



Unit 4

Biological Community Awareness

Loko ʻĀ – Fishponds

Just about every culture in the world has practiced aquaculture to some degree, but the ancient Hawaiians with their extensive system of fishponds have been cited as some of the best examples of successful fish farming worldwide. Nowhere else is there such a simple, yet technologically well-developed aquacultural system as there was in ancient Hawaiʻi. Prior to contact with the western world in 1778, it is estimated there were over 480 fishponds statewide producing an annual yield of 1.9 million pounds of fish and other edible sea life. The early Hawaiians developed these shoreline fishponds as a means of insurance for a continuous supply of seafood. The growing population needed a constant supply of fish and other sea life, and could not rely on the unpredictability and limited supply of shoreline fish.

Although we now consider these fishponds to be a part of aquaculture, the early Hawaiians considered it agriculture, mainly because it was an integral part of the land, as in the *ahupuaʻa* concept. The successful ponds were usually constructed in sheltered areas, such as bays and harbors, with protective seawalls (*kuapā*) built out from the shoreline, enclosing shallow bodies of water. The seawalls, made of basalt and coral pieces, usually contained *makaha*, or sluice gates, to assist in regulating the pond's water temperature, depth and salinity, as well as allowing smaller fish to pass through.

The intellect of the early Hawaiians was evidenced by their selection of locations for these fishponds. They chose to construct their seawalls in areas either next to the mouth of a stream or near freshwater springs, allowing the mixture of freshwater with saltwater. This brackish water consistency seemed to be ideal for fish growth and other forms of sea life.

According to Paul L. Jokiel (Hawaii Institute of Marine Biology), 'Ama`ama (mullet) and Awa (milk fish) were the "most important fishes cultured in the fishponds." He states that, "the Hawaiians chose these two species of fish that fed directly on plants (algae) and, therefore, utilize a much shorter food chain....resulting in a much more efficient use of their marine resources." Jokiel's explanation reveals: Typical marine food chains consist of primary producers (plants) which are fed on by small herbivores, which are fed on by small carnivores, which are then fed on by larger carnivores. In each stage of the food chain, only about 10% of the food material is incorporated into the next higher feeding level. Therefore, if humans are the 5th link in a food chain (i.e., plant, herbivore, small fish, large fish, man), 10,000 lbs. of plants would be necessary to produce 1 lb. of human. By utilizing a 3-link food chain (plant, fish, man), it would only take 100 lbs. of plants. This is a 10,000% increase in efficiency, and proof that the Hawaiian people were "sophisticated in understanding marine food chain dynamics."

Hawaiian fishponds played a significant role in the spiritual, cultural, and political lives of their people. To native Hawaiians, there is a direct spiritual

connection between man, God, and nature. The fishponds were considered sacred because it was believed they contained spiritual power, having the presence of both the *akua* (gods) and the *`aumakua* (ancestral gods).

The massiveness of some of these fishponds clearly suggest that pond-building was intense, lengthy, and costly in terms of material, manpower, feeding, housing, etc. Archaeological studies reveal that the majority of lengths of these fishpond walls are between 1200 and 2000 feet, with the average wall containing 33,700+ cubic feet of stacked rocks and coral fill. That would be equivalent to one person carrying a 5 gallon bucket of rocks 22,500 times. If that person made 30 trips per day, it would take him/her 750 days, or approximately two years and twenty days to complete! Historical counts noted that, "making of the large fishponds required the labor of more than 10,000 men."

The precise date of the construction of the first Hawaiian fishpond is uncertain, but the earliest mention of fishponds in Hawaiian legends can be dated to pre-13th century *mo`olelo*. The *mo`olelo* attributes the construction of the first fishpond on O`ahu to the Hawaiian gods *Kane* and *Kanaloa*. In fact, only 23 fishponds in the entire Hawaiian island chain are documented as having been man-made. The Hawaiians, `til today, believe that the remaining fishponds were built by either the gods or by *menehune*, the "super engineers" and first inhabitants of the islands. As the stories say, *menehune* always completed their tasks in the course of a single night, and always worked with rocks as their building material. The last documented fishpond being constructed was the *Puko`o* fishpond on the island of Moloka`i, in 1829.

With regard to Kane`ohe Bay, there once existed as many as 30 fishponds, ranging in size from 0.3 acre (Kaea Loko l`a) to 215 acres (Nu`upia Loko l`a). Today, only 12 walled fishponds remain, and several of these are not even recognizable as fishponds. During the late 1940's it was seen as advantageous to fill some of the fishponds in order to establish new land for housing development. Nine fishponds were destroyed between 1946 and 1948, some as large as 10+ acres. In many cases, fill material was dredged up from nearby fringing and patch reefs, sometimes cutting deep into the reef flat that had previously been dredged to 11 feet during World War II. The names of the original 30 fishponds are listed in Dennis M. Devaney's book, "Kane`ohe, A History of Change," on pp. 146 and 147, and in these notes in Appendix E. The 12 existing fishponds, arranged from the smallest to the largest, are:

Fong's, in Kahalu`u	Size: 0.6 acre
Papa`a, in Kane`ohe	Size: 1.6 acres
Kanohuluiwi, in Kane`ohe	Size: 2.7 acres
Waikaluwaho, in Kane`ohe	Size: 3.5 acres
Mokoli`i, in Kualoa	Size: 4.6 acres
Waikalua, in Kane`ohe	Size: 11.9 acres
Kaluapuhi, in Kane`ohe	Size: 14.0 acres
Kahalu`u, in Kahalu`u	Size: 26.6 acres
Halekou, in Kane`ohe	Size: 36.0 acres
He`eia, in He`eia	Size: 88.4 acres
Moli`i, in Hakipu`u	Size: 113.0 acres
Nu`upia, in Kane`ohe	Size: 215.0 acres

