



May 10, 2022

**Kona Community Development Plan
Action Committee Meeting**

Dear Committee Members.

This testimony aims to urge the Committee and the County of Hawai'i to include water resource sustainability as a top priority in the design and function of our communities.

Article XI, section 1 of Hawai'i's Constitution establishes that "all public natural resources are held in trust by the State for the benefit of the people," and Article XI, section 7 of Hawai'i's Constitution specifically references water and includes the directive "to protect, control, and regulate the use of Hawai'i's water resources for the benefit of its people." The need for wise water use and reuse is a Constitutional and Environmental Imperative.

Historical rainfall data and scientific projections paint a dire picture for the future of water resources on our island. We are part and parcel of global climate changes. Researchers tell us that in the next 20 to 30 years, our drought is likely to worsen with a 30% reduction in rainfall. We currently have a 14% reduction. This will eventually mean our freshwater aquifer will be much smaller. We must begin now to implement conservation and reuse actions to provide for the future well-being of our people.

The following is a priority list of actions we can take.

1. Integrate all county functions, including the Department of Water Supply, to account for their water use and conservation impact.

2. Design homes and communities for freshwater conservation to include landscaping and home water conservation devices. Landscapes that do not require irrigation could be necessary for new developments.
3. Implement the sections of the current Uniform Plumbing Code (UPC) that provides for home greywater reuse
4. Design communities to capture and redirect stormwater for beneficial uses.
5. Institute plans and techniques that significantly reduce the impervious structures on the land, such as vast streets and parking lots.
6. Institute Grubbing and Grading regulations that effectively mitigate rainfall runoff and erosion
7. Where wastewater treatment plants provide sewage treatment, upgrade the plants to reuse plants (reuse plants do not discharge wastewaters HAR §11-62-27), treat the water to the highest reuse standard, R1, and provide the water for agriculture, public parks and recreation, and other commercial uses.
8. In new developments, neighborhood scale wastewater treatment may be more economical than conveying the sewage long distances in buried sewer lines. In this case, the reclaimed water can be returned to the home for toilet flushing and landscape needs.
9. In new home construction, install waste systems that separate the black water from the grey water. This will facilitate greywater reuse and reduce the size and cost of onsite sewage treatment. This step will augment the cesspool conversion process.
10. Prohibit the use of Injection Wells for the disposal of human wastewaters. Injection wells on the island transfer pollutants to the subterranean estuaries common to all coastal areas of the island

These actions will affect more than doubling fresh groundwater for human needs and prevent draconian measures when severe water shortages arise. Such measures create severe economic consequences. These actions listed above serve and honor the Public Trust Doctrine of our State Constitution.

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Adding to the County of Hawai‘i’s Sustainability Conversation: A Discussion on Water Law & Policy

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Summary

The County of Hawai‘i (COH), under the leadership of Mayor Mitch Roth, has engaged the community in two broad online conversations on the topic of sustainability. It is the purpose of this discussion paper to build on these conversations, and invite our best systems sustainability thinking to engage the topic of water – our most critical resource, in all of its forms.

Introduction

Central to any climate resiliency strategy or sustainability plan must be our island’s water security. Hawai‘i Island has a long history of drought episodes. We have dealt with these short-term events with various site-specific mitigations, however, any changes in how water is managed, allocated, and used, remain elusive and are often controversial.

With the guidance of the National Research Council, the Environmental Protection Agency adopted the following definition of Sustainability.

“Sustainability is based on a simple principle: Everything that we need for our survival and well-being depends, either directly or indirectly, on our natural environment. Pursuing Sustainability is to create and maintain the conditions under which humans and nature can exist in productive harmony to support present and future generations” (USEPA 2021).

¹ Waiwai Ola ‘Ohana was formerly organized as Waterkeepers in Hawai‘i. While names will be used interchangeably in this document, all “Waterkeeper” programs currently fall under Waiwai Ola ‘Ohana.

Our survival and well-being is largely dependent on healthy breathable air and clean water resources. In Hawai‘i, freshwater is derived from rainfall and forest dew which support healthy aquifer systems. Unlike other states, underground rivers or aquifers that move water over great distances, are non-existent in Hawai‘i. Rainfall distribution on our island is highly variable. Water availability, like the climate, differs regionally. Distances of only a few miles can mean the difference between a rainforest and a desert.

Thus, it seems somewhat incongruent that our water resources were not a substantial portion of the recent Hawai‘i Island sustainability conversations. A major rainfall study provides an alarming conclusion.

“Almost imperceptibly, rainfall over the Hawaiian Islands has been declining since 1978, and this trend is likely to continue with global warming through the end of this century, according to scientists at the University of Hawai‘i at Mānoa and the University of Colorado at Boulder”(Oliver 2013).

The historical trend for the dry or Kona side of Hawai‘i Island is particularly concerning.

“From 1920 to 2012, over 90% of the state experienced drying trends, with Hawai‘i Island, and in particular the western part of the island, experiencing the largest significant long-term declines in annual and dry season rainfall” (Frazier 2016).

Our reservoir, and the only lifeline for true sustainability, is a floating lake or lens of freshwater sitting on top of the seawater that intrudes through the fractured rock and lava at and below sea level. Forty feet of floating freshwater provides one foot of water above sea level. Inland and below the high rainfall zones, hundreds of feet of freshwater “floats” in a lens and thus is available for domestic pumping. That same lens drains away in a perpetual slow migration to the sea. Recharge of the freshwater lens is rainfall-dependent (USGS, 2000).

Many authors stress the issue of water resource sustainability, notably:

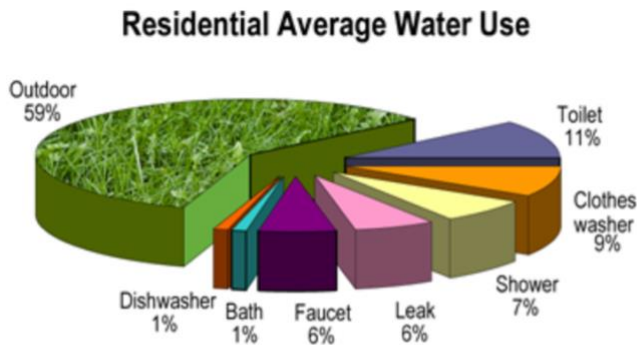
“Given that approximately 70% of the annual rainfall happens during the wet season, Hawai‘i is expected to face an overall reduction in annual rainfall leading to a decline in sustainability of groundwater recharge” (Burnett and Wada, 2014).

SUSTAINABLE WATER RESOURCE POLICY AND PRACTICE

The prevailing practice on Hawai‘i Island for water resource management is drill and pump. The policy of drill and pump is predicated on the sustainable yield of the aquifer. Of concern is the fact that the current sustainable yield does not take into account decreased rainfall and decreased recharge.

People need high-quality potable water. Water is essential for drinking, bathing, cooking, waste disposal, and cleaning, among other needs, however, individual and family water use only accounts for about 25% of household water usage. Where does the balance of the water go?

Figure 1. Home Water Use



Source: American Water Works Association Research Foundation, End Uses of Water

End Uses of Water, source: American Water Works Association Research Foundation

Outdoor irrigation is the largest domestic water user, however, our irrigation water could be used more efficiently and sustainably. The choice of plant species and the irrigation method are areas with excellent conservation potential. Xeriscapes in the southwest states are notable examples of sustainable and effective water conservation practices. The Board of Water Supply for the City and County of Honolulu states that with the proper choices, a homeowner can save 30 to 50% of the water used on landscaping (2021 Board of Water Supply, City and County of Honolulu). This option conserves water, reduces the family water bill, and addresses multiple crucial sustainability issues.

Accordingly, irrigation water conservation programs must be an essential component of any sustainability effort for the County of Hawai‘i. Water conserved for other domestic demands will be far less expensive than increasing pumping capacity for additional water. For select wells, such savings can reduce saltwater uptake from over-pumping and lower the cost of blending water to manage excessive salts. The challenge for the COH is how best to achieve sustainable policies and water conservation education. The Department of Water Supply is not noted for progressive water conservation policies and effective public education. A change in policy and programmatic efforts will likely require leadership and engagement from the Mayor and Council to effect significant water conservation measures.

Grey Water Reuse

Every home has additional options to conserve even more freshwater. Fixing leaks and reusing the greywater from the laundry and shower will conserve about 22% of home water resources. When combining this conservation with proper irrigation, a household water savings can approach 72%. Gray water from the laundry, shower, and bathroom sinks can be lawfully and safely reused on-site to irrigate landscaping. In some cases, little if any freshwater is needed. The new provisions of the Uniform Plumbing Code (UPC 2012) allow for greywater reuse.

Greywater reuse applications will help conserve wastewater treatment plant capacity as sewer flows would also be reduced. Sufficient black water will remain in the system for gravity flow sewers to remain functional. A new COH policy enabling, encouraging, or even mandating greywater reuse for commercial and residential units would go a long way to addressing local water sustainability.

Wastewater Reuse

When greywater is comingled with toilet or black water (sewer water), as is the current practice, it all becomes black water and requires a higher level of treatment to remove nutrients and incidental pathogens. Such treatment is expensive and even more costly if the treated water is then discarded. The cost of legally dumping secondarily or partially treated black water is very high in light of the recent U.S. Supreme Court ruling on wastewater injection wells in Lahaina. It is no longer lawful to discharge wastewater to drains or injection wells that lead to Waters of the United States without an NPDES permit. Where the receiving water is “impaired” under the US Clean Water Act provisions, as it is in West Hawai‘i, permits will not be issued unless any further impairment is mitigated.

It is more economical to treat blackwater to R1 reuse standards than it is to permit wastewater discharge to the ocean. Reusable R1 water has a market value. Other grades of wastewater do not. R1 water may be reused for landscaping, golf courses, and agricultural uses. In each case, the reused water provides revenue to the COH and replaces some freshwater pumping distribution and use, which is a critical conservation measure for climate resiliency.

As the COH builds out new water infrastructure for subdivisions, parks, and open space, the reuse of R1 water is key to sustainable development. For example, vacuum flow sewers can successfully move high solids blackwater and have other advantages over gravity lines, including an almost zero risk of leakage to the environment, groundwater, and coastal seawater. Moreover, vacuum sewer lines are far less costly to install and are well suited to regional small-scale wastewater treatment facilities.

The COH would be well advised to adopt and implement new water use and reuse policies as soon as possible, as hundreds of new homes and many subdivisions await approvals and construction. Once they are built, without a reuse plan, the option is lost.

Water from 50,000 Cesspools

By 2050 all cesspools must be retired, converted, or retrofitted. The water will have to be further treated to remove nutrients and the occasional pathogen. As opposed to being discharged to the ground, the water could be collected and reused as greywater for landscaping. In so doing, we remove 90% of the nutrients that are currently over nourishing our coastal waters, killing corals and turning our clear blue waters green and brown. A recent report from UH to the Legislature details the extent of human waste nutrients flowing to the sea (Smith et al. 2021).

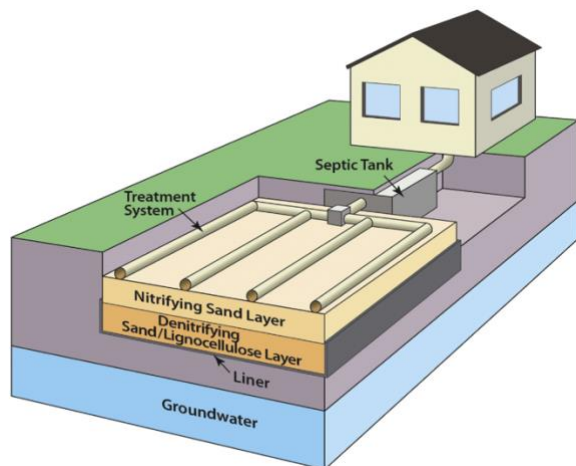
There is no question that we must stop using holes in the ground, cesspools, to dispose of human waste. The huge question remains, what are the alternatives?

From today until 2050, thousands of new homes will be constructed on Hawai‘i Island and it is very likely, at least in the near term, the Hawai‘i Department of Health will recommend and approve traditional septic systems as a primary alternative to cesspools. Unfortunately, this practice runs contrary to overwhelming scientific data revealing that the effluent from a modern

septic system is functionally no better than that of a cesspool. States from Maine to Florida are requiring the removal and retrofitting of septic systems. In these states, coastal waterways have become eutrophic, fish kills have occurred, and red and brown tides replace the deep blue waters as the quality of life and coastal property values plummet due to poor water quality from poor wastewater management.

A very comprehensive research project in Florida documents the impacts of conventional septic systems. The waste nutrients, nitrogen, and phosphorus are ubiquitous in coastal waters. The isotopic signatures of nitrogen and the presence of sucralose in coastal waters leave no doubt as to the source. (Herren 2021). In Sarasota Bay, when septic systems were removed there was a 64% reduction in N pollution, which was reflected in relatively low human waste nitrogen isotope values $\delta^{15}\text{N}$ of $\sim +3.8\text{‰}$ (SBEP, 2014). Accordingly, it is important to note that communities across the nation are removing septic systems while Hawai‘i is approving them. As a result, the nutrient loads to the nearshore waters will likely continue, which is a practice that is not ecologically sustainable.

Figure 2. Nitrogen Reducing Biosystem (NRB) (Gobler 2021)



The technology to best replace or convert cesspools to systems that protect water quality remains in development for Hawai‘i. However, states on the East Coast demonstrate many suitable alternatives. The most promising among them is the NRB or Nitrogen Reducing Biosystem (Figure 2.). The term belies simplicity. The leach-line field overlies two layers, one layer of sand over one layer of sand and wood shavings, a 50/50 mix. The layers create unique microbial habitats. The top layer is aerobic and the bacteria convert waste nitrogen products into nitrate. The lower layer is anaerobic and the microbes there act on the

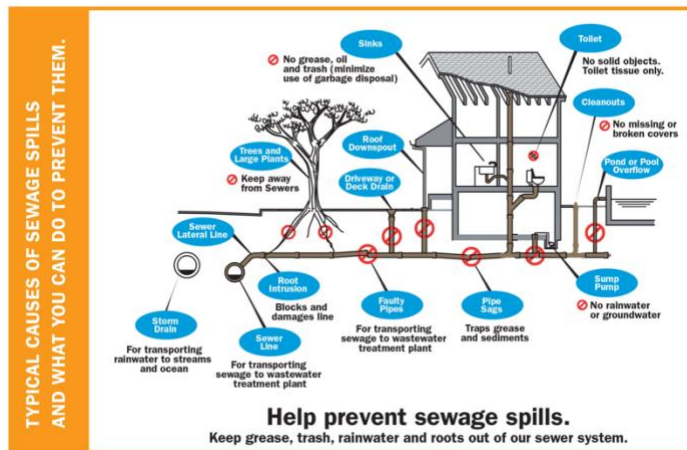
nitrate and convert it to nitrogen gas released to the atmosphere. The iron content of the sand absorbs phosphate removing it from the wastewater. This simple NRB layer system adds marginal cost to a conventional septic system while removing up to 90% of the nutrients and a 100,000 fold reduction in the fecal bacteria indicator *E. coli*, according to a study for the state of Massachusetts (Heufelder 2019). This type of system is recognized and approved by the State of Florida. The State of New York approves other denitrifying systems that meet its nutrient reduction requirements (Gobler 2021).

Stormwater Redirection

Occasionally, it rains very hard on Hawai‘i Island and vast quantities of stormwater rage down streets like wild rivers. The COH has thousands of “dry wells” that function to direct some of this flow into the porous ground below. In some cases, the stormwater is directed to natural drainages that can also become raging rivers, carrying mud and debris to the sea. These flooding events are very deleterious to our nearshore ecosystem. The fine silts alone can smother and

destroy a coral reef. Many communities have learned that promoting hard surfaces like asphalt and concrete add volumes of sediment to the storm flows. The County could design natural water catchments and allow the stormwater at the top of the watershed to percolate and settle into the ground before collecting roadway debris and pollutants. This water flow can help offset seawater intrusion, common to coastal areas, and help protect the anchialine ecosystems unique to the Kona Coast.

Stormwater Education



Each year, there are nearly 400 sewage overflows statewide from Hawai‘i’s sewer systems. Spills of untreated sewage can enter streams and the ocean, endangering public health and compromising our natural resources. Rainwater entering the sewer line is a major cause of sewage spills. Too much rainwater overwhelms the system to the point where untreated wastewater spills out of manholes and can even back up into homes through toilets and drains.

The County can help people learn how they can make a difference. With each water bill, the County could include a diagram similar to the one above produced by Hawai‘i American Water.

In 2020, Hilo Bay Waterkeeper launched a social media campaign to educate residents about land-based sources of pollution and impacts on Hilo Bay. Our website also contains information about how ordinary citizens can play an active role in improving water quality. In partnership with the County Department of Public Works, Waiwai Ola ‘Ohana is working to raise awareness about stormwater pollution with a new storm drain stenciling youth program.

In 2021, Waterkeepers began working with a certified FAA pilot to collect aerial footage of Hilo’s ahupua‘a (watershed) system and include the three main rivers: Wailoa, Wailuku, and Honoli‘i. Our goal is to use this as an awareness tool for residents who may not realize their impact on the ‘āina (land) and people. This would also be used to pin-point local agricultural and commercial runoff washing into the rivers and observe the flow events of the rivers from the top of the watershed to the coastal waters. Alongside runoff testing, this drone footage is key in community engagement



actions to tell the story of the effects communities can have on their watershed and how we can positively shift how much pollution we put into our coastal communities.

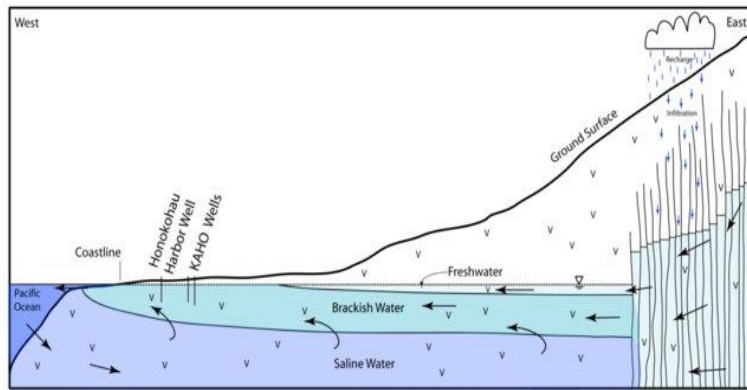
Waiwai Ola ‘Ohana will continue to provide outreach and education by collaborating with fishponds and other community groups as well as holding virtual and/or in-person community talks about stormwater runoff and its effect on our watersheds and our health. Our continuing goal is for our residents to become aware of pollution impacts and work to reduce the flow of pollution to our nearshore waters.



The Ocean Resource

Water inexorably flows downhill to the sea. Unlike wastes in the Mississippi River that flow hundreds of miles into the Gulf, the island's water makes its trip to the sea more directly. On the Hilo side, about 212 rivers and streams flow continuously, allowing people to see the hydrologic cycle in action. The Wailuku River in Hilo is a dramatic example. Its watershed is a vast mountainside. Heavy rains create a torrent of brown water carrying dirt and fine sediments to Hilo Bay. Less apparent are the urban drainages of the Waiākea and Wailoa rivers. A drive through Hilo town reveals many storm drains and gutters that convey street rain runoff to these rivers and the bay.

Figure 3. Kona's Subterranean Estuary (Johannesson 2017)



There is only one stormwater channel in the Kona area that drains Holualoa mauka. Most rainfall runoff migrates underground and joins the subterranean estuary that flows under the entire Kona plain. Figure 3. depicts a model of the water flow. University of Hawai'i hydrologists suggest the brackish ground water flows into the sea at the rate of about 2.5 million gallons

per mile of coastline, per day (Peterson 2009).

This groundwater flow is rich in dissolved pollutants, ranging from fertilizers and wastewater nutrients to many other chemicals used in the home and the community. Two chemical markers of "human activity" found in the groundwater are sucralose, the artificial sweetener, and anomolous levels of Gadolinium, a metal used in medical MRI imaging. Both chemicals are excreted unchanged in human wastes, and serve as proof of concept markers for human pollutants in the groundwater flowing into the sea.

We have designed our communities to drain to the sea, emphasizing flood mitigation, however, this feature has also created the largest waste sink on the planet. Globally, the coastal waters of most continents are heavily polluted by both intent and ignorance. A recent study identified 135,000 sites on the planet where sewage wastes flow to the sea (Ogasa 2021). As we look to a more progressive future, we know that using the sea as a waste dump is not sustainable.

We have made some progress regulating and controlling "Point Source" pollution in Hawai'i. A more significant challenge is redesigning communities to prevent "Non-Point Source" pollutants from joining the water as it flows downhill to the sea. We must account for pollutants in runoff, be it motor oil on streets, or the water seeping out of the new home septic systems. There is actually a requirement for this accounting. A TMDL (Total Maximum Daily Load) study is required by the Clean Water Act for watersheds that drain into any "impaired"² watershed. Almost all ocean sites on the Kona Coast are impaired as listed by the EPA, however, the State of Hawai'i has conducted no TMDL's on Hawai'i Island, other than those developed in partnership with nonprofits.

² Section 303(d) U.S. Clean Water Act.

Figure 2. Kailua Bay May 2020 Phytoplankton Bloom



Once our coastal waters become polluted, our single greatest economic asset - one that attracts both visitors and locals - will become a dangerous nuisance. Figure 2 shows a dark green phytoplankton bloom in Kailua Bay that reduced visibility to under 3 feet. This is a very popular ocean swimming area, used by residents and visitors pursuing exercise and competing in world famous events. The blue line shows a major

nutrient-rich submarine groundwater discharge.

The economic impacts from similar greening events will be disastrous. Even when the ocean may still look deep blue and “AA Pristine” (a state policy requirement), the scientific data portends an ecological tipping point. Once tipped, reversing the ecological collapse is nearly impossible.

Water is the Key to Sustainability

As briefly outlined above, sustainability of our water resources is the kingpin for just about every other sustainability issue. The COH and the DWS must coalesce to implement a whole range of sustainable water policies and practices. Without ample high-quality water for all, at affordable prices, sustainability becomes moot. It is time to become proactive, pick the can up and fix these problems, rather than continue to kick the can down the road of climate resiliency.

The Public Trust and County Duties³

Article XI, section 1 of Hawai‘i’s Constitution establishes that “all public natural resources are held in trust by the State for the benefit of the people,” and Article XI, section 7 of Hawai‘i’s Constitution specifically references water and includes the directive “to protect, control, and regulate the use of Hawai‘i’s water resources for the benefit of its people.” Article XI, section 7 also establishes the State Commission on Water Resource Management (Water Commission), which is currently housed within the Department of Land and Natural Resources.

Although the Water Commission has the primary kuleana under Hawai‘i law to protect Hawai‘i’s fresh water resources, other government decisionmakers, including state and county agencies, have an independent duty to conserve natural resources, including water.⁴ In Hawai‘i,

³ This section has been excerpted from: D. Kapua‘ala Sproat, *Kūkulu Waiwai: Building Pono Water Management in Hawai‘i Nei*, Ka Huli Ao Center for Excellence in Native Hawaiian Law Boards & Commissions Training, pp. 2, 4-5 (July 2021).

⁴ See HAW. CONST. art. XI, § 1; *Kelly v. 1250 Oceanside Partners*, 111 Hawai‘i 205, 225, 140 P.3d 985, 1005 (2006).

we trace the origin of the public trust to Indigenous custom and tradition, which firmly established that natural resources, including water, were not private property, but were held by the government for the benefit of the people. Today, “the people of [Hawai‘i] have elevated the public trust doctrine to the level of a constitutional mandate.”⁵ Pursuant to the Constitution, Water Code, and common law, the “state water resources trust” applies to “all water resources without exception or distinction.”⁶

The public trust also prescribes a higher level of scrutiny for private commercial uses.⁷ Hawai‘i decision-makers must, therefore, closely examine requests to use public resources for private gain to ensure that the public’s interest in the resource is fully protected.⁸ Agencies “may compromise public rights in the resource pursuant only to a decision made with a level of openness, diligence, and foresight commensurate with the high priority these rights command under the laws of our state.”⁹ After all, “[t]he duties imposed upon the state [and counties] are the duties of a trustee and not simply the duties of a good business manager.”¹⁰ For example, the Hawai‘i Supreme Court ruled that the public trust requires that agencies do more than simply impose requirements and conditions; they also have an obligation “to ensure that the prescribed measures are actually being implemented after a thorough assessment of the possible adverse impacts . . . on the State’s natural resources.”¹¹

In addition to the public trust, the Hawai‘i Supreme Court also adopted the “precautionary principle,” ruling that “the lack of full scientific certainty should not be a basis for postponing effective measures to prevent environmental degradation” and that “where [scientific] uncertainty exists, a trustee’s duty to protect the resource mitigates in favor of choosing presumptions that also protect the resource.”¹²

Issues for Hawai‘i decision-makers often arise in the context of permits or other applications that may impact streams, springs, groundwater, or traditional and customary Native Hawaiian practices dependent upon those resources, such as kalo cultivation or gathering practices. For example, a planning commission may receive a permit application from a water bottling company. Or, the Board of Land and Natural Resources may want to lease state land where streams are diverted. Many different scenarios arise in which decision-makers must consider their duty to protect and conserve Hawai‘i’s precious water resources.

We pray that this discussion paper will greatly further our efforts toward sustainable use of water, in all of its forms, for the benefit of all people of our island home.

END

⁵ *Waiāhole I*, 94 Hawai‘i 97, 131, 9 P.3d 409, 443 (2000).

⁶ *Id.* at 133, 9 P.3d at 445.

⁷ *Id.* at 142, 9 P.3d at 454.

⁸ *See id.*

⁹ *Id.* at 143, 9 P.3d at 455.

¹⁰ *Id.*

¹¹ *Kelly*, 111 Hawai‘i 205, 231, 140 P.3d 985, 1011 (2006).

¹² *Waiāhole I*, 94 Hawai‘i at 154, 9 P.3d at 466.

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UPC, Uniform Plumbing Code 2012, Adopted by Hawaii County.

<https://www.hawaiicounty.gov/home/showpublisheddocument/302743/637526294112600000>

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https://www.hawaii.edu/govrel/docs/reports/2022/act132-slh2018_act170-slh2019_2022_wastewater-pollution-intrusion_report.pdf

USEPA Sustainability <https://www.epa.gov/sustainability/learn-about-sustainability#what>

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