



Chapter 12

'Ua Mau Ke Ea O Ka 'Aina I Ka Pono

The Life of the Land is Perpetuated in Righteousness

Summary

In a traditional Hawaiian approach to conservation, humans play a central role in managing resources that are taken from the natural world. People are not viewed as a problem; rather, they are viewed as part of the living universe, with clear responsibilities to nurture the land in a reciprocal and sustainable manner. The land is typically *used*, not left alone, unless for reasons related to the use. The Hawaiian attitude boils down to establishing a relationship between people and their lands. For native Hawaiians, these islands are the “*one hānau*” the “birth sands” and so it is a responsibility to know your lands and care for them¹. Practiced ideologically, a relationship grows out of long-term, intimate knowledge of species and ecological systems. This relationship is not about total preservation, it is about sustainable use. Hence, it may differ from the traditional western environmentalist approach of a “hands off” management style. Rather, sustainability in the traditional Hawaiian sense is about “hands on” in a sustainable manner. The trick, sometimes achieved, and sometimes not, is to reach that ideal level of sustainability.

Although there are a myriad of natural hazards and stewardship issues in Hawai‘i, there are also overarching themes suggesting how we might effectively manage negative impacts. A unified governmental vision, a more holistic view of natural systems that is place-based, and a reintroduction of ahupua‘a principles of respect and responsibility are but a few of the shared means to address the various issues discussed in this book. Overall, perhaps the most important key that remains unturned in Hawaii’s system of natural management is the creation of tools and principles that vary with the place. Beaches and dunes, estuaries, and reefs are all highly unique from one place to another – each should have its own specific rules of management that incorporates a hierarchy of community involvement. As daunting as some problems might seem, at the intersection of our environment and our communities lie the tools (such as local knowledge, local enforcement, local gathering privileges, local protected areas) to live

sustainably on the shores of paradise. We have the means – we just need the vision, effort, scientific knowledge, and long-term commitment to implement them.

Modern governance relies on legislators to set priorities and engage in cost-benefit analysis to allocate funds. Unfortunately, in a struggling economy and a state with a multitude of needs, inexpensive short-term answers often reign supreme. But there is equal urgency for more robust solutions and to inspire individuals to demand the change we need. Throughout this text, we have identified problems as well as potential new attitudes and management tools with which to address them. This chapter serves to condense that information and reiterate the issues we think are most pressing. Resting in our hands is the future possibility that natural hazards do not become catastrophes, and natural resources do not continue to disappear.

The Problems We Face

The failure to protect our shorelines occurs where federal, state, and county authorities neglect to work for a common vision, where good laws are weakly enforced, and where rules and regulations do not fit the personality of our environment. Perhaps predictably, the more federal, state, and county governmental agencies that get involved to help protect the environment, the less protected the environment is – due to fractured enforcement, a lack of coordination, and strengthening of jurisdictional boundaries. Land is managed separately from the ocean, ocean water is managed separately from its inhabitants, and the ocean floor is managed under a different set of rules from all of these. Any advancement of useful policies happens in spite of – not because of – this regulatory framework.

The lack of a common vision or a coordinated environmental plan between the county and state affects several aspects of environmental stewardship in Hawai'i. For example, some say that there is ambiguity and confusion over which agency should lead the way in coordinating various water quality programs and enforcing water quality mandates. This lack of clarity among agencies means that Hawai'i has no integrated water management plan for watersheds. What should be a coordinated coastal zone management system with unified goals is too often a chain of separate agencies that may resent the advice and comments offered by sister agencies, and just as frequently ignore them. And too often the goal of overworked and understaffed authorities is to simply comply with statute, not take steps to conserve the resource.

Often times, regulations enacted to protect our environment, in practice, act as a guideline for destruction rather than preservation. Permitting along the shoreline in piecemeal, parcel by parcel fashion, without guidance from an overarching vision for the future of the resource, is a ticket to its destruction. The minimum forty foot setback for buildings along the coast, for example, does not provide nearly enough room for the preservation of sand dunes and other natural bulwarks against erosion, tsunami, and hurricanes. There are no guidelines for appropriate building practices or parcel layout, and no accommodation for an eroding or wave-prone shoreline. At no place in Hawaii statute will you find guidance for dealing with sea-level rise or climate change. Acting entirely within their legal rights, developers flatten dunes to give tourists a better view of the beach they unwittingly destroy. The beach is part of a connected system between the land and sea, and should be regulated that way.

Many land use practices are perpetuated by a desire to strengthen our economy and yet, in the long term, serve to devastate ecosystems and our natural beauty – the very attraction that sustains

our visitor economy and provides most of us with jobs. Often the profits generated by these actions end up going offshore anyway. A short-sighted, profit-only mentality of land use will ultimately *cost us* money and, more importantly, our island way of life. Take, for example, our coral reefs. Hawai‘i is America’s largest ocean economy, with 18% of state revenue coming from ocean-related commerce.² The most significant human threats to Hawai‘i’s coral reefs are overfishing, land-based pollution, invasive algae, recreational overuse, and increases in ocean acidity and surface temperature associated with carbon dioxide build-up in the atmosphere. There are local solutions to some of these dangerous influences; we need only the political will to implement them.

We must recognize and account for the fact that water quality, potable water availability, and watershed and coastal ecosystems are diminishing in proportion to the pace in which land is converted under pavement. It is remarkable that best management practices do not dictate the use of permeable concrete. The very first use of permeable concrete was only made at the UH Manoa campus in 2008 – and its use is not required anywhere else in the state. Unlike natural landscapes where rainwater pools in gullies and filters slowly into the ground, urbanized streets, parking lots, driveways, rooftops, and gutters divert polluted runoff into channels, culverts and storm drains all headed at high velocity into our coastal waters. This artificial maze of conduits alters the natural course of the runoff, accelerating its pace, damaging streamside vegetation, widening channels, and depriving our groundwater resources of their recharge while carrying the polluted discharge into the ocean. The potential for polluted runoff to affect coastal and marine environments is immense in Hawai‘i as most of the population and its wastes reside within a few miles of the shoreline. The fate of the islands’ water quality is closely linked to the choices that will be made in coming years about how the vast agricultural fields will be used. Flattening dunes and building seawalls, channelizing streambeds and blanketing our land with impermeable surfaces is a cocktail mix for beach loss, ecosystem damage, and poor water quality around the state.

There are also important waste issues that need to be addressed. Raw sewage spills, leaks in the pipelines, plant level problems, sewer-line blockages, structural failures from corrosion, sewage infiltration to groundwater, groundwater infiltration to overwhelmed treatment facilities, limits in sewer line capacity, and poor maintenance programs, together with Hawai‘i’s moist environment, have created a persistent and pervasive water quality hazard on O‘ahu that rises anew with each rainstorm.

Potential Tools

Both individual residents and governmental officers have a hand to play in the future of our disaster preparedness and environmental well-being. None of us can stop a natural hazard from coming, but all of us can prepare and utilize mitigation techniques. Experts have gathered enough information about hurricanes, earthquakes, and tsunamis to guide us in reducing our chance of catastrophe. It is incumbent on Hawaiian citizens to avail ourselves of these materials and start making wise choices that enhance our own safety as well as the sustainability of our environment.³

For example, one can mitigate hurricane damage by building away from the coast, ridgelines, and exposed hillsides, build homes with continuous load paths from the foundation to the uppermost components of the roof, and minimize external features such as eaves, balconies, and

other structural components that are easily ripped off by high winds. We can resist earthquakes by establishing a continuous load path from the roof to the foundation, by using flexible materials in the original design, and by making sure the structure is firmly attached to its foundation.

We can avoid mass wasting by avoiding construction on or at the base of steep slopes, avoiding run-out areas at the mouths of gullies, gulches, and narrow stream valleys, keeping away from regions where scars of previous events can be identified, and identifying areas where other indicators of down-slope movement exist, such as leaning trees or structures and hummocky topography. If a building or home is already located on an unstable slope, only a few options exist to reinforce the soil. One can re-vegetate the hillside with native plants, grade slopes to a more stable angle, install drain systems to de-water slopes, anchor one's house to bedrock, and avoid increasing the load on the slope. One could always consider relocation if these options aren't effective. Much of the information on how to avoid a debris flow applies to slow-moving landslides as well.

And, of course, individuals can engage in good old-fashioned environmental protection by reducing, reusing, and recycling when they can, not building seawalls, being mindful of the chemicals they dump on our streets, using permeable materials when building driveways and other projects, and being an advocate in the halls of our legislature for responsible stewardship.

By their nature, the state and counties shoulder the greatest responsibility for both our environmental well-being and disaster preparedness. It is in them we trust – for better or worse. To make our regulatory system work, it must be adjusted to view natural resources as more than a patchwork of parcels of sky, land, and ocean.

Stepping Back to Move Forward

Our leaders are tasked with preparing us for future threats as well. How we confront sea-level rise may make the difference between prosperity and bankruptcy (both economically and environmentally). Researchers need to exactly map the water table throughout the urban corridor seaward of the blue line shown on the map in Chapter 8. The water table needs to be monitored with gauges the same way we monitor the sea level with tide gauges today. As we learn how the water table rises and falls with the tides, large waves, and rainfall, we will be able to more accurately map regions that are vulnerable to flooding from rising sea level. Some areas will inundate sooner than others and these are the places where we need to focus a redevelopment and retreat strategy.

Researchers also need to develop an improved ability to predict what lands will be overtopped by high waves. The system of buoys that surrounds the islands provides us with an early warning of large waves arriving on our shores. With several days advance notice, it is possible for road crews to get outfitted, homeowners to shore up their homes, and communities to prepare for the high run-up of waves on eroded beaches and low roadways. By using combinations of wave run-up models, detailed topographic maps of coastal lands, and knowledge of arriving waves, the disruption to our lives caused by these events can be predicted, and prediction is the first step to mitigation. As seas rise the frequency of wave inundation will rise from rare to often. Eventually, at approximately 0.6 m above present, community inundation will

be an annual event. We can either meet this with awareness and improved resiliency, or we can be victims and leave our communities to suffer.

Sea level is rising, it has accelerated since the 20th Century, the atmosphere continues to set new records for warmth causing ocean waters to expand, and ice around the world is melting and their water is flowing into, and raising the level of, the oceans. Our most immediate need is to stage a statewide retreat from the shore, and we need to implement it as policy now. Establishing a retreat policy, and actually seeing the positive end product of it, are two events likely to be separated in time by many decades. What does it mean to “retreat from the shore”? How will such a policy fit into the governing laws of the land? What actual tools would be used to implement a retreat? And, how can retreat be performed fairly for the thousands of beach front property owners?

A retreat policy can be implemented over a half-century. It will require buy-in from county, state, and federal agencies, and the creation of a truly integrated planning function that abandons the jurisdictional schism created by the administrative shoreline. The issues will be complex and political forces against the program will be strong because the winds of change are always perceived as threatening to those who want the status quo. But it is the right thing to do. Let us leave the gift of beaches and safe communities for our children to enjoy.

Shoreline retreat will need to include various tools embedded within state, county, and community planning venues. Among these will be the use of variable setbacks such as those already adopted on Maui and Kaua‘i. On Maui, a new home must be set back a distance equal to fifty years of erosion plus twenty feet. On Kaua‘i, the set-back accounts for the width of a lot, with wider lots requiring greater setbacks, and in general the setback accommodates seventy years of erosion plus a forty foot buffer zone.

Other tools will require purchasing properties threatened by erosion. A number of methods should be considered for this: general obligation bonds that fund a program of reverse mortgages that provide incremental pay-out eventually ending with the transfer of property ownership; a homeowner donation program wherein a property is donated for conservation purposes in exchange for rewards such as tax rebates, transferable development rights or others; county, state, and federal land conservation funds, and others. A number of fees are generated in the coastal zone that could be applied to conservation such as land lease fees, the real estate transfer tax, coastal property taxes, local business proceeds, and others. Some portion of these could be set aside to fuel a conservation fund for purchasing developed lands that are sand-rich along otherwise pristine beaches that are likely to need protection in a future of rising sea level. Sandy lands are the primary target for conservation and these should be pried free of the grasp of development so that they may respond naturally to coastal processes.

Also to be considered should be a moratorium on all seaward creep of existing development, and the implementation of a withdrawal timed on redevelopment. This could include a mix of no longer allowing any building on accreted lands, amending state rules so that no new certified shorelines are allowed seaward of prior shorelines, and disallowing the “string line” of neighboring properties to be broken by new building. For beaches with a significant population of rental properties, converting these to public lands would offer less impact to the local community and local families because they are being operated as businesses and not as residences. Where shores are retreating, and these are now known nearly statewide on Kauai, Oahu, and Maui, erosion rates can define the first step in phasing the pullback. However, even

the variable erosion-based setbacks in use now are not calibrated to sea-level rise. They represent sediment deficiencies of a historical nature, not the stepped up erosion that will occur under accelerated sea-level rise.

Nearshore Resources

In order to maintain Hawai‘i’s high quality of life and dynamic economy, continual, sufficient funding is imperative in order to hone coral reef management and disseminate educational material to promote reef conservation. Hawai‘i State Department of Land and Natural Resources, Division of Aquatic Resources has undertaken a number of measures to improve the management of marine resources. A few of these measures include changes in minimum size limits for certain resource species, the initiation of marine recreational fisheries surveys, and changes to the rules governing marine protected areas.

These are important steps, but many call for three additional critical moves: ban all gill-netting, put into management status at least 20% of the state shoreline, and implement a fishing license program. Today there are rules that govern the use of gill nets in Hawaii. Unfortunately it is impossible to enforce these on all shores all the time. Just in the past two years gill nets have killed monk seals, turtles, sharks, and other unintended bycatch. Banning gill nets will rouse vocal opposition. Many will claim gill nets are their prime source of food and livelihood. They will claim native gathering rights. But these people are choosing to make netting their source of food and their livelihood – they do have options. Unfortunately, while we worry over the plight of the few, the plundering of coastal fisheries by nets continues and that is one community that does not have options.

Researchers have called for placing at least 20% of the shore under protected status. Scientists familiar with the problem of overfishing in Hawaii report that total fish biomass in Hanauma Bay and ten other protected areas under state management is 2.7 times greater than the biomass in comparable unprotected areas. They report that in the Northwestern Hawaiian Islands there is 6.7 times more fish biomass on average than in comparable habitats in the main islands. These data indicate that humans have reduced fish stocks in the main Hawaiian Islands to about 15% of what they once were. Currently the eleven state marine protected areas in Hawaii offer protection to only 0.3 percent of the Hawai‘i coastline. If we are truly serious about restoring our coastal fishery we need to stop fishing in at least 20 % of Hawai‘i’s waters and regulate fishing in the rest.

A number of communities throughout the state are currently strengthening local influence and accountability for the health and long-term sustainability of their marine resources through revitalization of local traditions and resource knowledge. Marine reserves can produce long lasting and rapid increases in abundance, diversity, and productivity of fish populations. Fish size and reproductive output is known to increase within reserves. Decreased mortality, decreased habitat destruction, decreased extinction, and balanced, healthy ecosystems also result.

A fishing license program allows several things to happen at once. Applicants for a license will learn about the problem of overfishing, about proper fishing techniques, about species that are endangered, and about areas to avoid. This public education is targeted and specific and can only be achieved at this level of specificity through a licensing program. Also, a licensing program allows for scientific data to be collected through monitoring of catch and fishers. The

casual visitor or local who grabs a three prong and heads for the beach will now be an educated fisher, and is likely to think twice before aiming at and killing that fish that used to be anonymous but now looks like the picture in the education program of the endangered species.

No Mandated Expertise

The state currently struggles with an information gap. Geologic analysis should be part of every development and the final factor in siting everything from homes and roads to pathways and parks. Yet the state of Hawai‘i has no lead science agency. In fact, being the only state in the union without a state geologist and lacking an office of the state geological survey, there is literally nowhere for citizens to turn for geologic information. Neither is there a collated body of literature on rock and mineral resources, sand and gravel reserves, soil erosion, mass wasting, flash flooding, or any number of geological issues of critical importance to public safety and resource management. Scientists at the University of Hawaii, the U.S. Geological Survey, the Pacific Tsunami Warning Center and a few other bastions of expertise are happy to lend their know-how either by contract or out of good will, but public safety should not pivot on this happenstance arrangement. A science office, with specifically chosen experts possessing purposely defined roles to enhance public safety and welfare must be created by the legislature and the governor’s office. Indeed, some of the current problems in resource management may be rooted to some extent in this lack of knowledge.

Who within state government is responsible for scientific analysis and monitoring of the seismic threat? We largely look over the shoulders of generous researchers in federal agencies and at the University of Hawai‘i. Our official risk assessors are the folks at Hawai‘i State Civil Defense who deal with this information gap by organizing experts from various agencies and departments into committees that meet and share ideas and data. This is fine but it is a band-aid analysis. Hawai‘i needs a state science agency, a “geological survey”, with responsibility to gauge and help prepare state citizens for seismic hazards as well as our other geologic threats (e.g., rock falls, flash flooding, sea-level rise, coastal erosion, and others). Such an agency would offer the advice that sister agencies need for decision-making that is so glaringly lacking at present. Civil defense is meant for managing people and mitigating hazards, a geological survey would be responsible for managing scientific information. To the detriment of public health and safety, we lack the science component.

What a Waste

Although many local legislators may be tired of hearing about it, there also remain serious waste issues in Hawai‘i. It is sound planning for the state to protect the tourist industry by ensuring our waters are safe. The State of California recently adopted a “right to know” bill that requires monitoring of all public beaches with more than 50,000 annual visitors, and regular sampling near storm drains.⁴ A protocol similar to California’s could be applied to Hawai‘i if the state is going to guarantee the safety of swimming water, especially against polluted run-off.

Shifting sentiments are beginning to redefine the way Hawai‘i manages water and a suite of solutions are being discussed. New sewage treatment plants can be located close to agricultural production to reduce distribution costs. For many of the mega-hotel complexes the reuse and treatment facilities are integrated from the beginning. Wastewater treatment plants can be

designed with re-use as part of a single system, supplying all the needed water to irrigate their golf courses, lawns, and open space. Merging water supply offices with waste water managers under one roof may also be a step in the right direction to promote more urgent examination of the long-range costs that effluent re-use can avoid.

Monitoring of cesspools and septic systems has been a difficult and costly dilemma for the state. Ideally, the state would monitor the safety and condition of each cesspool and septic field, but rarely are funds allocated specifically for this purpose. Monitoring is made even more difficult by the fact that there are no records of how many private systems are in place, or of how much wastewater they generate. Hawai‘i will need to dedicate a worthy portion of their financial resources to the waste problem, as it is affecting stream and coastal water, and our public health and safety.

Climate Change

The challenge posed by climate change in Hawaii is enormous and unfortunately there is no state-level authority to which we can turn for information. Here again is an important role for a state science office. But for now, we remain in the dark regarding potential impacts. Global circulation models that provide Earth-scale understanding of climate change effects do not even recognize features on the small scale of our islands. We will learn more when our computing power improves and regional assessments become possible. It is critical that managers be given some prediction of how rising atmospheric and ocean temperatures will impact the system of moisture delivery, winds, and ocean currents that govern our climate and its products.

The potential for decreased rainfall associated with a rising cloud base may already be underway as reported by the U.S. Geological Survey data on decreased rainfall over the 20th Century. Shifts in the Hadley circulation that governs winds and rains in this part of the Pacific need further understanding, and managers lack knowledge of how climate change will alter the El Niño and PDO systems. There is speculation that rainfall events will become more rare, but also more intense. These impacts need refinement and they need to be assigned probabilities so that managers have solid targets on which to make plans. Our economy, environment, and way of life may change with global warming, it is important that a concerted effort be made to forecast these possibilities as soon as possible.

Back to the Future: Mining the Hawai‘i of Yesterday for a Prosperous Tomorrow

With concepts emerging from cultural practices, it may be possible to stem the tide of environmental decay. Our stewardship system must be grounded in *pili ‘āina* (sustainability), a preservation/reconstruction ethic characterized by human use of the environment based on sustainable practices. This ethic should be formulated through a community process, be characterized by technical aspects that enhance the natural gifts of the land, and utilize a variety of mitigation techniques to preserve natural assets.

Let us remember the lessons of the ahupua‘a and the basic tenants that underlie this management system: stewardship, cooperation, and respect. All of these concepts must be incorporated within our land management system if Hawai‘i is to choose a sustainable future. Ahupua‘a has now taken hold as the guiding principle of the Hawai‘i Ocean Resource Management Plan, the official state effort to unify and coordinate coastal and ocean-related

activities and missions among government agencies. An updated and refined ahupua‘a system within a 21st Century setting can provide a template for sustainable living on the shores of paradise.

¹ Taken from The Nature Conservancy, Hawaiian High Island Ecoregion website:
<http://www.hawaiiecoregionplan.info/culture.html>

² Athline Clark and Dave Gulko, Hawai‘i’s State of the Reefs, State of Hawai‘i, Department of Land and Natural Resources, Division of Aquatic Resources (1998).

³ See for example:

1. U.S.G.S. Atlas of Natural Hazards in the Hawaiian Coastal Zone: <http://pubs.usgs.gov/imap/i2761/>
2. Purchasing Coastal Real Estate -
<http://www.soest.hawaii.edu/SEAGRANT/communication/pdf/Purchasing%20Coastal%20Real%20Estate.pdf>
3. Hawaii Coastal Hazard Mitigation Guidebook -
<http://www.soest.hawaii.edu/SEAGRANT/communication/HCHMG/hchmg.htm>
4. Homeowners Handbook to Prepare for Natural Hazards -
<http://www.soest.hawaii.edu/SEAGRANT/communication/NaturalHazardsHandbook/naturalhazardprepbook.htm>

⁴ Surfrider Foundation, State of the Beach Report: Surf Zone Water Quality, California,
<http://www.surfrider.org/stateofthebeach/08-fc/body.asp?sub=SurfZoneWaterQuality>