

## KO'IE'IE FISHPOND RENOVATION AN EXAMPLE OF LOCAL, STATE AND FEDERAL PARTNERSHIP

*Allen Tom, U.S. Department of Commerce, National Marine Sanctuary Program  
Kimokeo Kapulehua, President, Ao, ao O Na Loko I'a O Maui*

Keywords: Polynesian, Hawaiian, Fishpond, Ali'i, restoration, restoration / revitalization

### INTRODUCTION:

Throughout Polynesia, fishponds were commonly used as an early type of aquaculture. Fishponds were great examples of early ingenuity amongst a native people. Hawaiians studied the tides, moon, and sun and realized that they could harvest fish within a confined area. Similar to fish traps made in other areas of Polynesia, fishponds used the same idea of taking advantage of natural surrounding environment.

Basically, a fishpond consists of a wall and a sluice gate. For a *loko kuapa* type of fishpond, the wall was made of boulders and stones of all sizes and was known as the *kuapa*. A sluice gate or *makaha* was placed at precise locations where currents occurred. The complex building of such structures took into account social, environmental, cultural and geological criteria in order to create a fully functioning fishpond. There were many different types of fishponds, which can now be categorized into several familiar forms. It is interesting that in today's modern world, we have recognized the importance of not only aquaculture to supplement our food supply, but that the fishponds served a much larger role in the community, whole villages were built around their existence.

Today, off of the southern developed coast of Maui, a large fishpond (almost 3 acres large) is undergoing a revitalization and renovation (restoration is the complete rebuilding to original working function, renovation is restoration, but not to complete former use) It is not a true rebuilding of the fishpond, as it is not the goal of this renovation to bring the fishpond back to its original purpose of producing food. Instead the fishpond is being revitalized in order to teach future generations about how fishponds used to work, provide an area for teaching of biology, history, geology and most importantly culture. For residents and visitors alike, this is an exciting project that has brought together partners from all walks of life on Maui, from state, federal, local county agencies to visitors and residents who have donated money, time, expertise, art work etc, this Ko'ie'ie fishpond renovation has captured the heart and minds of all who have visited and want to see this project succeed as a example of true partnership.

### BACKGROUND:

For centuries, Polynesian's including Native Hawaiian's looked to the oceans for not only sustenance but also recreation and cultural purposes. One way in which the people of Polynesia used the ocean to their advantage was the creation of fishponds that

normally hugged the coastline, but were intricately designed to take full advantage of the ocean's currents, nearby streams and local fish and invertebrate populations.

Native Hawaiians built and maintained fishponds along the coast of all the main Hawaiian Islands. The fishponds were created for aquaculture purposes, to raise larval food fish to feed the coastal villages. Fishponds were built and used by ancient Hawaiians to harvest fish, and other marine resources (algae). It was an awesome example of engineering expertise that took into account wave patterns, ocean currents, fresh water runoff, fish and invertebrate biology and other natural factors. Today, many of these ponds still exist in some fashion. Different types of fishponds are still found throughout Polynesia, and one of the common designs is the rock walls made with some type of gate mechanism. The rock wall or *kaupa* was normally made of lava rock, with crushed coral filling in the holes between the rocks making a solid base, yet still allowing for fresh seawater to circulate through the wall and into and out of the pond.

Rocks were normally gathered from river beds and lava fields in the upland areas and transported by human chains for miles at a time to the ocean. The rocks were then strategically laid out with the larger rocks forming the foundation followed by smaller rocks and rubble filling in the top layers. The height of the *kaupa* was taller than the highest tide of the year, thus preventing the larger fish from escaping the fishpond.

The *makaha* or gate helps define the characteristic of the fishpond. The Ko'ie'ie fishpond was made of wood bound by cordage leaving half inch gaps between the pieces. The result was a vertical slotted gate held stationary by stones. Many species of larval fish were able to enter the pond through the gate, but as the fish grew larger, were unable to escape. The larval fish were drawn into the fishpond by the brackish water, the amount of algae, plankton and other food sources supplied by the care taker of the pond. The fish could then be harvested whenever requested by the ruling *ali'i*.

Today, all that is left of the fishponds are remnant walls. However, in the past 15 years a native Hawaiian renaissance has emerged and several fishponds on the islands of Molokai and Oahu have been restored to working condition (e.g. fishponds on Molokai). Fronting the headquarters site of the Hawaiian Islands Humpback Whale National Marine Sanctuary (HIHWNMS) office in Kihei, Maui, the Kalepolepo fishpond is a three acre pond which is known by its ancient name of Ko'ie'ie (1). Ko'ie'ie means "rapid current" and is the best preserved fishpond on *loko kuapa* (see METHODS) on the south shore of Maui. This pond was traditionally reserved for *ali'i*. It is not known where the pond was actually constructed, but archeological estimates and oral histories seem to indicate that it may have been built between 1400-1500 AD \*. Legend tells us that the *menehune* (or race of small people) built the pond in one night –just as they have on the island of Kauai.

Historical accounts note repairs to the fishpond wall took place during the times of several chiefs, including King Kamehameha the great. Thousands of people lined up to pass stones from the uplands to the ocean, clouds of dust were said to have been suspended in the air, giving the name to the local community "*Kalepolepo*" or "the dirt".

Throughout its history, Kalepolepo was a popular resting and recreational area for the ruling ali'i. Today countless numbers of hotels and condominium's line the south shore line of Maui. Few open areas provide beach access along Maui's south shore. *Kalepolepo* remains a recreational area for visitors and residents alike.

METHODS / TYPES OF FISHPONDS (2): There are four types of fishponds in Hawaii.

- 1) *Loko I'a kalo* – utilizes water flowing throughout taro patches to raise fish – mainly a fresh water system
- 2) *Loko wai* – is a natural freshwater inland pond that can have some seawater mix – e.g. for mullet and other eurolaline fish species.
- 3) *Loko pu'uone* – is a fishpond that runs parallel to the sea.
- 4) *Loko kuapa* – is a fishpond with one or two makaha (gates) and is located near a fresh water source. This type of pond was reserved for Ali'i. – *Kalepolepo* is an example.\*

*Ko'ie'ie* Fishpond: One of the last remaining fishponds along the South Maui Coastline, *Ko'ie'ie* is by far the most intact (slide of Fishpond from the air). *Ko'ie'ie* is one of the most accessible and approachable fishponds and is open to the public. Others are privately owned or have barely visible footprints.

Built more than 500 years ago, by Native Hawaiians, who probably lived in the south Maui area, the *Ko'ie'ie* fishpond has weathered natural disasters and human development. Its walls were originally maintained in the past by Prominent Hawaiian chiefs or alli (including King Kamehamha the great). Under his direction, over 10,000 people were gathered to repair the collapsing wall, one stone at a time.

The three acre pond is located in Kihei, Hawaii, a very popular tourist area on the island of Maui. Located adjacent to the fishpond is a large stream that collects run off from the upland areas, while inside the fishpond numerous freshwater springs have been documents by the reconstruction efforts.

#### USES:

Hawaiian practioners and hula *halau* (hula schools) would hold cultural protocol ceremonies at the end of high water mark of the fishpond. Construction of the rock wall helped solidify social status and it was often deemed an honor to work on the "king's fishpond". In ancient times, *ali*'I were considered wealthy if they had fishponds within their *ahupua`a* (land division). In fact, the greater the number of fishponds, the wealthier the chief was considered to be. He had complete control of the entire system. If a fishpond needed to be repaired, the entire community was summoned to do their share of work.

Today, in an effort to grasp and hold on to the knowledge of Hawai'i's elders yet progress in an innovative growing society, community organizations throughout the islands have been seeking State permits to rebuild these ancient walls.

Renovation and Restoration: Renovation of the Ko'ie'ie fishpond actually began ten years ago with the acquisition of the necessary permits. The Fishpond was not technically "owned" by anyone entity. Therefore ownership and insurance issues had to be resolved with the State of Hawaii and the county of Maui, before a single stone could be moved. The NMSP assisted in this effort from the start, because the rock wall has served to prevent soil erosion on the NMSP property. Plus the NMSP mandates "to facilitate native Hawaiian uses where applicable within the HIHWNMS(3) blends well with the restoration and eventually educational components of the fishpond. A singular sign was installed on the HIHWNMS grounds in 1995, and residents and visitors alike began to ask questions about the fishpond and its operation. In 1996 a community group was formed called *Ao ao O Na Loko I'a o Maui* (fishpond association of Maui) with the sole mission of restoring the Ko'ie'ie fishpond wall. In 2006, the fishpond wall renovation physically started, almost 10 year from when the first sign was installed and the *Ao ao O Na Loko I'a O Maui* was created! The wall reconstruction as started from the north end – the end closest to the NMSP headquarters building. The workers (mainly Native Hawaiian young men but not exclusive to other nationalities) worked for several hours each day at an average rate of a couple yards. However, strong summer swells and winter storms eroded some of the rock wall and repairs were necessary. Water conditions also played a role in when the men could actively work on the wall. Unlike the days of old, when the entire village turned out to work on the fishpond, only a handful of men were present at any one time. Currently the wall stretches 500 yards from the north end. At the same time, construction of the wall has started on the south end, which currently extends 200 yards.

#### EDUCATION:

The fishpond continues to provide a wealth of information, not only about Native Hawaiian culture, but marine biology, beach erosion, archeology etc. Currently over 2,000 students visit the fishpond annually, working with the HIHWNMS, a joint visitation program that includes classroom lecture, on site field work and long term monitoring is offered. A university project looking at settling rates has been going for the past year inside the pond utilizing different substrates to look at settling rates (photo of substrate). Native Hawaiian emersion classes also used the fishpond as a true connection to their culture. Courses are taught not only in Hawaiian, but with hula, gathering protocols and fishing techniques. A NOAA B-WET (Bay Watershed and Estuarine) grant in 2006 helped purchase six small "boats" with camera's located on the bottom of the boat – that can be driven remotely from land and images recorded on TV monitors. This allows students to manually operate the boat from shore, without having to get wet. One of the reasons for the development of this B-WET project is that until very recently, the State of Hawaii Department of Education did not allow students on field trips to enter the water (due to possible litigation). These B-WET boats helped address that problem, by allowing the students to explore the fishpond without getting wet. Additionally, other school projects included studying the sedimentation rates on different substrates. Different types of substrate were used including plastic, nets, tin cans, organic material, etc to test the setting rates of algae (*limu*). This is the first year of the project, but so far, it looks as if the nets and rock material seem to have high recruitment rates, followed by

the stuffed animals and plastic toys. To date, the Fishpond in conjunction with the Sanctuary Program have created a number of brochures, coloring books, on-site lesson plans, curriculum, a homepage and several public television specials and DVD's.

## RESEARCH

Currently the State of Hawaii, Department of Land and Natural Resources and the University of Hawaii are conducting surveys of fish populations inside the fishpond. Invertebrate surveys and sampling are also being conducted. These studies have been on going since 1997 and will serve as a baseline for population counts, especially after the fishpond wall is fully restored. Already the fishpond is home to countless number of invertebrates from *ina / wana* (sea urchins), to fireworms, that live inside the wall, to large schools of aholehole (silver perch or flagtail, *Kuhlia sandvicensis*), ama'ama (mullet, *Mugil cephalis*) and moi (threadfish, *Polydactylus sexfilis*). Green sea turtles and even an occasional monk seal have also been spotted in the fishpond. Additional research on recruitment rates of certain type of algal species as well as surveys for nuisance algal species are continuing with the University of Hawaii, Botany Department. The County also monitors beach erosion and the movement of sand along the coastline before and after the fishpond wall renovation. Due to the fishponds proximately to the NOAA office site, storage of sensitive research equipment is not a problem, nor is having lab and desk space for visiting researchers.

## CULTURAL USES (2)

Hawaiian Fishponds also served many cultural purposes as well. In ancient times, ali'i were considered wealthy if they had fishponds within their ahupua`a (land division). In fact, the greater the number of fishponds, the wealthier the chief was considered to be. He had complete control of the entire system. If a fishpond needed to be repaired, the entire community was summoned to do their share of work. Certain fishponds were only reserved for *ali'i* (or royalty) and anyone other than ali'i or their family caught using the fishpond were sentenced to death. *Oli* (chants), *mele* (song), *hula* (dance), *kanikapila* (playing music), *wala`au* (talking story) all took place near or around fishponds as they were often the center of village life. Different fishponds were celebrated in Hawaiian chant or mele (song), while certain fishponds were utilized for the gathering of limu (certain seaweeds) or types of fish for ceremonial purposes. Construction of the fishpond was reserved for males – because woman were considered unclean after they reached puberty. Fishponds were often the source of religious ceremonies, the construction of the *makaha* often warranted its own ceremony. Fishpond legends usually fit into one of four categories, 1) stories of the creation of the fishpond, 2) explanations of natural marine phenomena, 3) warning against inappropriate behavior relating to the fishpond and 4) stories of guardians or magical beings that protected the fishpond. Many of these guaradians took the shape of lizards or *mo'o*.

## FUTURE:

The Fishpond renovation is scheduled for completion in the summer of 2007. It will continue to be a place where people gather for recreation, fishing and learning. This has been a partnership between the people of Maui, visitors and residents alike, the County,

the State, federal (NOAA) and a variety of local NGO's. The eventual goal is to not only renovate other fishponds around the state, but to demonstrate a true federal / local partnership at its most basic level, the tangible result of partners coming together to complete one task. A couple of yards south from Kaleolepo is a much larger fishpond almost 3 miles in circumference; the outline can be viewed from the air. Kimokeo and his group already have their eyes set on this site as the next renovation project !

For more information:

<http://www.mauifishpond.com/fishpond.php>

<http://www.sanctuaries.nos.noaa.gov/>

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