai Stream Restoration Alliance) and a coalition of supporters to restore streams originally diverted by Central O'ahu sugar plantations. O'ahu Sugar’s 1993 announcement of its closure in 1995 sparked a monumental legal battle over the diverted water -- in the words of the Hawai'i Supreme Court, a case of "unprecedented size, duration, and complexity."

The windward parties sought to: return diverted flows to the streams to restore native stream life, such as ʻoʻopu, ʻōpae and hīhīwai; protect traditional and customary Native Hawaiian practices; support the productivity of the Kaneʻohe Bay estuary; and preserve traditional small family farming, including taro cultivation. But large scale agricultural and development interests, including Campbell Estate, Robinson Estate, Kamehameha Schools, Dole/Castle and Cooke, and others, joined by the State, pushed to continue the flow of Windward water to leeward lands to subsidize golf course irrigation, short-term corporate agriculture, and housing development.

This debate is likely to arise again as demands for Waiāhole water increases on both sides of the island.