

Application of Hawaiian traditions to community-based fishery management

A. Friedlander¹, K. Poepoe², K. Poepoe², K. Helm², P. Bartram³,
J. Maragos⁴ and I. Abbott⁵

ABSTRACT

The community in the Ho'olehu Hawaiian Homesteads on the island of Moloka'i is strengthening community influence and accountability for the health and long-term sustainability of their marine resources through revitalization of local traditions and resource knowledge. The traditional system in Hawai'i emphasized social and cultural controls on fishing with a code of conduct that was strictly enforced. Local resource monitors, in conjunction with visiting scientists, are creating a predictive management tool based loosely on the Hawaiian moon calendar to guide responsible fishing practices. Community-sanctioned norms for fishing conduct are being reinforced through continual feedback based on local resource monitoring, education, and peer pressure. Hawaiian community building and proper cultural protocols are essential to understand and revitalize marine conservation traditions.

Keywords Community-based management, Hawaiian traditions, Subsistence fisheries.

security is not at stake for most residents because few depend on local fish production for subsistence.

Introduction

Many indigenous cultures see themselves in essential relationships with the rest of nature (Callicott 1994). Although the dynamics may vary among cultures, respect, caring, mutual benefit, and accountability often characterize these relationships. Subsistence fishing is culturally and economically important to many rural communities and in previous times, Hawaiians developed a management system that provided for sustainable harvest of their natural resources. The community (Hui Malama o Mo'omomi) in the Ho'olehu Hawaiian Homesteads on the island of Moloka'i is currently attempting to strengthen community influence and accountability for the health and long-term sustainability of their marine resources. The traditional system in Hawai'i emphasized social and cultural controls on fishing with a code of conduct that was strictly enforced. Harvest management was not based on a specific amount of fish but on identifying the specific times and places that fishing could occur so it would not disrupt basic processes and habitats of important food resources. One of the major behavioral norms was that marine resources were limited and there was a strongly perceived social obligation to exercise self-restraint in resource exploitation. A related concept was the belief that nurturing and respect were required for beneficial relationships with marine life.

Coastal fisheries are facing severe depletion and overexploitation on a global scale and Hawai'i is no exception. This decline in abundance, particularly around the more populated areas of the state, is likely the cumulative result of years of chronic overfishing (Shomura 1987). Despite the opinion of many fishers that overharvesting is one of the major reasons for a long-term decline in inshore marine resources, there is poor compliance with state fishing laws and regulations. Fishermen in Hawai'i are frustrated by this trend but food

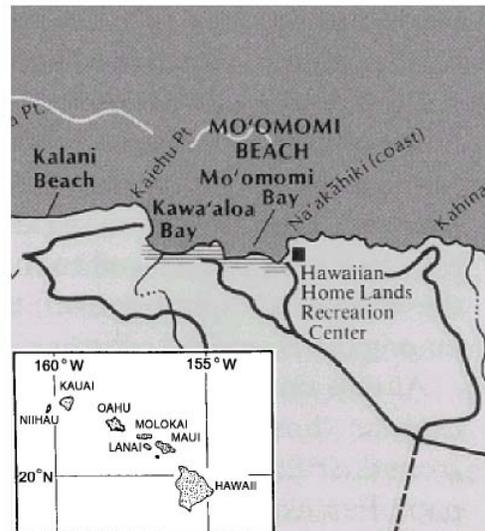


Fig. 1. Study area showing locations of Mo'omomi and Kawa'aloa Bays, Moloka'i.

A notable exception is the community residing in the Ho'olehua Hawaiian Homesteads on the northwest coast of the island of Moloka'i (Fig. 1), which depends on food from the ocean for much of its subsistence. Subsistence activities, including farming and fishing, supply about one-third of the food needed by the approximately 1,000 Hawaiian residents of this community (Hui Malama o Mo'omomi 1995). Seafood harvesting by community members is distributed along a 21 km length of the northwest coast of Moloka'i. Except for the partially sheltered bays at Mo'omomi and Kawa'aloa, nearshore waters are a high-energy environment exposed to the open ocean. Access to Mo'omomi Bay is through Hawaiian Home Lands and encompasses some of the least accessible

¹ The Oceanic Institute, Makapu'u Point/41-202 Kalaniana'ole Hwy, Waimanalo, Hawai'i 96795 afriedlander@oceanicinstitute.org

² Hui Malama o Mo'omomi, P.O. Box 173, Kualapu'u, Hawai'i 96748

³ Pacific American Foundation, 925 Bethel Street, Suite 101, Honolulu, Hawai'i 96813

⁴ U.S. Fish and Wildlife Service, Pacific Islands Ecoregion, 300 Ala Moana Blvd., Honolulu, Hawai'i 96850

⁵ University of Hawai'i at Manoa, Botany Department, 3190 Maile Way, Honolulu, Hawai'i 96822

coastline in Hawai'i. Greater exposure to fishermen from other parts of Moloka'i and from other islands has introduced standards of behavior and perceptions of marine resources that deviate from traditional fishing practices and resource conservation norms.

Despite its rugged shoreline and windward exposure, the project area has a long history of use of subsistence fishing and gathering by local communities. The people of old from the island's wet, northeast valleys spent summer months at Mo'omomi Bay and nearby coastal areas catching and salt curing fish to see them through winters too rough for fishing (Summers 1971).

In 1993, the Governor's Moloka'i Subsistence Task Force suggested that the Ho'olehua Hawaiian Homestead be allowed to manage shoreline marine resources in nearby areas for subsistence fishing. The 1994 Hawai'i State Legislature created a process for designating community based subsistence fishing areas. In response to this legislation the Hui Malama o Mo'omomi prepared a fisheries management plan for the northwest coast of Moloka'i (Hui Malama o Mo'omomi 1995). The plan had three major objectives: (1) establish a marine resource monitoring program that integrates traditional observational methods and science-based techniques; (2) foster consensus about how fishing should be conducted to restore community values and stewardship; and (3) revitalize a locally-sanctioned code of fishing conduct.

The community's long-term goal is to bring fishery resource management in the coastal areas in and around Mo'omomi Bay down to the level of the users who have the most detailed understanding of the resources and the greatest long-term interest in their sustainable use.

Methods

To facilitate on-site monitoring, recent color aerial photographs of the project area were obtained and spliced into a photomosaic. The coastline was sectioned into sub-areas, usually individual reef benches (papa). Wherever possible, Hawaiian names were verified and used to refer to localities within the project area. Two full-time monitors from the Ho'olehua Homesteads were recruited and trained for responsibilities as monitors and caretakers. Community resource monitors were taught traditional Hawaiian observational methods of monitoring marine resources based upon careful observation by an expert fisherman – Kelson "Mac" Poepoe, the senior caretaker ("haku'ili") of the Hui Malama o Mo'omomi. Monitors were also trained in science-based methods by visiting scientists who advised the project. Their observations, recorded in daily journals, become the raw material to construct a calendar patterned after the traditional moon calendar.

Hawai'i is one of the few places in the world where seaweeds or "limu" are still an important food resource (Abbott 1984). Resource monitors included limu in their regular on-site observations and made detailed surveys of limu composition and abundance along 30 m transects at four reef benches (papa). Monitors recorded observations about the ecology of important edible species, particularly "limu koku" (*Asparagopsis taxiformis*) and "limu

lipe'epe'e" (*Laurencia succisa*). Contents of the stomachs of seaweed-eating fish were examined after capture to identify limu that are major dietary components for food fishes.

Results

Hawaiian Traditions of Fishery Management

Long before any association with westerners, Hawaiians depended on fishing for survival. The need for food security motivated them to acquire a sophisticated understanding of the factors that caused limitations and fluctuations in marine resources. Based on their familiarity with specific places and through much trial and error, Hawaiian communities were able to devise systems that fostered, in modern terminology, "sustainable use" of marine resources. Fishing grounds were never depleted; for the fishermen knew that should all the fish be taken from a special feeding spot (ko'a) other fish would not move in to replenish the area (Titcomb 1972).

There was not a single definition of "sustainable yield" but many, each based on an intimate knowledge of a specific locality with its own natural cycle and fishery dynamics. In this way, fishing could be adapted to the needs of particular Hawaiian communities within the resource limits and variability of their local marine environments (Bartram 1996). The traditional form of fisheries conservation functioned within a specific local context. It demanded an awareness of nature and attention to detail not found in contemporary fisheries management (Bartram 1996).

Many of the Hawaiian fishing techniques survived into the 20th century but traditional conservation principles have been weakened. Modern fishing emphasizes individual accomplishment and fishing decisions are made with considerable uncertainty about how fishermen will behave collectively. Such uncertainty places a premium on short-term catches over future catches or the catches of future generations.

The traditional system emphasized social and cultural controls. Behavior before, during and after fishing was disciplined by a strict code of conduct and transgressions were harshly punished. Expected norms of behavior grew from awareness that marine resources were limited and a strongly perceived social obligation to exercise self-restraint in resource exploitation. This concept is acknowledged in the contemporary concept of taking "only what you need" for immediate personal and family consumption. A related perception is that nurturing and respect, important for good human relationships, are also required for beneficial relationships with marine life. This concept is reflected in the Hawaiian cultural value known as "malama" (to care for).

Traditional Hawaiian values establish the general principles for proper behavior. A code of conduct for fishing requires not only belief in the basic principles but a very detailed understanding of marine resources so that harvesting is done in a proper ecological context that does not disrupt basic biological processes and habitats.

In ancient Hawai'i, a fisherman was recognized as an expert only after years of training by a predecessor. The apprentice was allowed to watch and hold the catch but not to actually catch anything himself. He was trained to observe subtle and major changes in the condition of marine resources. Before becoming acknowledged as an expert, the apprentice must understand the life cycle, diet, daily and seasonal feeding habits, the preferred habitat and growing conditions and the appropriate season, time of month, time of day, and method for harvesting many species of fish, invertebrates, and seaweeds

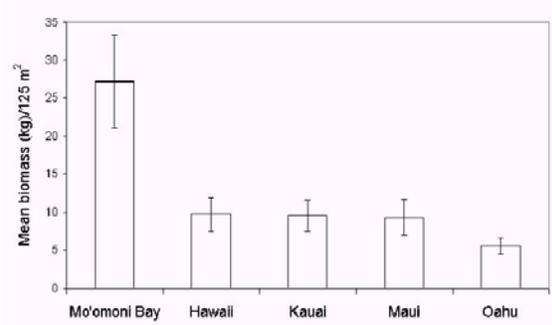


Fig. 2. Comparison of fish biomass in Mo'omomi Bay and similar exposed north shore locations around the main Hawaiian Islands. Error bars are standard error of the mean.

Scientific-based assessments

Quantitative science-based transect methods were used to compare fish abundance in Mo'omomi Bay and adjacent coastal waters with similar north shore locations around the State. Fish biomass was between 3 to 5 times higher than other locations with the densely populated

island of O'ahu having the lowest standing stock of reef

fish observed in north shore habitats (Fig. 2). Important resource species in Mo'omomi Bay such as moi (*Polydactylus sexfilis*) and "aholehole" (*Kuhlia sandvicensis*) were larger and more abundant than in many other areas around the state. Based on these observations, the reef fish re-sources in the vicinity of Mo'omomi Bay appear to be very healthy and in much better condition than similar habitats around Hawai'i.

Benthic habitat cover was monitored at several sites in the project area using photo transect methods to generate permanent records. The monitors selected and staked several locations where they used underwater photography

to check for changes in live coral condition. Damage to live coral was observed in areas where spiny lobsters were harvested with tangle nets after the season opened on September 1, 1999. Photographs of habitat damage caused by lobster netting were used to bring attention to this harmful fishing practice. These sites were a focus of coral monitoring before and after the spiny lobster season opened on September 1, 2000.

Hawaiian moon calendar

The moon calendar is a tool that Hawaiians of old developed for holistic understanding of marine and terrestrial environments. The wisdom of the moon calendar is based on lifetimes of observations and experiences by the people of old in their quest for survival (Edith Kanaka'ole Foundation 1995) and this wisdom is not fully appreciated or utilized by contemporary Hawaiians. Modern-day people of Hawai'i still refer to the calendar to plan fishing and planting activities and a popular form of the calendar is published annually by the Prince Kuhio Civic Club. Most contemporary users, however, extract only superficial information from them moon calendar.

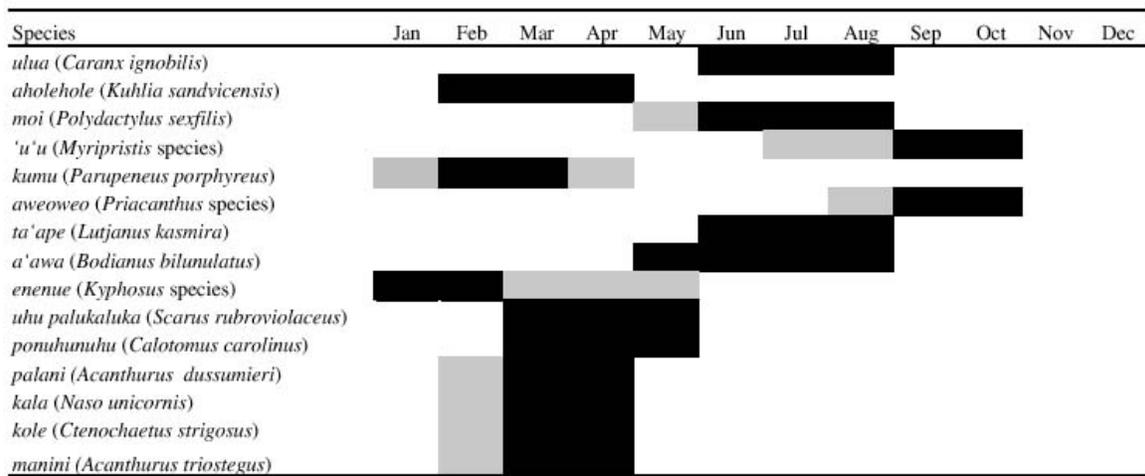


Fig. 3. Mo'omomi Bay fish spawning calendar for the year 2000 for key resource species. Black boxes indicate months of peak spawning. Grey boxes indicate other months when spawning was observed.

The moon calendar emphasizes certain repetitive biological and ecological processes (e.g. fish spawning, aggregation, feeding habits) that can be validated by fishermen's own observations. By identifying peak spawning periods for important resource species, traditional closures or "kapus" can be applied so as not to disturb the natural rhythms of these species. By observing spawning behavior and gonads, community monitors were able to develop a calendar identifying the spawning periods for the major resource species in Mo'omomi Bay during the 2000 calendar year (Fig. 3). Peak summer spawning occurred for "ulua" (*Caranx ignobilis*), moi (*Polydactylus sexfilis*), ta'ape (*Lutjanus kasmira*), and a'awa (*Bodianus bilunulatus*). Late winter-early spring spawning was observed for "aho-leholo" (*Kuhlia sandvicensis*) and "kumu" (*Parupe-neus porphyreus*). Surgeon-fishes and parrotfishes typically spawned in late winter and early spring as well.

A deeper understanding of the moon calendar provides the biological and ecological context for proper harvesting. Natural rhythms and effects on marine resource dynamics occur at several levels that are considered in the moon calendar: seasonal changes, monthly changes, daily changes.

Seasonal changes

During the wet season (ho'oilu), minus tides occur at night but during the dry season (ka'u), they occur during daylight. The change of seasons (huli) has a dramatic effect on the behavior and availability of many species.

Exposure during minus tides at night darkness is not as stressful for limu as exposure during daylight. The dry season, therefore, creates environmental conditions less favorable for limu growth. Shallow-water growths that are exposed during the day become dehydrated and sun-burned, then die out. The dry season also brings longer days, which triggers spawning in some reef fish species and stimulates the sub-tidal growth of limu.

The project area is exposed to winter swells that erode sand from the shoreline and adjacent benches (papa). Sand removed by winter surf moves back onshore during the summer months. Inshore and offshore sand movement influences the distribution and availability of some important marine resources, especially aholehole and limu. Stakes were driven at beach locations inland of Mo'omomi and Kawa'aloa Bays to establish benchmarks where sand accretion and erosion could be regularly monitored.

In Kawa'aloa Bay, moi move inshore to spawn when sand has stopped moving but not too much sand has moved in to fill in the pukas (holes) in the reefs that provide shelter during the spawning period. Stable sand leads to higher infauna of moi prey (shrimp and crabs). Observation of sand movement and the height of sand waves can give a good indication of when moi will move inshore to spawn. As sand waves flatten out, the sand becomes more stable. Steep sand waves indicate the movement of sand.

Aholehole spawn during the wet season, typically in late winter-early spring. Much of the distribution of aholehole is based on the movement of sand in and out of nearshore habitats. During the winter months, sand is transported offshore providing ample space inside reef pukas for aholehole to school. During the summer months, sand is transported inshore resulting in reef pukas being filled in and causing aholehole to move offshore.

Monthly changes

Three phases of the moon generate different tidal patterns and other environmental cues on a monthly basis:

- (1) Full moon - fish sensitive to light remain hidden while fish that favor light are in the open. The greater visibility of some prey species results in a greater activity of predators during this lunar phase. Extreme tidal fluctuations and currents occur at this time of the month.
- (2) Half moon - tide fluctuations not extreme (kai mau mau). Good time for fishing.
- (3) New moon - extreme tidal fluctuations. Negative tides allow for exploring shallow reef benches normally submerged.

Daily changes

Other environmental influences, especially rainfall, tradewind velocity, North Pacific swells, combine with seasonal monthly effects to influence the day-to-day dynamics and availability of marine resources. Understanding of these subtleties is what distinguishes the master Hawaiian fisherman from others. Fig. 4 shows how the growth of "limu kohu" (*Asparagopsis taxiformis*) can be better understood in the context of the moon calendar. Growth of limu kohu is most favorable during half moon phases of the wet ho'oilu season.

Code of fishing conduct

The written history of the project area was reviewed by eight kupuna (elders) and master fishermen from the Ho'olehua Homestead. The information obtained through cultural research was synthesized with widely accepted Hawaiian cultural values to define community-sanctioned norms that can be used to govern marine resource use in the project area. These norms were validated by selected community representatives, primarily the board of directors of the Hui Malama o Mo'omomi.

The code of conduct was designed to be true to Hawaiian values, to consider the community's culture, and be biologically sound for resource sustainability.

- Rule 1. Take only what you need. Share the catch with the "kupuna" [elders] and underprivileged families.
- Rule 2. Reserve inshore areas for children and novice swimmers and fishermen. Not for commercial purposes.

- Rule 3. Education. Utilize traditional practices and science-based methods. Harvest resources in proper biological and ecological context.
- Rule 4. Community governing board. Responsible for creating, implementing, judging, and seeing that guidelines are carried out correctly.
- Rule 5. Malama. "Malama ka aina", "malama na poe", "malama na mea nai ka aina a me ke kai", "Care for the land; care for the people; care for all things; understand the land with the ocean".

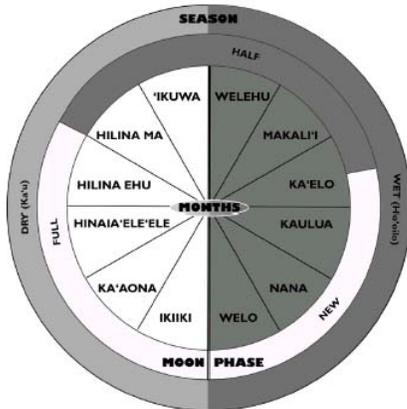


Fig. 4. Calendar showing the most favorable times of year for growth of *limu kohu* (*Asparagopsis taxiformis*). Months, seasons and moon phases in dark gray represent periods of most favorable growth.

Discussion

Owing to its isolation and strong community conservation ethics, the fish populations at Mo'omomi appear to be in much better condition than in other areas around the state. Its northern exposure to large winter swells and prevailing trade winds result in the local marine resources being affected by seasonal and environmental conditions. The Hui Malama o Mo'omomi has communicated a code of conduct based on traditional Hawaiian concepts of marine resource management that has led to sustainable use of their marine resources. As fisheries resources at Mo'omomi are very healthy compared with most areas around the state, management of these resources can focus more on wise sustainable use rather than rebuilding of stocks.

The most effective means of eliciting proper conduct of fishing is through education of young people in the community and on the island of Moloka'i as a whole to become good Hawaiian citizens, who understand that they have responsibilities, as well as rights, for marine resource use. Young practitioners can influence their elders, bringing shame to those who deviate from proper conduct of fishing. When fishermen use the access road through Hawaiian Home Lands they tacitly agree to abide by the community-sanctioned code of fishing conduct.

Community resource monitors emphasized high resolution monitoring of the area using traditional observation methods and adapted science-based methods to fit specific information and educational needs within the community. Interpretation of the detailed resource information recorded in the monitors' daily journals provides the basis for understanding local fisheries' dynamics and adjusting fishing effort so that resources are not harvested at the wrong times and places.

Community participation and involvement has clearly enhanced the role of the Hui Malama o Mo'omomi in local marine resource management and conservation. This was possible because of the emphasis on revitalizing Hawaiian cultural protocol in the use of marine resources. Cultural protocol communicates a code of behavior in respect to places, people and other living things (Edith Kanaka'ole Foundation 1995). The use of cultural protocol within the framework of the traditional Hawaiian moon calendar provided a highly credible basis for self-management of fishing conduct within the community. The moon calendar emphasizes certain repetitive biological and ecological processes (e.g. fish spawning, aggregation, feeding habits) that can be validated by fishermen's own observations. A deeper understanding of the moon calendar provides the biological and ecological context for proper harvesting. Community-based management is thought to be useful in overcoming what is seen as the distant, impersonal, insensitive and bureaucratic approach now characterizing the role of government in fisheries management (Dyer and McGoodwin 1994). Community involvement has particular utility for coral reef resources management in Pacific island areas with cultural foundations that emphasize cooperative and communal values (Johannes et al. 1993).

In areas where community ties are weak and multiple conflicting uses occur; more contemporary forms of management must be implemented. Components of community-based management can be incorporated with marine reserves and contemporary fisheries management in varying degrees depending upon the wants and desires of the community. Each community will have to develop management strategies that are compatible with their own unique situation. Environment, history, and resources will all dictate what type of management regime is most suited for each individual community.

Acknowledgements This project was funded in part by a grant from the Administration for Native Americans to the Pacific American Foundation.

References

- Abbott IA (1984) Limu: an ethnobotanical study of some Hawaiian seaweeds. Pacific Tropical Botanical Garden, Lawai, Kauai, Hawai'i
- Bartram PK (1996) Chapter 4 in Kaho'olawe Island Reserve Fisheries Management Plan. Prepared by Dames and Moore for Kaho'olawe Island Reserve Commission

- Callicott JB (1994) *Earth's insights: a multicultural survey of ecological ethics from the Mediterranean Basin to the Australian outback*. University of California Press, Berkeley
- Dyer C, McGoodwin JR (1994) *Folk management in the world's fisheries*. University Press of Colorado, Niwot, Colorado
- Edith Kanaka'ole Foundation (1995) 'Aha Pawalu, a cultural protocol for Kanaloa-Kaho'olawe. Consultants to the Kaho'olowe Island Reserve Commission
- Hui Malama o Mo'omomi (1995) Proposal to designate Mo'omomi community-based subsistence fishing area, northwest coast of Moloka'i. Prepared for the Department of Land and Natural Resources, State of Hawai'i
- Johannes RE, Ruddle K, Hviding E (1993) The value today of traditional management and knowledge of coastal marine resources in Oceania. In: *Workshop on People, Society and Pacific Islands Fisheries Development and Management: Selected Papers*, Inshore Fisheries Research Project Tech Rept No 5, South Pacific Commission, Noumea
- Shomura R (1997) Hawai'i's marine fishery resources: yesterday (1900) and today (1986). US Dept Commerce, NOAA, NMFS, SWFSC Admin Rept H: 87-21
- Summers C (1971) Molokai: a site survey. *Pacific Anthropological Records* No. 14. BP Museum, Honolulu
- Titcomb M (1972) *Native use of fish in Hawai'i* University of Hawai'i Press. Honolulu, Hawai'i