



**Aloha `Āina:  
A Framework for Biocultural Resource Management in Hawai`i's Anthropogenic  
Ecosystems**

Proceedings from a Technical Expert Workshop:  
Organized by the Native Hawaiian and Research Committees of the Hawaiian Islands Humpback  
Whale National Marine Sanctuary Advisory Council.

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**Aloha `Āina:**

**A Framework for Biocultural Resource Management in Hawai‘i’s Anthropogenic System**

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## ***Introduction***

When the kingdom passed to Mā`ili-kūkahi, the land divisions were in a state of confusion... Therefore Mā`ili-kūkahi ordered the chiefs, *ali`i*, the lesser chiefs, *kaukau ali`i*, the warrior chiefs, *pū`ali ali`i*, and the overseers, *luna* to divide all of O`ahu into *moku* and *ahupua`a*, *ili kūpono*, *ili`āina*, and *mo`o`āina*. There were six districts, *moku*, and six district chiefs, *ali`i nui`āi moku*. Chiefs were assigned to the *ahupua`a* – if it was a large *ahupua`a*, a high chief, an *ali`i nui*, was assigned to it. Lesser chiefs, *kaukau ali`i*, were placed over the *kūpono* lands, and warrior chiefs, *ili`āina*. Lands were given to the *maka`āinana* all over O`ahu.

Mā`ili-kūkahi commanded the chiefs, *kāhuna*, lesser chiefs, warrior chiefs and people: “Cultivate the land, raise pigs and dogs and fowl, and take the produce for food. And you, chiefs of the lands, do not steal from others or death will be the penalty. The chiefs are not to take from the *maka`āinana*....”

The chiefs and people agreed with pleasure. Because of his exceedingly great concern for the prosperity of the kingdom, the chiefs and people never rebelled during his reign. No voice was heard in complaint or grumbling against this *ali`i*, from the chiefs to the commoners, from the most prominent *po`e ki`eki`e* to the most humble *po`e ha`aha`a* (Kamakau, 1991).

The Hawaiian Islands Humpback Whale National Marine Sanctuary (sanctuary) is considering an ecosystem-based management approach for the natural and cultural resources within its boundaries. The sanctuary is currently focused on a single species, the humpback whale (*Megaptera novaeangliae*), and is evaluating the potential management transition through a management plan review process. In January 2012, the Sanctuary Advisory Council (council) recommended that the sanctuary convene a workshop for experts to discuss incorporating Native Hawaiian cultural management practices and Western scientific knowledge into the sanctuary management plan. Established in 1992, the sanctuary’s designation document requires the facilitation of customary and traditional Hawaiian uses in the sanctuary, but now there is an opportunity to also use both Native Hawaiian and Western scientific management approaches to develop a framework for an ecosystem-based revised management plan.

Sanctuary managers asked the following members of the Sanctuary Advisory Council to assist in organizing this workshop, based on their expertise and their roles on the council and in their communities: Jack Kittinger (former co-chair of Ecosystem Protections working group), Adam Pack (chair of council’s Research sub-committee), and Trisha Kēhaulani Watson (chair of council’s Native Hawaiian sub-committee). On July 5-6, 2012, a group of technical experts gathered in Maunaloa, O`ahu to reflect on the implementation of aloha `āina (deep love for the land and sea) in an ecosystem-based management approach that has a strong basis in customary Native Hawaiian management practices and traditions. The goal was in part to create a document that was not a singular, definitive framework, but rather, one suggested approach to integrating a diversity of cultural knowledges that worked cohesively in addressing the complex environmental needs of Hawai`i today, recognizing that different groups had different and

significant contributions to make towards this shared goal. Workshop participants were invited based on their roles in their communities and relevant research and/or academic expertise in marine ecosystems or Native Hawaiian practices. Many of the participants represented experience in all of these areas.

This framework was then presented to the Native Hawaiian and Research Subcommittees of the Hawaiian Islands Humpback Whale National Marine Sanctuary. After approval by both standing subcommittees, the framework was presented to the entire Sanctuary Advisory Council in September 2012. The Sanctuary Advisory Council vote unanimously and enthusiastically to send the framework forward to sanctuary staff for consideration in the management plan review, noting in its discussion that it would be advisable to use this document as a basis for both a handbook and trainings for conservation managers.

### ***Background and Purpose***

The prosperity of Hawai'i during the reign of Mā'ilikūhāhi stemmed from the people's fundamental trust and support of the government. Yet, just as the kingdom Mā'ilikūhāhi took over in the 6<sup>th</sup> Century, we find Hawai'i to again be in a state of disarray and confusion as to the management of its resources, in spite of (but perhaps due to) multiple scales of resource ownership and management (e.g., various landowners; private, state, and federal resource management entities). The mandate of Mā'ilikūhāhi did not allow governing ali'i to impose on their communities, but rather empowered the people to be the best stewards of their own areas. Likewise for Hawai'i today, it is important to significantly include the traditional, cultural perspectives which are unique to each island and each area in order to effectively manage the resources in Hawai'i. Native Hawaiian culture encompasses strong underlying values which are deeply rooted in the natural environment, and these values foster a cohesive relationship with the land and sea. This relationship was not only value-based, but it was need-based as well, and we acknowledge the mutual interaction between biological and cultural factors. Since biological factors in the natural environment make certain social behaviors possible, and those social and cultural behaviors can also influence the biological factors in the environment, the term "biocultural resource(s)" is used throughout this document to reflect the enhanced value of resources.

The contemporary uses and management of coastal areas demonstrates the complexities in Hawai'i resource management today. The traditional living system in Hawai'i included coastal access as an essential component, and communities today still rely on cultural practices and gathering rights. Yet, contemporary coastal use now includes commercial fisheries, recreational activities, tourism, military use, heavy industrial activities and other uses. These uses are also largely place based, and in turn need an approach that recognizes and embraces the unique nature of individual ecosystems and communities.

Since their arrival to the Hawaiian Islands, kanaka ʻōiwi (Native Hawaiians) developed sophisticated political, religious and economic systems. The ahupua'a is one of their greatest achievements. Rather than parceling land into individually owned plots, the land was divided into large partitions that often stretched from the mountains to the ocean, the ahupua'a. The ahupua'a ensured self-sufficiency for its residents: mountain forests provided residents with

materials for homes and canoes, streams brought fresh water for crops to the plains, and the shoreline and ocean offered fishing. Maka‘āinānā were free to access all parts of the parcel to gather necessary items. The system thrived upon a healthy trust and cooperation between the people and the government. We believe it is necessary to again achieve this level of trust and cooperation, as it is a fundamental element of Hawai‘i’s ecopolitical traditional history.

However, the arrival of westerners changed Hawai‘i’s ecosystems and the use of its biocultural resources significantly. Hawai‘i’s land and natural resources became tailored in furtherance of economic growth. Western merchants began exporting sandalwood and sugar. Land for commercial agriculture operations became a valuable resource, and businessmen soon sought private ownership rights from the Ali‘i. This began the process known as the Mahele. Hawai‘i’s land was divided between the government, and the Ali‘i. Two years later, through the Kuleana Act, maka‘āinānā were allowed to own land in fee simple. However, despite the private ownership concept, the Kuleana Act specifically granted residents of an ahupua‘a the right to gather certain items from the ahupua‘a in which they lived, provided that those items were not sold for profit. Rights under the Kuleana Act have since been codified in Haw. Rev. Stat. § 7-1.

The protections of native Hawaiian traditional gathering rights were unclear until Chief Justice William S. Richardson of the Hawaii supreme court issued its decision in *Kalipi v. Hawaiian Trust Co*, 66 Haw 1 (1982).<sup>1</sup> By looking to the traditions on which Kalipi’s asserted right was based, the court was able to both affirm the existence of the right, as well as limit it to its traditional boundaries. In recognizing protections for traditional gathering rights, the court also limited these rights to undeveloped lands.

Ten years later, the court again addressed cultural access rights in *Pele Defense Fund v. Paty*, 73 Hawaii 578 (1992). In *Pele Defense Fund*, Hawaiian cultural practitioners sought access to undeveloped lands within a natural area reserve despite not being residents to the ahupua‘a. The court first cited *Kalipi* for the general rule that access and gathering rights are limited to those who reside within an ahupua‘a. However, the court then recognized a possible exception to this general rule, holding that certain circumstances might exist to permit the exercise of gathering rights by non-residents of an ahupua‘a. Noting evidence from cultural practitioners that the reserve was a place of great cultural and religious significance for residents of several surrounding ahupua‘a, the court held that residents of those ahupua‘a could assert gathering rights, regardless of residence. In *Public Access Shoreline Hawaii v. Hawaii County*

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<sup>1</sup> Plaintiff William Kalipi claimed that his family had long used specific lands to gather traditional items “for use in accordance with traditional Hawaiian practices.” He accordingly sought the right to enter undeveloped property owned by Defendant Hawaiian Trust for these purposes. Hawaiian Trust, in response, argued that traditional gathering rights were inconsistent with a modern property rights regime, and that such rights should not be recognized as a matter of policy. The court noted a possible conflict between Kalipi’s asserted traditional gathering rights and the modern regime of exclusive property rights, but emphatically stated that “any argument for the extinguishing of traditional rights based simply upon the possible inconsistency of purported native rights with our modern system of land tenure must fail.” Accordingly, the court found that traditional gathering rights had survived through the codification of the Kuleana Act and the more recent Amendment to the Hawaii State Constitution. The court also noted, however, that Kalipi was not a resident of the ahupua'a in which he sought to exercise gathering rights. Because gathering within an ahupua'a allowed residents to obtain items from an economically self-sufficient land division, the court held that Kalipi held no traditional right to gather from another ahupua'a.

*Planning Comm'n*, 79 Hawaii 425 (1995), the court reaffirmed *Kalipi and Pele Defense Fund*, again noting the importance of history and tradition in defining these rights by stating, “[c]ustomary and traditional rights in these islands flow from native Hawaiians' preexisting sovereignty.”

Today, among the diverse activities that take place in the marine environment, “indigenous, cultural gathering rights” is a constitutionally protected classification of rights to coastal access and resources granted to Native Hawaiians, yet these rights also offer a foundation for enhanced information gathering, knowledge, mechanisms for community co-management and co-existence among culturally diverse groups. Native Hawaiian values and management principles must be clearly defined, understood, and communicated in order to effectively incorporate them into the sanctuary’s management plan to guide resource management decisions in the future.

The participants of this workshop worked collaboratively to develop a framework and guide for integrating Hawaiian and non-Hawaiian sciences and customary management practices into biocultural resource management, specifically for potential implementation in the management plan of the Hawaiian Islands Humpback Whale National Marine Sanctuary, which is currently undergoing its management plan review.

Participants were selected for their varied areas of expertise (Appendix A). Prior to the workshop, participants were provided with a primer document which provided a brief overview of three key focal areas: (1) guidelines for engagement with customary and traditional ecological knowledge, (2) models for integrating customary and conventional knowledge and management systems, and (3) strategies for implementing ‘integrated’ approaches in planning and management.

During the workshop, participants identified a number of over-arching themes:

- **Need to promote sustainable use ecosystems (i.e., the reciprocal relationship between healthy ecosystems and healthy communities);**
- **Recognition and promotion of regulation and non-use as traditional Hawaiian practices and values;**
- **Development of a process to maximize community input in management (i.e., a process for community engagement, empowerment, and partnership with state and federal agencies);**
- **Need to enhance communication, transparency, and accountability in decision making processes;**

Workshop participants acknowledged the need to find effective ways to manage natural resources that promote and protect sustainable use ecosystems; they also called for better processes whereby community stewardship and traditional knowledge are enhanced, recognized, more effectively utilized by resource managers. This includes cultural resources such as submerged historic properties which also often serve as artificial reefs or submerged archaeological sites of biocultural significance. These calls are not inconsistent with calls from other areas of conservation activity. Many communities are arriving at the conclusion that community participation is a necessary element in successful resource management (Butler and

Koontz 2005; Carroll et al. 2007, Jentoft S 2000, White et al, 2002). Communities tend to have a much better perception of processes which are inclusive of their input, information and values (Selin, Schuett, and Carr 2000). Researchers are learning that as resource management problems increase in conflict and complexity, community cooperation and participation are becoming greater drivers of success in resolution than technical information (Shannon 1992; Fischer 1993; Dryzek 2000; Fiorino 2000, Jentoft S 2005). Failure of conservation managers to account for socioeconomic factors, political motivations and cultural beliefs contributes to community conflict, opposition and potential failure of the actions (Gray 1989; Arvai et al. 2006; Petts and Brooks 2006; Chilvers 2008). Many of these themes were echoed in the workshop and during the Sanctuary Advisory Council meeting when Sanctuary Advisory Council members emphasized the reality that current “processes have imploded,” making the need for a new path forward that embraces shared sustainability needs and values input from a range of stakeholders and knowledge sources critical and urgent.

### ***Traditional Hawaiian Approaches to Research and Knowledge***

In addition to enhancing community stewardship alliances that focus on management responsibilities, there is a need to share learning and education. The Hawaiian concept put forward was “a`o aku, a`o mai,” the traditional Hawaiian process and value of reciprocal learning. The group expressed both a need for community education and shared learning. This is meant to address limitations on scientific or environmental literacy in communities, while also addressing the reality that many technical scientific experts may lack appreciation of socioeconomic and cultural knowledge that resides in a community’s collective knowledge. Education programs and shared learning opportunities build trust; increase community educational and socioeconomic capacity; enhance information that informs decision making; enable greater community buy-in and cooperation; increase compliance and thereby decrease needs for conventional government enforcement. Ultimately, the current decision-making process is limited by relying on tools of conventional science for gathering and analyzing information, and in order to improve the process, decisions should be heavily informed by indigenous science, cultural knowledge and socioeconomic values.

The group identified the concept “makawalu” as a cultural value that can inform a community based research methodology. Makawalu literally means “eight eyes,” yet conceptually reflects an approach that integrates numerous ways of seeing or knowing. A makawalu methodology would be one that considers the many different ways a community can approach or see a resource.

It is important to recognize that there is a rich history in Hawai`i through which residents, especially Native Hawaiians, were alienated from the natural environment. Despite a proven history of success, community participation is typically limited in Hawai`i. While some situations have improved, it is important to remember the ecopolitical context in which this workshop took place.



## *Ecosystem-Based Management*

The documents and recommendations provided by the primer and recommendations of the Sanctuary Advisory Council in their Ecosystem Protections Recommendations Report sufficiently address the biological necessity of moving from a single species based management approach to an ecosystem-based management approach (HIHWNMS Sanctuary Advisory Council 2011). The definition for ecosystem-based management (EBM) used in the recommendations report was taken from the Scientific Consensus Statement on Marine Ecosystem-based Management: “an integrated approach to management that considers the entire ecosystem, including humans. The goal of EBM is to maintain an ecosystem in a healthy, productive and resilient condition so that it can provide the services humans want and need. EBM differs from current approaches that usually focus on a single species, sector, activity, or concern; it considers the cumulative impacts of different sectors” (McLeod et al. 2005).

The Ecosystem Protections Recommendations Report further defined an ecosystem-based approach to the management of marine resources specific to the Hawaiian Islands sanctuary, which were formally adopted by the Sanctuary Advisory Council and forwarded to the sanctuary managers for consideration (HIHWNMS Sanctuary Advisory Council 2011). This definition was based on both traditional Native Hawaiian concepts of management and western ecological knowledge and includes protection of both human uses and ocean habitats and species. The working group definition for an ecosystem-based approach to management in Hawaiian waters includes these two primary and inseparable dimensions:

1. *Protect and Promote Sustainable Human Uses*: Protect and further develop connections that humans have with the marine environment, their associated knowledge systems and socio-cultural traditions. Promote inter-generational cultural transmission of those knowledge systems and the preservation and perpetuation of local traditional and ecological knowledge that is place based. Promote sustainable use of marine resources; preserve and enhance ecosystem services (including ecological and socio-cultural services).
2. *Conserve Ocean Habitats and Species*: Protect areas of habitat complexity, areas of high biodiversity, endemism and cultural value, and key ecological species and functional groups. Protect a range of habitat types and critical biological zones (e.g. spawning grounds, juvenile nursery habitat), protect and recover if necessary populations of keystone or determinant species, such as habitat builders (e.g. reef-building corals) and key ecological functional groups (e.g. reef herbivores, top predators). Recover depleted populations of endemic species; and conserve species and places of high cultural value (e.g., underwater heiau, archeological sites, fishponds).

To fail to move to such an approach would be both scientifically and culturally inadequate for Hawai‘i’s emerging resource management needs. However, we also contend that an ecosystem-based management approach absent biocultural considerations is insufficient to meet the needs of resource management in Hawai‘i. The Sanctuary Advisory Council also embraces the potential for the sanctuary to have strong cultural foundations; in January 2012, they acknowledged the Kumulipo as a pathway to the future, through an official resolution.

This parallels to the Hawaiian understanding of time and cyclical learning: “I ka wā ma mua, i ka wā ma hope” - in the time in front, in the time in back. In Hawaiian thinking, the past is referred to as the time in front, and the future is referred to as the time that follows in back. The Hawaiian people believed strongly that our past guides our future. We can see our past, but our future is uncertain, so the experience is much like walking backwards, so we need to be careful because we cannot see where we are going.

***Need for Integrated Process***

The stressors on natural resources have grown beyond the capacity of conventional conservation practices (Friedlander et al. 2008). There is a need for bold and innovative means of protecting resources for their “most effective and sustainable use” (modified from group term “highest and best use” to avoid confusion with the term’s use in real estate law). Often, advocacy for protecting a resource for its most effective and sustainable use is met with opposition. Community participatory processes have been found to effectively address complex resource management problems when the following best practices are implemented (Reed 2008):

- Stakeholder participation needs to be underpinned by a philosophy that emphasizes empowerment, equity, trust, and learning.
- Where relevant, stakeholder participation should be considered as early as possible and throughout the process.
- Relevant stakeholders need to be analyzed and represented systematically.
- Clear objectives for the participatory process need to be agreed among stakeholders at the outset.
- Methods should be selected and tailored to the decision-making context, considering the objectives, type of participants, and appropriate level of engagement.
- Highly skilled facilitation is essential.
- Local and scientific knowledge should be integrated.
- Participation needs to be institutionalized.

Workshop participants also called for maximizing clarity and communication about jurisdiction and decision making. Communities are fatigued and frustrated. Community consultation efforts have become formulistic and taxing.

<b>Common Practices in Management</b>	<b>Problem</b>
<b>Agency or entity seeks to minimize community consultation / input</b>	Public hearing or other minimal community input device is utilized only as a means to satisfy legal requirements
<b>Agency or entity seeks community support for existing or pre-determined action</b>	Public is not afforded any real authority or input into the action
<b>Agency or entity seeks community input into mitigation for pre-determined action</b>	Public is not afforded opportunity to provide information or input into the decision making of the action

The above common situations have left community with a lack of trust for government actors and actions. Additionally, there are questions as to how community needs can be addressed. The group recognized a need to prioritize different user groups and resource uses. Therefore, important to a community participatory process in Hawai'i would also be the development of tools for assessing user roles and responsibilities in a value neutral evaluation. In doing so, the sanctuary should work together with other government agencies so that all entities are complimentary in their work plans. A major strength of the sanctuary is that it is unique among Federal and State agencies in having broad-based long-standing community access and participation through its Sanctuary Advisory Council. The Sanctuary Advisory Council can serve as the launch pad through which the sanctuary can engage the community.

Both the workshop participants and Sanctuary Advisory Council emphasized the need to have individuals facilitate this process who possess an appreciation for community values, beliefs and traditions. Having appropriate and effective facilitators was a reoccurring theme throughout the crafting of this framework and reinforced the need for strong communication between stakeholder groups. An ideal facilitator is one that is from or otherwise accepted by the local community, and who can navigate the complex needs of management mandates while serving as an advocate for community needs. This is best achieved by someone who has empathy for the community being impacted by the management actions.

Both groups also recognized that portions of this framework have effectively taken place in various projects and places throughout Hawai'i, and a helpful next step for this framework would be an expanded version of this document that included case studies of some of these efforts. Some analyses of these efforts would surely provide helpful insight in the future implementation of this framework, yet due to time constraints and a sense of urgency to complete the document so that it can be shared, case studies were not included. Much could be learned from an analysis of case studies that would include review of decision making processes, public input processes, "best information available" standards used in decision making processes, projects in which processes "imploded" and projects that are considered successes by both government and community standards. By reviewing efforts that have been successful models of collaborative community conservation efforts and projects that have led to high levels of conflict between community and government, we can hopefully identify where, when and under what circumstances the model developed herein can provide helpful insight for future conservation and biocultural resource management opportunities.

## *Kapu and Non-Use as Traditional Values*



*This image by Jacques Etienne Victor Arago, first published in 1822, illustrates the severe punishment carried out against kapu violations in the traditional Hawaiian system.*

The importance of use and non-use exists across Polynesia. Hirini Moko Mead explains the history of the rāhui, or restrictions on the use of resources: “This type of rāhui could also be regarded as a conservation rāhui when it was used to protect resources. ... Interesting, it is this sort of rāhui which is widely known in the Pacific and seems to have been used by both Melanesians and Polynesians. It is evidently an ancient cultural trait that might go back as far as the Lapita people who were the ancestors of the Polynesians” (Mead 2003).

In Hawai`i, non-use was coupled with extremely mindful and careful awareness of one’s relationship within the ecosystem.

Each child was instructed to recite these words to the sun while planting each sweet potato slip: “*Kanu nei au, aia iā `oe ka ulu.*” I plant and the growth is yours. Throughout the planting, the children backed away from the sun, being careful not to let their shadows fall on the new plants. We had to move and plant, move and plant, without letting our awareness slip for a moment. When the potatoes appeared, what potatoes! If we planted consciously, the potatoes could be as large as a human head. The elders taught, “When the sun is ascending, everything is growing and energy is growing toward its peak.”

When my mother sent us out to collect herbs, she always instructed us to be quiet and gave us a prayer to repeat before picking a single leaf. Ask permission and give thanks – that was the Hawaiian protocol that extended to every aspect of nature. If you observe this constantly, you begin to develop an inner silence, a deep strength that comes from having your mind attuned to the universal consciousness that pervades all things (Veary 2001).

Kapu was therefore both prohibition (non-use) and regulation. Like the tapu in Aotearoa, the concept of the kapu referenced a sacred nature to biocultural resources. Traditional Hawaiians, like most indigenous people, did not distinguish between an object's biological or ecological value and its cultural or spiritual value. Social conventions and behavior was shaped accordingly. As such, indigenous knowledge about resources is similarly integrated. Kapu was an integration of management and cultural practices and it was this system that enhanced and perpetuated the rich biodiversity of Hawai'i for centuries. Western researchers have enhanced their appreciation of these values. The Millennium Ecosystem Assessment defines these values as “the non-material benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experience, including, e.g., knowledge systems, social relations and aesthetic values” (De Groot R et al, 2005).

This was reflected in the concept of Wao Akua and Wao Kanaka, the realm of the gods and the realm of man. Each was distinct in purpose and allowable resource uses. Wao Akua were areas reserved for the gods; there were also areas where the ecosystems most precious resources were housed. Human entry into Wao Akua was reserved for only rare and sacred purposes. Wao Kanaka was where man occupied, lived, and utilized.

By failing to maintain this traditional system, human populations have lost sight of the ecological value of Wao Akua, which was to protect the ecosystem's most vital components. Today, responsibility to protect these resources falls on land owners or government agencies, often at great expense to those actors. The Edith Kanakaole Foundation identified these vital resources as kaumaha, or resources considered to be of such great significance that the management and care of them is both an honor and burden. Our kaumaha resources are our most sacred and most essential to the source of all food and biocultural resources; the compromise or loss of these resources would critically harm the entire ecosystem and all its inhabitants.

Also lost is the recognition that the traditional system qualified expertise. Traditional Hawaiian resource managers possessed a quality known as `ike papalua, which referenced a deeper, expert and spiritual understanding and appreciation of the natural world. Literally `ike papalua means double sighted, which can in a modern interpretation reference appreciation of both conventional scientific and traditional Hawaiian science knowledges and methodologies.

Term	Definition	Potential Modern Interpretation
<b>Mō`ī<sup>2</sup></b>	King, High Chief	Political Leader (Governor, Appointed or Elected Official)
<b>Konohiki</b>	Chief, Authority	Official with Legal or Delegated Legal Authority
<b>Kahuna</b>	Expert	Expert
<b>Ali`i Kua`āina</b>	Country Chief	Knowledgeable Community Leader
<b>Maka`āinana</b>	Resident	Citizen Scientist

Also qualified were individuals' relationships to lands and resources. The system Mā`ilikūkahi instituted was particularly detailed in the roles and authority individuals held and to which resources people were assigned responsibilities over. While it was a system that seemed to require little enforcement, it was a system with tremendous attention paid to establishing clear political and geographic boundaries for agents to operate within. Further, while knowledge and expertise developed within the established geographic boundaries to be very place-specific, the appropriate general behavior for regarding and managing resources was certainly transferable between regions and ahupua`a (e.g., asking permission from akua or ali`i or kia`i for either access or gathering, and leaving offerings to give back to the appropriate recipient). Both the

<sup>2</sup> The relationship between Maka`āinānā and Konihiki and by extension the Mō`ī is the best materialized explanation for the perfective taken by kanaka maoli toward land tenure. Until the Māhele in 1848 no one owned any of the land. Quite the contrary no one, not even the Mō`ī, was above the land. There is a very famous `ōlelo no`eau that states, He ali`i ka `āina he kauwā ke kanaka, *The land is the sovereign the people her subjects*. So instead the konohiki system was used to honor the land for taking care of the people. Therefore the hierarchy was established as the `āina being the most powerful. This is also shown through another `ōlelo that states, Hānau ka `āina, hānau ke ali`i, hānau ke kanaka, *The land is born, the chiefs are born, and the common people are born*. This `ōlelo shows not only the structure of power by birth order but also shows the three (land, chief, and people) to coexist together as three things in one relationship. Konohiki knew that if they were good to their people the land would flourish and they would all live prosperously because, i `āina no ka `āina I ke ali`i, a i waiwai no ka `āina i ke kānaka, *The land remains the land because of the chiefs, and prosperity comes to the land because of the people*, in essence the chiefs were responsible for protecting the land and people and why the common people were needed to work and tend the land. This last `ōlelo gives us a particularly interesting insight to some of the reasons a change in land management was called for. When Kamehameha unified the islands in 1810, his people were suffering a complete collapse in population. No longer was it feasible to expect family to maintain the extensive ahupua`a system with less than half the people able to tend it.

Because no one owned their land and the tenure was contingent on the people being productive with the land, it was important for Kauikeaouli to enact a way to protect his people and allow them to stay on the land even if they didn't have the means to produce from it in the way they had for generations with the ahupua`a system. The Māhele was then created to officially divided the interest in land in 1/3<sup>rd</sup> portions between the Mō`ī, the konohiki (including the Mo`i), and the maka`āinānā. The Mō`ī and the konohiki would make claims to land based off of their ancestry and which lands had been tended by their families. The konohiki then had the choice to either surrender 1/3 of that land or pay the estimated value of 1/3 of the land to be held in the kingdom as the undeniable right of the maka`āinānā. Therefore any commoner who did not make a claim would reserve his right to 1/3 of all the lands in Hawai`i because of his unique relationship to the ali`i and the land. Therefore the people of Hawai`i, the descendants of those who did not submit claims to the land they dwelled continue to have an undivided 1/3 interest in all of Hawai`i's lands and ocean resources. This poses a particular question about how this right will play into the management and protection of resources.

workshop participants and Sanctuary Advisory Council members noted that government agencies often are faced with the challenge of knowing which community members or groups to work with; this can be a difficult and time consuming process, but should be addressed and worked out at the community level. Additionally, recent legislative developments like the codification of the `Aha Moku system may offer potential guidance in addressing this question.

The relationship between biodiversity and cultural diversity has been globally recognized (Posey 1999; Harmon 2002; Stepp et al 2002; Carlson and Maffi 2004; Maffi 2007; Kassam 2009). This has led to projects across the world focusing on biocultural diversity and resource management. It is widely acknowledged that ecological resilience is linked to the resilience of its human community (Berkes and Folke 1998; Rapport 2007; Rapport and Maffi 2010). Among researchers, biocultural diversity is defined as follows: “Biocultural diversity comprises the diversity of life in all of its manifestations – biological, cultural, and linguistic – which are interrelated (and likely co-evolved) within a complex socio-ecological adaptive system” (Maffi 2007).

Maffi and Woodley (2010) identify three “entry points” whereby biodiversity projects make connections between biodiversity, cultural diversity and linguistic diversity:

- Biological diversity: The *conservation of biological diversity* achieved by supporting or reviving local cultures and languages or elements of those that ensure (or ensured in the past) biodiversity conservation.
- Knowledge, practices and beliefs: The *maintenance or revitalization of cultural knowledge, practices (management and use) and beliefs* associated with the conservation of biodiversity.
- Language: The *maintenance or revitalization of local languages, or aspects of a language* that embody information about the natural environment.

Analysis of other biodiversity projects may inform the implementation of a new framework in Hawai`i by conceiving of means by which resource responsibilities can be emphasized in communities. Biodiversity projects that emphasize the importance of biodiversity conservation in traditional knowledges and place based identity, strengthen a sense of responsibility (Maffi and Woodley 2010).

We believe there is tremendous potential in enhancing these entry points to make strong connections between biodiversity, the Hawaiian culture and the Hawaiian language.

Entry Point	Example
<b>Supporting or reviving local cultures and languages or elements of those that ensure (or ensured in the past) biodiversity conservation</b>	Kapu system.
<b>Maintenance or revitalization of cultural knowledge, practices (management and use) and beliefs associated with the conservation of biodiversity</b>	Ahupua`a based planning and management.
<b>Maintenance or revitalization of local languages, or aspects of a language that embody information about the natural environment</b>	`Ōlelo Hawai`i, especially research about lawai`a, mahi`ai, concepts about wao, etc.

***Need for Identifying Uses and User Groups***

While there continues to be a growing and global recognition of the need to conserve and protect our biocultural resources, there is also a growing appreciation that protected areas can have both positive and negative socioeconomic impacts on stakeholder communities (Wilkie, D, 2006). Therefore, it is critical to begin developing a process whereby different user groups and their respective uses can be identified and distinguished. The International Institute for Environment and Development (IIED) released a publication in which they noted:

A common factor is that protected areas can affect the rights (both positively and negatively) of local people with respect to access and/or control over the protected natural resource, and related benefits. This suggests that an important early step in defining a conceptual framework is to understand the various property and other rights as defined by different stakeholders (including overlaps and existing or potential conflicts) with further discussion about how these rights are affected by the protected area (Schreckenberg, K et al, 2010).

Therefore, we have created a glossary that integrates traditional Hawaiian roles and compares them to potential existing user groups, identifying in part uses as related to the resources.



## Glossary of Traditional and Modern Roles of Relationship to Resources

Hawaiian Role	Definition	Western / Legal Term	Legal Definition	Example
<b>Haku</b>	<p>1. n. Lord, master, overseer, employer, owner, possessor, proprietor. A chief was often addressed as ē ku‘u haku, my master.</p> <p>2. vt. To compose, invent, put in order, arrange</p>	Owner	The person in whom is vested the ownership, dominion, or title of property; proprietor.	Kamehameha Schools / Bishop Estate
<b>Kahu Waiwai</b>	n. Trustee, executor. <i>Lit.</i> , custodian of wealth or property.	Trustee	Entity appointed, or required by law, to execute a trust; one in whom the power is vested, under an express or implied agreement to administer or exercise it for the benefit or to the use of another.	Papahānaumokuakea National Marine Monument (co-Trustees)
<b>Luna</b>	<p>1. loc.n. High, upper, above, over, up;</p> <p>2. n. Foreman, boss, leader, overseer, supervisor, headman, officer of any sort, commissioner, superintendency, control, rule.</p>	Manager	Entity with legally delegated authority, under an express authority to act in a manner consistent with legal or legislative mandates or responsibilities.	DLNR; HIHWNMS

Hawaiian Role	Definition	Western / Legal Term	Legal Definition	Example
<b>Mālama</b>	1. nvt. To take care of, tend, attend, care for, preserve, protect, beware, save, maintain; to keep or observe, as a taboo; to conduct, as a service; to serve, honor, as God; care, preservation, support, fidelity, loyalty; custodian, caretaker, keeper.	Steward/Guardian	Person lawfully invested with the power, and charged with the duty, of taking care of the person and managing property of another.	Organizations with DLNR Stewardship Agreements
<b>Pūlama</b>	1. vi. To care for, cherish, treasure, save. He waiwai nui ke aloha, ‘o ka‘u nō ia e pūlama nei, love is of great value, it is what I do cherish.	Caretaker	De facto relationship of stewardship whereby an individual or organization cares for a resources without express permission or agreement.	Hawaiian families who have cared for resources for generations.
<b>Kālepa</b>	1. nvt. Trader, merchant, salesman, peddler; to trade, sell as merchandise, peddle; mercantile. <i>Lit.</i> , to strike flag, so called because a salesman hoisted a small flag to show that poi or another article was for sale. Moku kālepa, trading ship.	Merchant	A person who carries on trade with others, or buys and sells wares and merchandise.	Commercial fisherman; tour operators.
<b>Lawai‘a</b>	1. nvi. Fisherman; fishing technique; to fish, to catch fish.	Fisherman	A person who captures fish or other animals from a body of water, or gathers shellfish.	All fishers and gatherers of ocean resources for subsistence purposes are <i>Lawai‘a</i>

Hawaiian Role	Definition	Western / Legal Term	Legal Definition	Example
<b>Ohana Hawai'i</b>	Family unit. Sometimes multigenerational.	Families	A collective body of persons who live in one house under one head or manager.	
<b>Po'e Ho'onanea</b>	A person who uses the resource to <i>nanea</i> : 1. nvs. Of absorbing interest, interesting; fascinating, enjoyable; repose, leisure, tranquility; relaxed, at ease, at leisure, amused, engaged with, busy with; to have a good time. He hana nanea ke kui lei, lei making is pleasant. ho'o.nanea To pass the time in ease, peace, and pleasure; to relax, lounge, repose; absorbed, contented.	Recreational Users	A person to whom permission has been granted, without the payment of a fee or consideration to the owner, lessee, or occupant of the premises, to enter upon the land to engage in recreational pursuits.	The body surfers at makapu'u beach are <i>Po'e Ho'onanea</i> . Recreational fishers are also <i>Po'e Ho'onanea</i> ; distinction from subsistence fishing.
<b>Po'e Kupa'ai</b>	1. nvi. Citizen, native; well-acquainted. Kupa no ka 'āina 'ē, alien. Kupa 'Amelika, American citizen. Kupa 'ai au, native-born long attached to a place;	Multi-generational non-Hawaiian resident	Persons or person residing or having domicile in the place, where the person is descending from several prior generations.	Nissei, sansei (second-, third-generation from Japanese immigrants)
<b>Kūwaho</b>	vs. Outside, outer, foreign. <i>He who stands outside.</i>	New Resident	A person who has not resided in the place long enough to meet State requirements for domicile, typically 6 months.	New residents and long time visitors are kūwaho.

Hawaiian Role	Definition	Western / Legal Term	Legal Definition	Example
<b>Malihini</b>	nvs. Stranger, foreigner, newcomer, tourist, guest, visitor company; one unfamiliar with a place or custom;	Visitor/Traveler	A person who moves between distant geographical locations, to areas where he is not domiciled.	Short time visitors, no matter how frequent with no residency are malihini.

*Additional consideration of varied roles*

**Management** can be retained, delegated or shared by legal authority.

**Stewardship** includes some “legal responsibility” / liability – i.e., DLNR “Stewardship agreement.”

Once roles can be assessed, a mechanism for identifying use, benefits and impacts with a correlating responsibility should be considered. A responsibility based ecosystem management model would place great emphasis upon balancing use and responsibility. With growing uses from non-traditional and non-resident users, there is a need to develop a mechanism to balance and off-set those uses with some kind of compensation for any potential displacement or impact on traditional uses or sustainability. It is also critical to begin to enhance economic analysis of conservation and non-use of Hawai`i's biocultural resources.<sup>3</sup>

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<sup>3</sup> There is quantifiable economic benefit during the prohibition (non-use) phase of the kapu system. From an economic perspective, the total value provided by an ecosystem or a species can be distinguished into several components, on the basis of the particular ways in which the system benefits humans and is measured by the perceived relative benefits society receives from the various uses to which it puts the resources at its disposal (Kroeger and Manalo, 2006). For the nonuse phase of a species or geographic area, there are two categories that the resource (species or geographic area) has quantifiable economic value, passive-use value and indirect value.

The vast majority of empirical studies on the economic value of preservation have focused on recreational benefits (Walsh, Johnson and McKean, 1989). Such studies underestimate the economic value of preservation because they are designed to capture only a portion of the benefits. These studies fail to account for the economic value that accrues to people who do not use the resource in a conventional sense. Many people derive satisfaction in a passive manner, and this economic value is labeled as passive-use value. Passive-use value can take three distinct forms: existence value, option value and quasi- option value. In the case of existence value, a person derives satisfaction simply from knowing that a resource exists. There are several possible motives underlying existence value. These may include altruism, the desire to leave a bequest to future generations, or perhaps the capacity of people to derive satisfaction directly from the knowledge of the existence of certain species or wild areas. Existence value has been identified in a variety of contexts, including natural resources, places of historic significance, and great works of art. The importance of passive-use values has been confirmed also for improvements in environmental quality, such as forest health, and water quality of lakes and rivers (Whitehead and Groothuis, 1992; Banzhaf *et al.*, 2004), or improvements in endangered species populations (Olsen *et al.*, 1991; Hagen *et al.*, 1992).

The second category of economic value for the non-use phase is classified as an indirect value. Ecosystems or individual species contribute to economic production indirectly through their functional activities that enter the human production of goods and services (Barbier, 2000). In economic and ecological terminology, these activities are referred to as ecosystem services or functions (Costanza *et al.*, 1997; Daily *et al.*, 1997). Most economic analyses of the goods and services produced in a geographic area have tended to ignore ecosystem service values (Kroeger and Manalo, 2006). Instead, economic analysis commonly focuses on human-produced goods and services only, without recognizing explicitly the value of the ecosystem inputs (Kroeger and Manalo, 2006). In addition to providing the direct uses, ecosystems and individual species contribute to the production of many goods and services in the human economy (Daily *et al.*, 1997; Balmford *et al.*, 2002). For example, forests moderate the intensity of surface run-off from storm events. This reduces the erosion of topsoil in surrounding areas and the leaching out of soils of macro-nutrients and trace minerals essential for plant productivity. Through the functions they perform as part of the hydrological system of an area, forests also reduce fluctuations in soil moisture in surrounding areas that in their absence would result from storm events and droughts. This moderating influence on nutrient leaching and soil moisture fluctuations improves the productivity of surrounding agricultural areas and reduces the requirement for manufactured inputs such as fertilizers. (Kroeger and Manalo, 2006)

Neglecting the value of environmental services often generates grave misperceptions as to what makes human economies function, and there has been a recent realization in the economics profession that nature provides real contributions to human welfare that go beyond its use as a mere supplier of immediate physical inputs for the production of goods in the human economy (Hall *et al.*, 1986; Cleveland and Ruth, 1997). A rigorous analysis of the relationships between ecosystem functions and human well-being, and an integration of ecological services into existing economic accounting systems are needed if the goal is to achieve economically sensible natural resource policies (Banzhaf and Boyd, 2005).

A potential mechanism for identifying a resource user's responsibility would be to develop a mechanism for qualitative or quantitative analysis of factors in relationship to the resource:



This model would require prioritizing relationships to the resource. This is critical because it can inform use and need priorities. It can also support and reinforce government mandates that call for protections of kaumaha resources, like fresh water resources or food resources.

Subsistence living represents an essential sector of Hawaiian living. This cherished method of living focuses on the development of the “customary and traditional uses... of wild and cultivated renewable resources for direct personal or family consumption and for customary trade” (Mcgregor 2007). In addition to providing sustenance for the physical well-being of a family, subsistence activities benefit family cohesion, health, and community well-being through strengthening ties to the physical location and personal surroundings. Therefore, the benefits of maintaining a wealth of subsistence activities can be seen from multiple sectors. For example, “a subsistence economy emphasizes sharing and redistribution of resources, which creates a social environment that cultivates community and kinship ties, emotional and interdependency and support, prescribed roles for youth, and care for elderly” (Mcgregor 2007). Also, equally

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<sup>3</sup>Assessing the value of environmental goods and services not commonly traded in markets is difficult, because there are no prices that could serve as indicators of value. This does not mean that humans do not value them: empirical research clearly has shown that the natural world provides benefits to individuals that are not accounted for in markets, and that people are willing to pay for enhancements in the quality of natural environments (Krutilla and Fisher, 1985).

important is the maintenance of environmental resources by subsistence farmers and fishers as the values and practices conducted by those who live off the ‘āina are in sync with the values and needs of the resources themselves. Above all it is imperative to protect subsistence living because of the way that it re-connects us all to the foundation of Hawaiian spirituality, Aloha ‘Āina. Subsistence activities promote and reinforce the use and understanding of traditional place names and meanings, ancient sites, and endangered species. We have identified subsistence and food security as the highest and best use of coastal resource ecosystems in this manner. This knowledge and practice is critical to the protection and sustainability of both natural and cultural resources – as it reinforces the “i ka wā ma mua, i ka wā ma hope” concept – the essential link between Hawai‘i’s past and future.

The following is an integrated process for the management of resources that promotes and perpetuates co-existence between human and ecological communities. It is important to emphasize its built-in transparency, sustainability and adaptation components. We must recognize that as the speed of ecological change, and potentially deterioration, increases, so must our ability to adapt increase in speed and efficacy.

## STEP ONE: STRESSOR OR MANDATE

**Conservation action is initiated by an actor (community, government, resource owner or private entity).**

Examples:

- Community identifies need to develop conservation area in order to protect resources for sustainable use(s) (e.g. Ha`ena, Miloli`i);
- DLNR has legislative mandate to protect 10% of watersheds;
- Corporation wants to develop wind farms;
- Large land owner identifies need to manage land resources.

## STEP TWO: RESEARCH FRAMEWORK DEVELOPED

**Collaborative group of actors (including community, government, resource owners and developers, when applicable) collectively develop a process for gathering “best information available” to be used in assessment of resource(s).**

Key points:

- Utilize principle of “a`o aku, a`o mai” (reciprocal learning) to identify collective needs and research questions;
- Outline a management and legal / legislative framework that explains roles and responsibilities while managing expectations and maximizing transparency;
- Engage as many interagency partners as possible.



## STEP THREE: DATA COLLECTION

**Government, resource owner or developer provides resources to collect data for a biocultural survey of resources / socioeconomic assessment.**

### Methodology

- Utilize “makawalu” principle (multidisciplinary / traditional approach and perspective, literally, “eight eyes”);
- Utilize partnerships for research to leverage resources and maximize financial efficacy (i.e., work with and build upon work with other researchers for data collection and analysis);
- Observation based research used cooperatively with other forms of research that measure common needs / identify common language to enhance community engagement and vesture;
- Full survey of traditional ecological history, including history of use and non-use (kapu).

## STEP FOUR: DATA ANALYSIS

### Identification of “Most Effective and Sustainable Use(s)”

#### Elements:

- Data is shared with community for validation;
- Consensus is reached to use data as “best information available”;
- Data is significantly reflective of traditional values, beliefs and practices (i.e., kapu system and its history with resource, including Hawaiian language);
- Collective and consensus identification of “kaumaha” resources and non-uses;
- Assessment and prioritization of biocultural resources, and agreed upon means for assessing their significance.

## STEP FIVE: GOALS, TARGETS, IMPACTS

**Collective identification of biocultural resource goals and targets, including draft action plan for use and management of resources that considers socioeconomic impacts**

Steps:

- Resource goals are co-developed with community based on data;
- Resource targets include both biological and cultural resources;
- Inclusion of human welfare targets (consideration of balance and off set, including consideration of socioeconomic impacts and identification of measurable indicators of impacts);
- Financial resource sustainability developed;
- Draft Action Plan written (“official action,” which triggers applicable laws);
- Clear, written documentation of community participation and support.

## STEP SIX: COMPLIANCE

**Official actor undertakes compliance with applicable federal, state and municipal laws**

Elements:

- Environmental / Historic Preservation Disclosure documents / permitting;
- Mitigation plans formalized;
- Interagency review conducted as required;
- Public hearings held as required by applicable law(s);
- Public hearings coordinated with community partners.



## STEP SEVEN: FINAL ACTION

### Collective plan revision and development of final action plan

#### Steps:

- Collective goals and targets revised and finalized (including human welfare targets);
- Collective identification of direct threats and plans for redress;
- Roles and responsibilities identified, assigned and contractually formalized;
- Final interagency reviews conducted as required;
- Final public hearings conducted as required.

## STEP EIGHT: IMPLEMENTATION

### Collective implementation of action

#### Elements:

- Enforcement needs considered and implemented;
- Enforcement embraces community role and traditional practices (kapu);
- Long term mechanism for review, evaluation and accountability formalized and implemented (i.e., execution of MOA, PA, or other agreements);
- Legal authority delegated to community actors.

## STEP NINE: SUSTAINABILITY

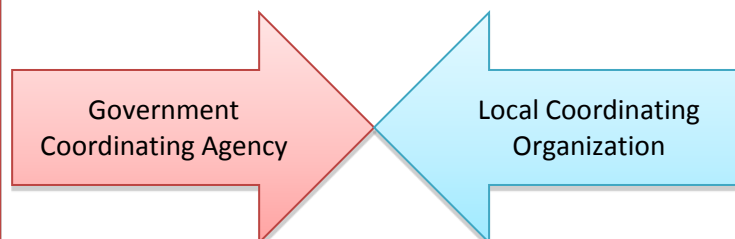
**Collaborative group continue to work and meet regularly to maintain relationship, sustainable uses and ensure adequate financial resources are flowing into management of resources**

- Government / Community Relationship is implemented

## Government / Community Relationship

(not necessarily applicable where there are large landowners involved)

- Lead agency
- Coordinates interagency communication to local coordinating organization
- Coordinates interagency resources
- Coordinates policy and regulatory actions



- Lead community organization
- Determined by community approved process
- Coordinates stakeholder / community engagement
- Involvement is institutionalized / formalized

### PURPOSES / GOALS OF RELATIONSHIP

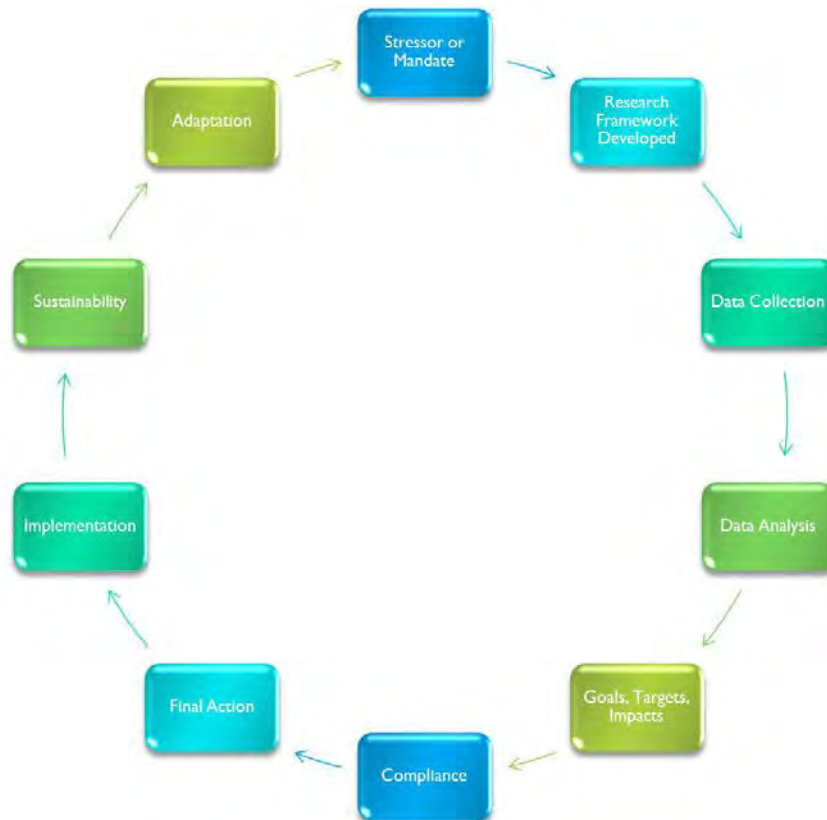
- **Bridge gap:** identify terms of engagement; “points of entry” for input and engagement by larger community or stakeholders; communicate process to larger community or stakeholders.
- **Maximize communication throughout process:** Establish a “decision tree”; identify and community process and timeline co-management and/or decision making.
- **Share resources priorities and goals**
- **Validations of goals and information**
- **Create a collective decision making space**
- **Enhance local monitoring engagement**
- **Address enforcement needs / issues:** coordinate training for documentation and/or reporting; consideration of community enforcement; opportunities for employment and/or education.
- **Facilitate obtain funding / resources for community**
- **Codify and facilitate evaluation, assessment and accountability**

# STEP TEN: ADAPTATION

**Assessment and evaluation of efficacy of resource management, modification and/or adaptation of management occurs as necessary**

- ▶ Strong, pre-determined and collectively agreed upon mechanisms for community concerns to be addressed and redressed;
- ▶ Accountability for mismanagement;
- ▶ Formalized agreement as to “successful management” and understanding as to when adaptation is appropriate;
- ▶ Agreed upon mechanisms for conflict resolution;
- ▶ Regular reviews and assessments established.

## Cyclical Management Process



## *Opportunities for the Resource Management Entities in Hawai'i*

The workshop provided vital and important guidance which can be applied to a range of resource management entities and their respective kuleana to resources and communities. It offered 1) a series of potential management strategies, 2) a draft framework for developing a management regime that integrates community knowledge and resources while implementing a government facilitator role (which does not require an increase in resources, thus addressing community concerns about ever-expanding government). It also offered 3) a range of values to incorporate into the strategies and actions of the management plan for the sanctuary in particular, and 4) tools for assessing, evaluating and prioritizing need and uses which would be applicable to assessing, evaluating and prioritizing the management options (in the sanctuary's case, this is applicable for recommendations from working groups).

For the Hawaiian Islands Humpback Whale National Marine Sanctuary, this in whole offers a foundation upon which to model efficient governance and prudent funding resource management. The proceedings and recommendations herein are also transferrable to other agencies and entities with resource management responsibilities. They build upon existing efforts and literature, while offering opportunity for additional input and modification.

Ultimately, with the sanctuary, as with any government agency, the onus is on the entity with the legal decision making authority to find where it has the discretion to expand consultation and enhance data collection to utilize this guidance to its full potential. We are hopeful, based on the strong favorable response to this document, that entities will recognize that this framework offers a wholly possible opportunity to improve decision making and enhance conservation management in Hawai'i.

The workshop itself served as an example of how diverse experts can gather to address increasingly complex and difficult biocultural conservation issues. Through commitment and leadership, great strides will continue to be made to dialogue and debate through the conservation challenges that lay ahead for Hawai'i.

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## Short Biographies

*Alphabetical by first name;*

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**Adam A. Pack, Ph.D.** is an Associate Professor in the Departments of Psychology and Biology at the University of Hawaii at Hilo. For the past 25 years, he has been conducting scientific studies and publishing research articles on dolphin cognition and humpback whale behavior in the Hawaiian Islands. He is also an Associate Editor of the journal *Marine Mammal Science*. For the past four years, Adam has occupied the research seat of the Hawaiian Islands Humpback Whale National Marine Sanctuary Advisory Council (SAC). He is currently the elected chair of the SAC.

**'Aulani Wilhelm** is the superintendent of Papahānaumokuākea Marine National Monument.

**Brenda Asuncion** is from Waipio (Ewa, O'ahu), and is a policy specialist for the Hawaiian Islands Humpback Whale National Marine Sanctuary. Her responsibilities include coordination of community engagement initiatives, and support for the Native Hawaiian subcommittee of the Sanctuary Advisory Council. She received her Bachelor of Arts in Biology at Occidental College in Los Angeles, and her Master of Science in Marine Science at Hawai'i Pacific University.

**Donna Wieting** is the Deputy Director for NOAA's Office of Ocean and Coastal Resource Management. She is currently on detail with the Hawaiian Islands Humpback Whale National Marine Sanctuary and the Pacific Services Center.

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**Gerry Davis** is the Assistant Regional Administrator for the Habitat Conservation Division of the National Marine Fisheries Service, Pacific Islands Regional Office. He is responsible under several federal mandates to effectively manage marine habitats for all US federal jurisdictions in the Western Pacific, including American Samoa, Guam, Hawaii and the Northern Mariana Islands. This includes permitting and consultation considerations for any actions using federal action (US funds or federal ownership) under Essential Fish Habitat, Fish and Wildlife Coordination Act, and coral reef impact under the Clean Water Act. He oversees 13 staff, all Divisional operations, programs and budgets including offices in American Samoa, Guam, Hawaii and CNMI. He has over 30 years of experience working in Pacific Islands on coral reef fishery management and protection issues. This work has relied on strong partnering skills across local and federal governments, focus groups and the community in many Pacific Island areas.

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**Guy H. Kaulukukui, Ph.D.** is the Deputy Director of the Department of Land and Natural Resources for the State of Hawai'i.

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**John N. ("Jack") Kittinger, Ph.D.** is a human geographer and coastal ecologist with broad interests in understanding and advancing solutions to complex problems that face society and the ocean environment. His research explores how social,

economic, and cultural factors influence the ways in which people use, perceive, and govern natural resources, with a particular emphasis on using applied social science to inform environmental management, planning and policy. He has extensive experience coordinating multi-disciplinary teams in cross-cutting research and frequently works with other researchers on social-ecological systems research. Many of Dr. Kittinger's research projects have focused on applying the results of basic research to community planning and management and he often collaborates with scientists, managers, and community stakeholders in knowledge-to-action partnerships to bridge science to policy and practice. His current research focuses on linking ecosystem services and food security to community well-being, collaborative planning and resource co-management, and social resilience and vulnerability to environmental and social change. Dr. Kittinger works primarily in Hawai'i, the Pacific Islands, and the Asia-Pacific region.

Dr. Kittinger received his PhD from the Department of Geography at the University of Hawai'i at Mānoa, his MS in Marine Science and Environmental Studies from the University of San Diego and his BS in Biology from the University of North Carolina at Chapel Hill.

**Joe Paulin** coordinates a 34 person Sanctuary Advisory Council comprised of various stakeholder, state and federal agency representatives for the Hawaiian Islands Humpback Whale National Marine Sanctuary. Additionally, Joe works with sanctuary staff and management on policy-related issues and the sanctuary management plan review process. Prior to joining the sanctuary team, Joe was the Acting Wildlife Specialist for Rutgers University Cooperative Extension where he lead a statewide research, outreach and education program focused on wildlife conservation, damage management, and resolving human-wildlife conflicts. As a Peace Corps Volunteer in Madagascar, Joe worked with local villages, researches, and NGOs on projects involving endangered turtle research and conservation, resolving human-crocodile conflicts, and the role of traditional beliefs and cultural practices in conservation efforts. Joe has also gained experience on research and restoration projects involving riparian restoration, watershed management, and alternative energy production. He has hands-on research experience with the American black bear, Nile crocodile, and Madagascar big-head turtle.

**Kaipo Perez III** was raised in an 'ohana lawai'a or fishing family. They instilled great lesson of stewardship, conservation, and sustainability. Currently he is pursuing a doctoral degree in zoology with a focus in marine ecology at University of Hawai'i at Mānoa. As part of his dissertation he is trying to ecologically evaluate coral reef resources at Kahalu'u Bay, Hawai'i. In addition he is trying to bridge the gaps between science and culture through the incorporation of traditional ecological knowledge.

**Kanani Frazier** was born and raised on Hawai'i island (Ola'a and Miloli'i). She received her BA in Biology from the University of Hawai'i at Manoa. Kanani is fluent in Hawaiian language, she graduated from Ke Kula 'o Nāwahīokalani'ōpu'u on Hawai'i island. She began working at the Hawaiian Islands Humpback Whale National Marine Sanctuary as an intern through the Hawaii Institute of Marine Biology and NOAA Partnership Fellowship Program. Kanani currently works at the sanctuary's Kona office on Hawai'i island as their Programs Assistant.

**Kehau Watson, Ph.D., J.D.** holds the Native Hawaiian seat in the Sanctuary Advisory Council for the Hawaiian Islands Humpback Whale National Marine Sanctuary. She is also the chair of the Native Hawaiian subcommittee.

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**Malia Chow, Ph.D.** is the superintendent for NOAA's Hawaiian Islands Humpback Whale National Marine Sanctuary. She grew up on the island of O'ahu, received her Bachelor's of Science Degree from the University of Washington and went on to obtain her Ph.D. in cellular and molecular biology from the University of Pennsylvania. She also trained as a post-doctoral fellow at the University of Maryland's Center of Marine Biotechnology. When Malia returned home, she began working as a researcher at the University of Hawaii's Hawaii Institute of Marine Biology on Coconut Island where she gained a

tremendous appreciation of the unique and fragile marine resources of the Hawaiian Islands. Malia is committed to increasing opportunities for local students to be involved in Hawaii's environmental issues and has worked extensively with the Hawaii State Department of Education to develop inquiry based high school science curriculum and seeks opportunities for students to be involved in place based environmental projects.

**Mehana Blaich Vaughan** was raised in Halele'a, Kaua'i. Her doctoral research at Stanford University focuses on collaborative management of coastal resources at the ahupua'a level in Hawaii, and on how to integrate customary practices into law. She is a teacher, with a background in 'āina based education programs on Kaua'i, and with Hawaiian charter and immersion schools.

Born and raised in Hawaii, **Noa Kekuewa Lincoln** connects strongly with the Hawaiian culture, which places environment at the core of human well-being. This cultural value has become the backbone of his professional and academic accomplishments, and the guiding principle that he brings to all. Traditionally he has worked in marine and terrestrial ecosystem restoration and conservation around the Pacific, particularly with indigenous Polynesian groups. His efforts are always coupled with cultural and environmental education and community engagement. Along these lines he has engaged in research focused on coral reef reproduction and mortality, biodiversity enhancement in forest ecosystems, large and small scale restoration on private lands, and cost-benefit analysis of conservation efforts. Bringing together concepts of decision analysis, ecosystem services, and economics he has provided consultation for a number of significant organizations. By synthesizing rigorous technical data, social values, and anticipation of future issues management decisions are interpreted for influential players. Examples include include "Assessment of Water Resources and Suggested Tribal Water Strategy" produced in 2006 for a tribal corporation in New Zealand, "Carbon Measurement Technologies and Risk Management Strategies" produced for the EDF in 2008, and "Strategies for Engaging in Culturally and Ecological Sustainable Tourism" produced for the Bishop Estate in 2007. His recent engagement in Hawaii's agricultural sector has led to a broader look at the intersection of land use, culture, and economics. Research interests examine combining traditional and modern knowledge of land management to evaluate corporate and policy decisions from a social utility, rather than an economic, basis.

**Rob Toonen, Ph.D.** During my research career, I have used a variety of approaches including individual behavioral assays, ecological experiments in both the field and laboratory, and molecular genetic tools in an effort to address a variety of interesting questions. In the process, I have conducted or collaborated on a wide range of research projects centered on marine invertebrates. These projects include jellyfish feeding behavior, chemical defenses of coral reef sponges, genetic structure and patterns of speciation in corals, cues for larval settlement, population genetics and phylogenetics of marine invertebrates, and marine ornamental culture.

Much of my current research focuses on the processes that influence dispersal and recruitment in coastal marine invertebrates, and I am particularly interested in the evolutionary consequences of larval developmental modes among marine invertebrates. In general, I try to approach my research from an ecological perspective to scale up from genes to individuals to populations, and ultimately to the micro- and macro-evolutionary consequences of the processes I study.

Ph.D. 2001, Center for Population Biology, University of California, Davis

M.Sc. 1993, Marine Sciences, University of North Carolina, Wilmington

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**Sarah Mesnick, Ph.D.** is the Science Liaison for the Southwest Fisheries Science Center (SWFSC), an ecologist in the SWFSC's Protected Resources Division, and co-founder of the Center for Marine Biodiversity and Conservation at Scripps Institution of Oceanography, U.C. San Diego. Her research focuses on the behavioral ecology of marine vertebrates in pelagic ecosystems. The main goal of these studies is to provide a behavioral framework within which to investigate population identity, population trends, and fishery interactions in cetaceans, and to bring a behavioral perspective to our understanding of the dynamics of marine mammal populations and human interactions. As the Center's Science Liaison, she provides direction and support for the SWFSC's external relations, the development of cooperative programs and the dissemination of SWFSC's science. Major activities

include: serving as the SWFSC's liaison with agency and legislative offices, constituents and the public; developing the broader impact of SWFSC science and research programs; and working with individual scientists to build cooperative programs with academia, other governmental agencies and key constituents.

Born in Hawai'i and of Hawaiian ancestry, **Stephanie Dunbar-Co, Ph.D.** was raised with a strong appreciation for things Hawaiian. Since childhood she's has been fascinated by Hawai'i's unique and beautiful assemblage of native plants. Steph grew up on Molokai where her family's land comprises the ahupua'a of Kainalu. This land was once covered in native forest, but has since degraded due to an influx of invasive plants and animals. This perspective led Steph to earn MS (2004) and PhD (2008) degrees in Botany from the University of Hawai'i. Steph's PhD research focused on the evolution, ecology and conservation biology of the endemic and endangered Hawaiian *Plantago* lineage (Laukahi kuahiwi). Since graduating Steph has been involved in coordinating the Ala Pālā'au Project, managing family land on East Molokai, and helping advise the Molokai Land Trust. Currently, she is coordinating an effort to extend the East Molokai Watershed Partnership (EMoWP) along south and northeastern Molokai.

**Ulalia Woodside** is currently the Regional Manager for Kamehameha Schools' Natural, Cultural and Community Resources unit of the Land Assets Division, which includes the land management of over 200,000 acres on Hawai'i, O'ahu and Kaua'i. In addition, her team is also responsible for the development and implementation of programs to steward natural resources (Mālama 'Āina), and increase understanding and preservation of cultural resources (Wahi Kūpuna) on the more than 340,000 acres of KS' agriculture and conservation lands.

Ulalia is a Kumu Hula completing the 'uniki rites of her family's genealogical hula tradition under the direction of her maternal relatives. She also incorporates and continues her training in the disciplines of Hawaiian cultural practices as a student of lua, Hawaiian warrior arts. She holds Bachelor's degrees in Political Science and Hawaiian Studies, a Certificate in the Hawaiian Language, and completed her graduate coursework in Urban and Regional Planning from the University of Hawai'i at Mānoa.

Through local and national networks, Ulalia has collaborated to advance the research and discourse of cultural ecosystem services and the unique relationship of indigenous peoples to natural resources management. She is a contributing author to a text book and several journal articles on ecosystem services through her involvement with The Natural Capital Project case study for the InVEST (Integrated Valuation of Ecosystem Services and Tradeoffs) model, and the National Center for Ecological Analysis and Synthesis working group on cultural ecosystem services.

She also lends her passion to support Hawaiian bio-cultural landscapes by serving on the board of directors for Kauahea Inc. and the Lālākea Foundation, two organizations dedicated to the advancement of Hawaiian cultural practices and the preservation of the Hawaiian relationship to land.

# ALOHA 'ĀINA

*Bringing together Native Hawaiian and western science perspectives for collaborative stewardship of the biocultural resources in Hawai'i*



**A Primer Document for Workshop Participants**

**Technical Experts Workshop  
Hawaiian Islands Humpback Whale National Marine Sanctuary  
July 5-6, 2012 · 6600 Kalaniana'ole Highway, Honolulu, O'ahu**

**Major Contributors**

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## 1.0 Overview

Across the Hawaiian Islands, coastal communities have fostered important cultural connections to the resources of land and sea. Native Hawaiian societies developed sophisticated and complex management systems for ahupua'a resources (Malo 1951; Kamakau 1976; ʻŪi 1993; Kahā'ulelio 2006), and these traditional ecological knowledge systems and management practices continue to sustain local communities today. Given the importance of resources from the makai and coastal zones and the Hawaiian heritage of local communities, it is increasingly important to integrate traditional knowledge, practices, and aspects of customary management institutions into today's marine management context.

Integrating indigenous and western scientific knowledge forms and management practices is challenging, as often the culture, goals, social and ecological benefits inferred, institutional arrangements, and temporal and spatial scales of these systems differ (Cinner & Aswani 2007; Bohensky & Maru 2011; Kittinger et al., In prep). The purpose of this document is to give workshop participants a common framework and background to address these issues in our workshop and in the larger context of the Sanctuary's management plan review process and marine resource management generally. We should note at the outset that this review is not exhaustive; rather, it is meant to serve as a primer to get workshop participants thinking about some of the key challenges – and opportunities – to integrating customary and conventional management. Below, we provide a brief overview of three key focal areas relevant to these issues, which include:

1. *Guidelines for engagement with customary and traditional ecological knowledge.* By guidelines, we mean the basic foundational guidelines for engaging with and being cross-culturally sensitive and competent in accessing, learning about, and engaging with indigenous traditional knowledge and resource management practices.
2. *Models for integrating customary and conventional knowledge and management systems.* By models, we mean conceptual frameworks for integrating traditional and western scientific knowledge systems and management practices.
3. *Strategies for implementing 'integrated' approaches in planning and management.* By strategies, we mean the on-the-ground approaches, actions and management measures that can be utilized by managers, practitioners, policy-makers, and decision-makers to effectively integrate customary management approaches into resource management for the Sanctuary (and likely beyond).

Below, we provide brief overviews for each of these key areas for workshop participants, summarizing information from scholarly research and application in real-world contexts.

## 2.0 Guidelines for engagement with customary and traditional ecological knowledge

We reviewed basic foundational guidelines and first principles for engaging with and being cross-culturally sensitive and competent in accessing, learning about, and engaging with indigenous traditional knowledge and resource management practices. Table 1 presents preliminary guidelines for engagement with traditional ecological knowledge and customary management practices in Native Hawaiian communities, which if followed would serve to facilitate communication and understanding for the diverse set of

stakeholders involved in marine resource stewardship and management in the Hawaiian Islands (Chang et al. 2011; Hawai'i Conservation Alliance 2012).

**Table 1. Principles for culturally appropriate engagement with traditional ecological knowledge and customary management practices in Native Hawaiian communities. Adapted from Hawai'i Conservation Alliance (2012) and Chang et al. (2011).**

<b>Know the history</b>	Learn the history of Native Hawaiian relationships with the land and sea, especially when engaging with site-specific communities
<b>Understand Hawaiian values</b>	Understand and reinforce Native Hawaiian values that build appreciation and responsibility for natural resources
<b>Integrate Hawaiian concepts</b>	Increase the use of Native Hawaiian language, values and concepts in policy making, planning and practice (e.g., in traditional place names, naming of new species, the creation of job titles and programs)
<b>Seek permission</b>	Respectfully, seek out and ask permission to incorporate Native Hawaiian place-based knowledge
<b>Equity</b>	Integrated approaches must be designed to deliver benefits to all resource users, but should also recognize the primacy of Hawaiian heritage in our island communities
<b>Respect</b>	Native Hawaiian knowledge systems are to be valued, respected and protected, and not all information and knowledge is appropriate for sharing
<b>Reciprocal knowledge exchange</b>	Scientists, researchers and natural resource managers should become cross-culturally competent and ideally be involved in Native Hawaiian knowledge perpetuation and transfer within the scientific community; additionally, Native Hawaiian knowledge holders should get involved in science and management processes because these dual knowledge holders can play a vital role as “bridgers” in knowledge collaboration and learning networks

In order to access, learn, and apply indigenous knowledge and practices, engagement between Native Hawaiian and western practitioners would benefit from clear intentions and solid commitments in order to build long-lasting relationships. Such approaches may help to build trust between indigenous communities and other stakeholders involved in coastal conservation and resource management (Sullivan et al. 2001). Efforts to initiate engagement with Native Hawaiian ecological knowledge should ideally:

- Meaningfully engage with Native Hawaiian communities about place-based social, political and ecological knowledge;
- Increase efforts to recruit, train, and hire Native Hawaiians into organizations at all levels;
- Include stakeholder Native Hawaiian communities in development and implementation of resource management plans as appropriate; convene Native Hawaiian advisory bodies for planning and management consultation and advice;
- Work with and support Native Hawaiian practitioners on resource access and management issues;
- Actively explore and utilize Native Hawaiian resource management knowledge and systems for their modern relevance in finding approaches to sustainably manage resources for future generations;
- Work to rebuild and maintain the relationships tying Native Hawaiians to any given site;
- Encourage other agencies and landowners that work to sustainably manage Hawaiian ecosystems to unite Native Hawaiian and western science knowledge, values and approaches for more effective management of resources.

### 3.0 Models for integrating customary and conventional knowledge and management systems

Given the diversity of human institutions involved in coastal resource management – from community-based stewardship initiatives to international agreements for highly migratory stocks – it can be daunting to



consider general ways in which customary management can be implemented with conventional management efforts. Integrated approaches have been successfully implemented in a number of nations and territories in the Pacific region, including Palau, the Cook Islands, the Solomon Islands, Fiji, Samoa, Vanuatu and elsewhere (Graham and Idechong 1998; Johannes 2002; Cinner and Aswani 2007; Jokiel et al. 2011; Kittinger et al. *In prep*). These approaches can provide examples of how this has been approached elsewhere in Pacific Island contexts, and help catalyze the development of a model that is specific for coastal resource management in Hawai'i.

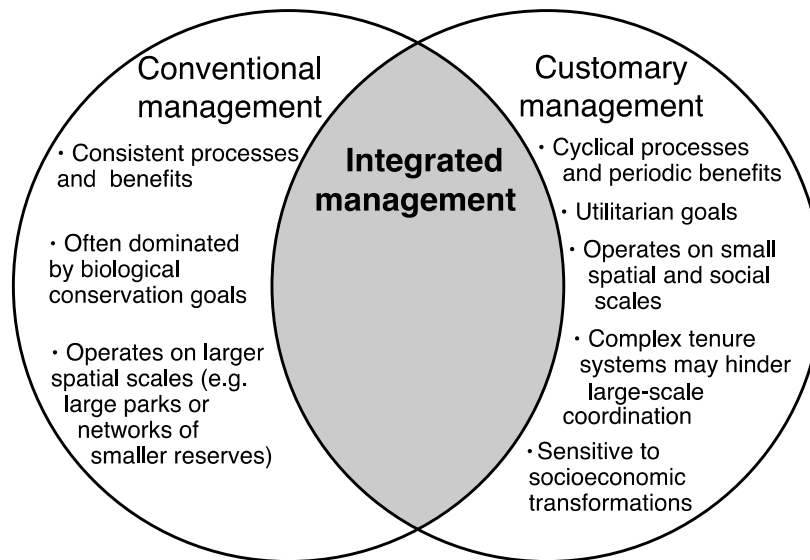
It is important to recognize that some fundamental differences exist between customary and conventional management systems. These systems may have contrasting goals, institutional arrangements, social and ecological benefits inferred, employ different incentives and deterrents, institutional and act on different spatial and temporal scales of management. Table 2 provides a comparison between customary and contemporary marine resource management in Hawai'i and ideas for integrated approaches that draw on existing or proposed actions.

Customary management approaches, and particularly Native Hawaiian ahupua'a management, are often held up as an example of ecosystem-based management (EBM). EBM is described as "an integrated approach to management that considers the entire ecosystem, including humans. The goal of EBM is to maintain an ecosystem in a healthy, productive and resilient condition so that it can provide the services humans want and need. EBM differs from conventional approaches that usually focus on a single species, sector, activity, or concern; it considers the cumulative impacts of different sectors" (McLeod et al. 2005). Core aspects of EBM have been articulated in the academic literature (e.g., Arkema et al. 2006; Crowder and Norse 2008; Foley et al. 2010), but conventional management approaches have largely failed to develop EBM approaches on the ground, which is due in part to the complexity of resource governance systems in coastal zones (Crowder et al. 2006) and the complexity of natural ecosystems themselves. The documented ability of Native Hawaiian customary management systems to protect and provide resources for coastal communities while maintaining ecological integrity (Kittinger et al. 2011; McClenachan and Kittinger 2012) points to the promise of integrating customary and conventional management that takes an ecosystem-based approach.

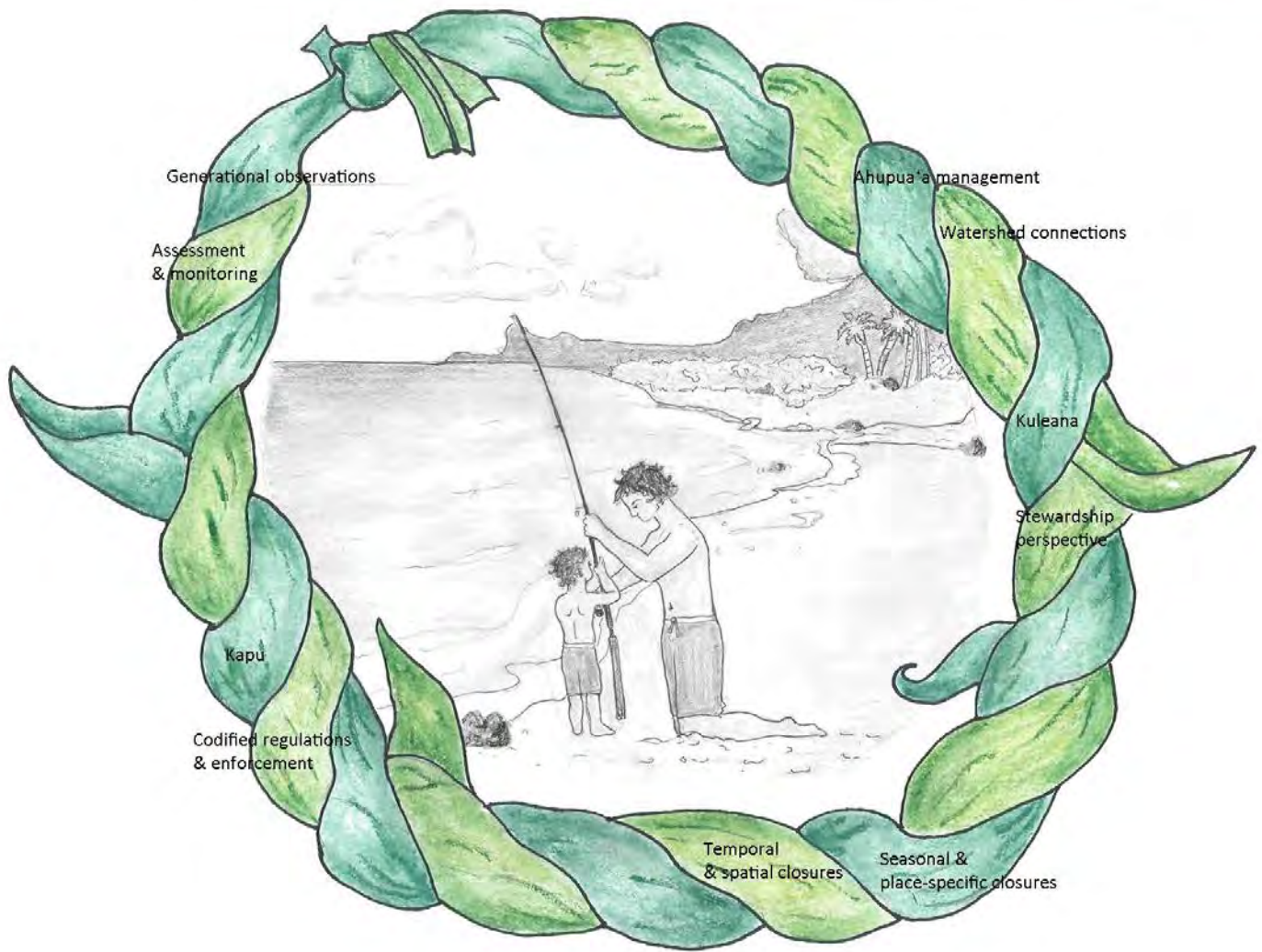
Several key strategies have been developed to integrate customary and conventional management systems. Drawing on lessons from terrestrial systems, the literature in marine systems, and their experience studying customary management systems, Cinner and Aswani (2007) developed a heuristic approach for developing integrated management systems (Figure 1). This figure provides an overview of some of the key differences between customary and contemporary fisheries management approaches. Another approach holds that management systems can benefit when diverse types of knowledge are combined (Folke et al. 2005). In this model, both indigenous and western knowledge forms retain their traditions, approaches and integrity, and the best that each has to offer is drawn upon for collaborative stewardship of biocultural resources (Bohensky and Maru 2011). For Hawai'i, we conceptualize this approach with a simple lei lā'i, where both knowledge forms are woven together to form a collective, collaborative management approach (Figure 3). In this collective model, each knowledge form and approach is acknowledged as fundamentally unique in their approach, and support each other rather than losing their individual character through integration.

Integrating customary management with conventional systems of management should ideally include extensive stakeholder and community engagement throughout the design, implementation, and

monitoring phases of a conservation program (Cooke et al. 2000; Mills et al. 2010). Such inclusive approaches can help to implement resource management in a culturally sensitive manner to increase compliance, efficacy of conservation actions, and the ability of the management arrangement to withstand social, political and environmental change. It is also important to note, however, that if improperly planned and implemented, efforts to integrate these systems may do more harm than good by eroding confidence not only in conventional science and management but also in traditional authority (Gelcich et al. 2006). For example, attempts to develop customary management into co-management arrangements have undermined and weakened traditional authorities and reduced the adaptive capacity of customary management institutions in Chile and the Cook Islands (Gelcich et al. 2006; Tiraa 2006). Inadequate understanding of local power structures and the sociocultural aspects of customary institutions and local resource users can thus lead to sub-optimal outcomes (Kittinger et al. 2012).



**Figure 1:** Properties of successful integrated management institutions. From Kittinger et al. (*In prep*), adapted from Cinner and Aswani (2007).



**Figure 2:** Weaving together traditional Native Hawaiian practices (dark green) and conventional management that takes an ecosystem-based approach (light green) to support shared visions of Hawaii with clean water, ahupua'a integrity, access to resources, and intergenerational transfer of knowledge. The terms in the lei illustrate concepts from both systems for a shared vision. The lei lā'i represents a collective approach, where both knowledge forms retain their integrity, and the best that each has to offer is drawn upon for collaborative stewardship of biocultural resources.

**Table 2.** Comparisons of customary and conventional marine resource management in Hawai‘i and application in integrated approaches. Adapted from Cinner and Aswani (2007: 203, Table 1), McClenachan and Kittinger (2012: Table 3), and Friedlander et al. (*In review*: Table 1). See also Jokiel et al. (2011:Table 1).

<b>Customary Management</b>	<b>Description</b>	<b>Conventional Management</b>	<b>Integrated approaches</b>
Spatial	Areas closed to fishing (kapu zones), which can be temporary or permanent (e.g., during Makahiki; rotating Aku/‘Ōpelu kapu)	Marine protected areas, temporary fisheries closures	Community managed marine areas, with established kapu zones to replenish resources if needed
Temporal	Restricting fishing/harvesting activities during specific days or periods. Often short in duration, specific to certain species, and for a specific event (e.g., for religious ceremonies, or to protect spawning aggregations)	Closed seasons	Community-based moon calendars that show which species are spawning and should be kapu
Gear	Prohibitions of restrictions on certain harvesting methods or techniques; Chiefly control of materials for fishing gears and boats, which limited access to some fisheries resources	Gear prohibitions	Restrictions on certain gears (e.g., for laynets, or no spearfishing with SCUBA)
Effort	Limits on who could access certain areas (e.g., only residents of an ahupua‘a could access the adjacent reef); Limiting who can harvest certain species, use certain gears, or fish certain areas	Permitting; Territorial user rights systems for fisheries (TURFS); Limited entry fisheries	Community-based subsistence fishing areas with rules that are developed in an inclusive, placed-based manner; Permitted access for local families or residents in a district (moku)
Species	Prohibitions on consumption of certain species, often related to class, gender, or lineage	Protection of vulnerable or endangered species	Bans on certain species until populations are regenerated; Limits on harvest for culturally significant species or resources that contribute significantly to local food security
Catch	Restricting the quantity of a harvest; Social norms discourage wasting and other harmful practices	Total allowable catch; Individually transferable quotas (ITQs)	Communal harvest events to sustain connections to local resources; Educational and outreach programs to connect community members and build social capital
Aquaculture	Creation of fishponds, stocked with wild caught juveniles, which sequestered nutrients from uplands and served as insurance against famines	Modern aquaculture	Rebuild and revitalize fishponds so they can provide fisheries resources to communities; Explore creation of Community Supported Fisheries (CSF) models to connect communities to local fishponds
Enforcement	Violations of customary restrictions resulted in sanctions or punishments that could be severe	Fines; Penalties; License revocation	Develop and implement a penalty schedule of graduated sanctions that includes community service by violators in restoration activities

#### 4.0 Strategies for implementing 'integrated' approaches in planning and management

Conceptual models can help define potential pathways toward integration but strategies are required to implement actions on the ground. Strategies include on-the-ground approaches, actions and management measures that can be utilized by managers, practitioners, policy-makers, and decision-makers to effectively integrate customary management approaches into resource management for the Sanctuary (and likely beyond). We have developed a general typology of different strategies that managers, scientists, and communities may use to integrate customary Native Hawaiian and contemporary management systems in coastal resource management in Hawai'i (Table 3). These strategies draw on existing reviews of these topics in the academic literature (e.g., see Cinner and Aswani 2007 and Bohensky and Maru 2011), and many of these strategies that have been used in Hawai'i and elsewhere in similar Pacific Islands contexts (e.g., Friedlander et al. 2002; Poepoe et al. 2003; Hā'ena Fisheries Committee 2011; HCF 2012; HCSN 2012; Friedlander et al. *In Review*).

**Table 3:** Key strategies for maintaining the resilience of integrated management of marine resources. Adapted from Kittinger et al. (*In prep*).

<b>Strategy</b>	<b>Description</b>
1. Reflect local socioeconomic and Native Hawaiian cultural conditions	Customary management strategies are diverse and place-based, and specific integrated management strategies should reflect the local context, capacity and needs of communities
2. Match varying social and ecological process scales	Integrated management efforts should ideally attempt to match the spatial scales of community-based management, with the scales of ecologically important processes such as herbivory, predation, and recruitment
3. Harness both ecosystem-based and customary knowledge systems	Resource management planning should rely on both western scientific data and analyses as well as traditional and local knowledge systems in developing resource plans; promote scientific leadership; provide opportunities to build local expertise and capacity
4. Establish "knowledge co-operatives"	Provide venues for informal and formal gatherings between practitioners to exchange knowledge and form learning networks
5. Incorporate legal capacity that is flexible and quick to respond to change	Develop legal and policy capacity to enact and enforce community-based management, ideally by strengthening the resilience of traditional authority structures upon which customary management practices depend
6. Maintain adaptive institutional architecture	Develop or maintain institutional arrangements and policies for community-based management that include aspects of key institutional design principles and which can allow for flexibility in response to changing social or environmental conditions
7. Embrace utilitarian nature of customary management	Preserving biodiversity and ecological integrity may be less important than utilitarian community goals such as ensuring traditional uses, resource security and sociocultural connections to place

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## 8. Recognize limitations

Integrated management may be limited in the scope and scale of the threats it can address and in its resilience to some socioeconomic processes, particularly those that extend beyond the local scale

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## 5.0 Conclusion

In conclusion, examples of successful integrated approaches in Hawai'i are widespread and include a diverse set of approaches, including: (1) community-based management (e.g., Community-Based Subsistence Fishery Areas or CBSFAs); (2) development and application of Hawaiian moon calendars for fishery management; (3) collaborative monitoring, assessment, and management of coastal resources (e.g., the 'opihi partnership); (4) initiatives that link communities together for learning opportunities and collaboration; and (5) other projects around the state (Freidlander et al. 2002; Poepoe et al. 2003; Kittinger 2009; Hā'ena Fisheries Committee 2011; Hanalei Watershed Hui 2012; HCF 2012; HCSN 2012). These examples illustrate the promise and future of integrated management in Hawai'i and point to a future of possibilities for better resource stewardship.

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