# Navigating Change

## Hawai'i's Approach to Adaptation

Report for the First Meeting of State, Local and Tribal Leaders
Task Force on Climate Preparedness and Resilience

December 10, 2013

Source photo Polynesian Voyaging Society

# Executive Summary

This report describes the State of Hawai'i's unique position and perspective as a member of President Obama's State, Local and Tribal Leaders Task Force on Climate Preparedness and Resilience. Hawai'i's team of state, federal, and academic partners sought out knowledge and practices from a variety of local and regional sources. In response to the Task Force's charge to advise the Administration on how the Federal Government can best support resilience efforts, the Navigating Change Report also proposes initial recommendations in the areas of actionable information, coordination, and implementation.

## Hawai'i's Vulnerability and Vantage Point

As the most geographically isolated islands on Earth, Hawai'i is especially vulnerable to the impacts of climate change:

- **Freshwater.** Hawai'i is 100% dependent on rainfall for our very survival. Rainfall and stream flows are declining.
- **Coastlines.** Hawai'i's shorelines (more than 750 miles) are its natural borders, but they are vulnerable to beach erosion and sea level rise.
- **Ocean Resources.** Pacific Islanders are ocean peoples. Rising temperatures and acidification kill the reefs, damage fisheries and jeopardize the island way of life.
- **Security.** Climate change is a matter of security for Hawai'i. Climate change will disrupt and then threaten economic systems--food, water, energy, biodiversity, and health. Hawai'i's people will be at risk.

Hawai'i shares a unique vantage point of the world as an archipelago of islands:

- An **indigenous host culture** with more than 1000 years of traditional knowledge and adaptation practice
- An **island understanding** of finite resources and the need for an integrated, collaborative approach—on islands, the feedback loops are direct, immediate and widely experienced
- An **Asia-Pacific regional connection** to islands, states and nations with shared issues

## Hawai'i's Leadership in the Face of Climate Change

Hawai'i is already a leader on climate change both nationally and internationally. The Hawaiian Islands are a learning laboratory for scalable, innovative mitigation and adaptation policies and techniques, and a model for local and regional collaboration.

- Hawai'i was the first sub-national government to sign onto the Majuro Declaration for Climate Leadership
- Hawai'i was the first state in the nation to adopt a barrel tax on imported petroleum to support clean energy
- Governor Abercrombie signed Climate Change Adaptation Priority Guidelines into law for multi-sector resilience
- Hawai'i hosts several research institutions and regional collaborations around climate change

## Hawai'i's Top Recommendations: An Opportunity to Strengthen Resilience with Federal Partners

**1. Provide actionable information for local decision-making and the island context**

- First Step: Support Task Force members' engagement of local stakeholders to develop specific recommendations and expedite the development and delivery of priority technical assistance

**2. Facilitate ongoing coordination and alignment of efforts after the Task Force dissolves**

- Convene an International Climate Change Resilience Forum at the East-West Center to coordinate domestic and international resilience efforts, especially in the Asia-Pacific region. "Think Globally, Act Locally"
- Establish a National Climate Change Network to coordinate federal efforts and facilitate state-to-state, local-to-local best practice sharing in real time

**3. Support implementation for "smart adaptation"** Recognize islands and indigenous perspectives, and the unique, biocultural needs of local communities in order to develop site-specific and appropriate place-based information, investments, incentives and barrier removal

## Hawai'i's Next Steps

Governor Abercrombie will convene a Resilient Hawai'i Forum in early 2014 to engage more stakeholders, including Native Hawaiian organizations, natural resource managers, the military, tourism officials, agricultural representatives, researchers and government at all levels to identify specific recommendations. These recommendations will be forwarded to the Task Force and County and State officials for consideration.

# LETTER FROM GOVERNOR ABERCROMBIE

***'A'ohe hana nui ka alu'ia—***
**No task is too big when done together by all.**

The Hawaiian Islands are the most geographically isolated lands on the planet, originally settled by some of the greatest voyagers in human history. Traditional wayfinding by voyaging canoes demands the necessary skills to navigate change: observation, mid-course corrections and resilience. Hawai'i's distinctive approach is guided by these skills and the values of **exploration, innovation, collaboration** and **indigenous knowledge** to face and adapt to the changes on the horizon and already at our shores.

Hawai'i's unique vantage point offers a microcosm of both diverse impacts and solutions. Hawai'i joins other islands on the front lines of climate change, exposed to impacts that are already hitting tropical islands first and most severely—including drought, sea level rise, coastal erosion, flooding, storm intensification, rising temperatures, climate-sensitive disease proliferation and ocean acidification. These impacts have a direct effect on our urban and rural populations, as well as our rare flora and fauna. Rising seas threaten the low-lying islands of Papahānaumokuākea Marine National Monument (in the Northwest Hawaiian Islands), home to species found nowhere else in the world. Most of our residential, commercial, resort, and industrial development is on or near the coast, and no point in the state is more than 30 miles from the shoreline. The coastline is Hawai'i's livelihood. The environment is our economy.

The transnational issues of climate change and security, energy, food, public safety, biodiversity, water, cultural resources, social justice and health are all represented and clearly intersect in Hawai'i, making our islands a focal point in the Pacific. As the endangered species capitol of the U.S. that imports 80-90% of its food and energy, Hawai'i is extremely vulnerable. Energy transformation, natural resource management and food self-sufficiency are essential, not optional. Mitigation, adaptation and security are the elements of survival for our islands.

Given these enormous challenges, Hawai'i must build resilience. In September 2013, with the support of the U.S. Department of State's Office of Global Change, Hawai'i became the first sub-national government to sign onto the Majuro Declaration for Climate Leadership, highlighting our state's ambitious targets for clean energy and integrated efforts for mitigation and adaptation. I signed Hawai'i's Climate Change Adaptation Priority Guidelines in 2012, recognizing the importance of multidisciplinary, public-private collaboration for implementation. Hawai'i has developed strong partnerships among multiple levels of government, universities, non-profit organizations, businesses and communities for an integrated, shared kuleana[1] approach to adaptation. As host of the Asia Pacific Economic Cooperation Leaders' Meeting (2011) and the Asia Pacific Clean Energy Summit, Islands and Isolated Communities Congress (2013), Hawai'i has always been a gathering place of cultures, sectors and institutional resources working together to identify creative adaptation and mitigation responses. We have some of the best researchers and scholars in the world at the University of Hawai'i (UH) and are the home base for the U.S. Pacific Command. Our collective expertise will ensure that we are prepared to address the realities of climate change.

*Mahalo nui loa* to President Barack Obama for inviting Hawai'i to participate on this Task Force. We are grateful for the opportunity to share our unique island experiences, needs and approaches. Our aloha spirit is a tremendous asset—we know how to work together toward a common purpose. We serve as a model for communication and coordination. We are a contributing partner that is empowered when we leverage Federal assistance and expertise. We look forward to continue working closely with our federal partners from the Department of Defense (DOD), National Oceanic and Atmospheric Administration (NOAA), Department of State (DOS), Department of the Interior (DOI), and others to identify and implement innovative, collaborative solutions. Addressing the complex interconnected challenges of climate change will call upon all of us to paddle together in the same direction—we are all in the same canoe. Building resiliency now is our moral obligation to future generations.

*Imua,*

Neil Abercrombie

Governor Neil Abercrombie

[1]Hawaiian word for right, privilege, concern, responsibility, authority, jurisdiction

# Hawai'i's Unique Vulnerability

## Climate Change—on the horizon and at our shores

*Much of the following information is referenced from the Pacific Island Regional Climate Assessment (PIRCA).[1]

Climate change is already a clear and present threat in Hawai'i. Many areas of Hawai'i are experiencing enduring drought. Seventy percent (70%) of the state's beaches are eroding. A new University of Hawai'i study suggests that the highest temperatures today will become the new average within a generation.[2]

## Major indicators of climate change in Hawai'i are:

- Warming air temperature;[3]
- Dwindling stream flows;
- Decreasing rainfall[4] and increasing drought;
- Shifting habitats;
- Rising sea levels;[5]
- Coastal erosion;[6]
- Warming ocean;
- Changing wind and wave patterns; and
- Ocean acidification

## Threatened Freshwater Resources

As an island state isolated from large landmasses, Hawai'i is 100% dependent on rainfall to provide freshwater for drinking, agriculture, and commercial uses, and to sustain forest, coastal and nearshore ecosystems. Over the past century, average rainfall has decreased throughout Hawai'i. Future freshwater supplies will be limited by multiple stresses including climate change, land use, population growth, aging infrastructure, and competing uses. All nine long-term stream gauges in Hawai'i show that between 1913 and 2008, base load stream flows decreased by more than 20% and in some places up to 70%.

## Vulnerable Coastal Zones

In Hawai'i, no point of land is more than 30 miles from the ocean. A majority of communities, commercial enterprise, and infrastructure are located along the state's coastlines. Hawai'i is expected to experience sea level rise of one foot by 2050 and three feet by the end of the century. This will impact the built environment in low-lying areas, as well as beaches, dunes, coastal wetlands, and their associated species. Damage to tourism infrastructure, including the loss of Waikīkī Beach, could reduce visitor expenditures by $2 billion a year. Already, beach erosion and waves threaten coastal areas and structures with increased frequency and magnitude. In areas of Honolulu within several blocks of the ocean, there is the potential for basements to flood, ground floors to be splashed by storm wave runup, drainage problems, saltwater intrusion into vulnerable ecosystems and agricultural areas, and flooding following heavy rains. Strong winds and high seas also may cause more extreme events like the 2011 wave overwash episodes at Midway, Laysan, and Kure Atolls in the Northwest Hawaiian Islands that inundated these low-lying islands, destroyed infrastructure, and killed thousands of nesting seabirds.

*Key Indicators of Climate Change in the Pacific Islands Region.*
*Source: Pacific Island Regional Climate Assessment (PIRCA), 2012, graphic designed by Susan Yamamoto, adapted from "Ten Indicators of a Warming World," in NOAA National Climatic Data Center, State of the Climate in 2009 (report)*

## Changing Oceans

Pacific Islanders are ocean peoples. Traditionally, they depended on healthy oceans for food, materials and navigation, and many communities continue to practice subsistence. Sea-surface temperature in the Pacific is rising and projected to keep increasing over time. Increased temperatures negatively impact coral reefs and associated fisheries, which are vital to sustaining Hawai'i's economy, food security and way of life. Many coral reefs are overtaxed and threatened due to the cumulative effects of human development, overfishing, invasive species, and changes in ocean temperature and chemistry. As carbon dioxide is absorbed by seawater, this leads to a process referred to as ocean acidification. Impacts to reef-building coral in Hawaiian waters are of high concern, as coral reefs provide a buffer against storm waves, are a source of food and support commercial and recreational opportunities important to the state's economy.

## People at Risk

Mounting threats to food and water security, infrastructure, and public health and safety will lead to increased human migration from low Pacific islands to high islands like Hawai'i and continental sites, which has already begun to occur in the case of the Marshall Islands.[7] Additionally, Hawai'i is concerned about climate-sensitive diseases and other public health effects from climate change. Hawai'i's tropical environment coupled with high volume international airports, put the state at high risk for the introduction of Center for Disease Control-recognized climate-sensitive mosquito-borne illnesses like West Nile Virus, malaria and dengue fever. Strengthening biosecurity is a critical adaptation strategy for Hawai'i.

# Climate Change is a Matter of Security in Hawai'i

Because climate change defies geographic, political and jurisdictional boundaries, it poses unique challenges given Hawai'i's strategic location. However, climate change can also be a catalyst for advancing resiliency through collaboration. As a non-traditional security threat, climate change requires place-based mitigation and adaptation spanning across multiple sectors, including government, non-governmental organizations, academic institutions and the private sector.

The U.S. DOD Report of the Defense Science Board Task Force on Trends and Implications of Climate Change for National and International Security states, "climate change is likely to have the greatest impact through its indirect effects on conflict and vulnerability."[8]

> *"[Climate change] is probably the most likely thing that is going to happen...that will cripple the security environment, probably more likely than the other scenarios we all often talk about."*
>
> — Admiral Samuel Locklear

The report categorizes the security threats as:

- Population support system resiliency (water, food, health and energy)
- Human security (population dislocation and armed conflict)
- Political continuity (governance and economic viability)

Hawai'i is facing security threats in all three categories. Given Hawai'i's dependency on food and energy imports and current drought, some of the islands' key population support systems are already extremely vulnerable. The State is working to strengthen the resilience of these systems through water conservation measures and watershed protection, food self-sufficiency strategies, and clean energy transformation, which are outlined below. Over the next couple of decades, climate change is also expected to have increasingly negative impact on tourism, one of the state's primary economic drivers.[9] Economic viability is a recognized security issue of political continuity. Human security may also be an issue as communities in low-lying Pacific islands seek to relocate.

Headquartered in Hawai'i, the U.S. Pacific Command (PACOM) is supported by four component commands, the U.S. Pacific Fleet, U.S. Pacific Air Forces, U.S. Army Pacific, and U.S Marine Forces, with forces stationed in Hawai'i and deployed throughout the region. PACOM's Area of Responsibility (AOR) encompasses about half of the earth's surface, stretching from the waters off the west coast of the U.S. to the western border of India, and from Antarctica to the North Pole. There are few regions as culturally, socially, economically and geo-politically diverse as the Asia-Pacific. The 36 nations that comprise the Asia-Pacific region are home to more than 50% of the world's population, three thousand different languages, several of the world's largest militaries, and five nations allied with the U.S. through mutual defense treaties.[10]

Through the Asia-Pacific Rebalance, the United States is expanding and intensifying its already significant role in the Asia-Pacific.[11] Given Hawai'i's strategic location and leadership in the region, Hawai'i will have an active role as the U.S. policy is advanced. PACOM Commander, Admiral Samuel Locklear states that, "The U.S. Rebalance is an intentional effort to reinforce to the people of the Indo-Asia-Pacific that the United States is a Pacific nation, with significant interest here, and that we remain committed to peace and prosperity for all...peace and prosperity that must be underpinned by a resilient security environment."[12] While emphasis is placed on the Rebalance as a military policy, it is more expansive than that. It is a national policy comprised of diplomatic, trade and security dimensions.

> *"If it goes bad, you could have hundreds of thousands or millions of people displaced and then security will start to crumble pretty quickly."*[13]
>
> — Admiral Samuel Locklear

In 2013, Admiral Locklear declared, "[Climate change] is probably the most likely thing that is going to happen... that will cripple the security environment, probably more likely than the other scenarios we all often talk about."[13] PACOM is already working with Asian nations to stockpile supplies in strategic locations and engaging other armed forces in the region about the issue, including the organization of a major exercise in May 2013 with nearly two-dozen countries to practice the "what-ifs."

The Pacific is also ground zero for a lot of the world's climate-induced migration refugees. Admiral Locklear says there is a "real potential here in the not-too-distant future of nations displaced by rising sea level."[13] The island of Tarawa in Kirbati, for example, is contemplating moving their entire population to another country because their home is no longer going to exist. The Admiral has also noted concern about more severe weather patterns, citing, "We are on super typhoon 27 or 28 this year in the Western Pacific. The average is about 17."[13] This was before Typhoon Haiyan, the most recent devastating typhoon to hit the Philippines.

"We have interjected into our multilateral dialogue – even with China and India – the imperative to kind of get military capabilities aligned [for] when the effects of climate change start to impact these massive populations," he said. "If it goes bad, you could have hundreds of thousands or millions of people displaced and then security will start to crumble pretty quickly."[13]

Climate change is also expected to exacerbate rainfall patterns, making wet areas more prone to flooding and drier areas more prone to drought. Regions already vulnerable to agricultural collapse could face extreme drying that leads to desertification and famine. Rising seas, shifting rainfall patterns, melting glaciers and drought all are expected to stress the supply of fresh water around the globe. While climate change alone does not cause conflict, it may act as an accelerant of instability or conflict. Admiral Locklear acknowledges sustainable systems that provide fresh water and dependable food supply will be needed.[14] Further, many experts have said that fresh water shortages could aggravate tensions between nations and spark conflicts around the world during the century, much as oil shaped geopolitics and war in the last century.[15]

In addition to multilateral dialogue, PACOM is participating in enhanced levels of discussion and coordination with other federal agencies and local stakeholders in Hawai'i on this matter. The Climate, Environment and Security in the Asia Pacific Region (CESAPR) Working Group is using security as the shared lens for collaboratively combating the impacts of climate change.

Hawai'i has also been involved in the DOD-led Micronesia Biosecurity planning process as a way to prevent the spread of invasive species between Hawai'i and Micronesia and protect vulnerable island natural resources, agriculture, human health and economies.

# Hawai'i's Climate Change Leadership & Innovative Approach to Adaptation

Hawai'i's Governor and State Legislature stand together in recognizing the urgent threat of human influenced climate change. Governor Abercrombie's New Day Plan[16] prioritizes long-term planning for the effects of climate change. The Hawai'i Legislature stated, "Climate change poses a serious threat to the economic well-being, public health, natural resources, and the environment in Hawai'i (Act 234, Session Laws of Hawai'i 2007)." Hawai'i's policies recognize that climate change mitigation and adaptation go hand-in-hand. This is particularly evident in the state's energy policies, adaptation priority guidelines, and related plans and emerging initiatives.

Hawai'i was recently recognized as:

- The first sub-national government to sign onto the Majuro Declaration for Climate Leadership, an outcome of the Pacific Islands Forum presented to the UN Secretary General in September 2013
- A "bright spot" with an innovative, integrated approach to green growth by the Global Island Partnership during the Island Summit at the 2012 UN Convention on Biological Diversity, Conference of the Parties 11 in India
- Number one in the nation for energy efficiency by the Energy Services Coalition's Race to the Top Award (2012 & 2013)

## Regional Collaborative Approaches—The Pacific Way to Climate Preparedness and Resilience

Hawai'i is a model for collaboration, coordination and communication, which extends beyond the archipelago to other islands in the Pacific. Working effectively together reflects "The Pacific Way" to building resilience. The Pacific Islands Regional Climate Assessment (PIRCA) is an outcome of this approach.

Additionally, Hawai'i hosts regional coordinating entities like the Pacific Islands Climate Change Cooperative, Pacific Regional Integrated Sciences and Assessments, and Pacific Climate Information System. These partnerships demonstrate a commitment to supporting risk management and climate adaptation based on the "co-production of knowledge," which facilitates a robust and sustained dialogue among the users and providers of information.

Because Hawai'i imports over 90% of its energy, energy independence is inextricably tied to mitigation, resilience and security. Hawai'i is now on track with one of the most ambitious targets for clean energy in the country and the most aggressive renewable portfolio standard of any state. With a combination of smart policy, committed leadership, and technology innovation, Hawai'i is beginning to realize its potential for energy independence. Hawai'i has six independent electricity grids, making it a perfect test bed for demonstrating innovation that enables a high-penetration of renewables. Korea, Japan, U.S. Dept. of Energy, and Dept. of Defense have all invested hundreds of millions of dollars into Hawai'i over the last year to develop clean energy technologies.

## Policies

### Hawai'i Climate Change Law (Act 234, 2007): GHG Emissions Reductions to 1990 Levels by 2020

In 2007, Hawai'i became one of the first states in the nation to enact major climate change legislation establishing Greenhouse Gas Emissions limits.[17] Pursuant to Act 234, Hawai'i law now requires statewide emissions reductions to levels at or below 1990 levels by January 1, 2020.[18] The legislature identified major Hawai'i industries such as tourism, agriculture,

recreation, commercial fishing, and forestry as vulnerable to impacts.[19]

### Hawai'i Clean Energy Goal (2008): 70% Clean Energy by 2030 (40% via renewable, 30% via efficiency)

On January 28, 2008, the State of Hawai'i and the U.S. Department of Energy signed a memorandum of understanding establishing the Hawai'i Clean Energy Initiative (HCEI), "to establish a long-term partnership . . . that will result in a fundamental and sustained transformation in the way in which renewable energy efficiency resources are planned and used in the State," and to "provide a replicable global model for achieving similar results."[20]

## Additional Innovative Energy Policies In Hawai'i

- Decoupling (2010) The Hawai'i Public Utilities Commission (PUC) adopted a ratemaking approach that decouples the utility's profits from its kilowatt-hour sales, removing a disincentive for energy efficiency and distributed renewables.[21]
- Solar Mandate (2010) Hawai'i was the first in the nation to enact a law requiring that most new homes built in the state include solar water heaters. [22]
- Feed-in Tariffs (2011) The PUC established a feed-in tariff (standard offer contract) for small- to utility-scale renewable energy projects.[23]
- On-Bill Financing (2011) Hawai'i adopted a statewide on-bill financing program that will allow residences and businesses—including renters—to install energy efficiency improvements, such as solar water heaters, and pay for them using their energy bill savings (2011).[24]
- Green Energy Market Securitization (GEMS) (2013) This pioneering financing model secures low-cost capital from the private sector to make clean energy improvements affordable and accessible to underserved community members, including low to moderate-income homeowners, renters and nonprofits. GEMS takes a proven rate-reduction bond structure and uses it in an innovative way to provide low-cost financing to utility customers.[25]
- Utility Performance Incentives (2013) Hawai'i enacted a policy to implement a variety of financial incentive mechanisms that help align clean energy, ratepayer, and shareholder interests.[26]

## Making Adaptation a Priority

Hawai'i's state and local decision makers' recognize the need for adaptation, which is evidenced in the Climate Change Adaptation Priority Guidelines, the Hawai'i barrel tax on petroleum, the state's watershed restoration plan ("Rain Follows the Forest"), and various county and community initiatives.

In Act 73( 2010), the Hawai'i State Legislature stated:

*[C]limate changes will likely impose major, but not fully understood, costs and other impacts on Hawai'i's people and the natural capital we depend upon to support our lives in the middle of the Pacific Ocean. Nowhere is it more obvious than in remote island chains like Hawai'i that our lives and the economy are intertwined with the health and function of the natural world around us . . . . Now is the time for bold action to squarely address Hawai'i's energy and food requirements and plan for and address the inevitable effects of climate change.*

## Policies to Support Climate Change Adaptation in Hawai'i

### Barrel Tax on Petroleum (Act 73, 2010): Hawai'i First in Nation

In 2010, pursuant to Act 73, Hawai'i adopted the nation's first barrel tax ($1.05 per barrel) on imported petroleum.[27] The act's six enumerated purposes fall under three general categories: (i) promoting energy self-sufficiency, (ii) promoting food self-sufficiency, and (iii) adapting to climate change, i.e., to "[h]elp Hawai'i's natural resources and population adapt and be resilient to the inevitable challenges brought on by climate change." Because the barrel tax raises revenues for a variety of climate-related funds, Act 73 functions uniquely as both a climate change mitigation and adaptation measure.

### Collaborative Development of a Foundation for Statewide Climate Change Adaptation Policy

In August 2011, the Hawai'i State Office of Planning (OP) and the Ocean Resources Management Plan (ORMP) Policy Group and Working Group hosted a two-day intensive workshop to implement the first steps of a Framework for Climate Change Adaptation in Hawai'i (2009), including the development of the foundation for a statewide climate change adaptation policy. Sixty participants engaged in the unique workshop, which combined a futures approach with appreciative inquiry to develop climate change adaptation "visions" for Hawai'i moving forward. The results of the workshop provided the foundation for the development of priority guidelines for climate change adaptation, which OP drafted with continued input from workshop participants and additional stakeholders. The resulting Act 286 was signed into law on July 9, 2012.

### Climate Change Adaptation Priority Guidelines (Act 286): Planning for Climate Change

The stated purpose of the Climate Change Adaptation Priority Guidelines is "to encourage collaboration and cooperation among county, state and federal agencies, policy makers, businesses, and other community partners to plan for the impacts of climate change and avoid, minimize, or mitigate loss of life, land, and property of future generations."[28] The guidelines are intended to prepare the state for climate change impacts on agriculture, conservation lands, coastal and nearshore marine areas, natural and cultural resources, education, energy,

higher education, health, historic preservation, water resources, the built environment (e.g., housing, recreation and transportation) and the economy. As a priority guideline, climate change adaptation must now be considered in state and county budgetary, land use, and other decision-making processes. In particular, the state Land Use Commission and Board of Land and Natural Resources must consider whether land use entitlements are consistent with the priority guidelines. In addition, land use planning, coastal permitting, and zoning at the county level must be consistent with county general plans, which must be consistent with the Hawai'i State Planning Act (Chapter 226).[29]

## Implementation of the Climate Change Adaptation (CCA) Priority Guidelines

The State Office of Planning is beginning to coordinate implementation of the CCA Priority Guidelines. The Office is assisting both state and county agencies to integrate climate change adaptation into their existing planning frameworks through the following initiatives:

**1.** Implementing the 2013 Ocean Resources Management Plan Update
**2.** Finalizing the Coastal Resilience Networks (CRest) Project
**3.** Developing a framework for conducting community-based vulnerability assessments
**4.** Preparing a Technical Assistance Memorandum for implementing the CCA Priority Guidelines

### The Ten Climate Change Adaptation Priority Guidelines are:

**1.** Ensure that Hawai'i's people are educated, informed and aware of the impacts climate change may have on their communities;
**2**. Encourage community stewardship groups and local stakeholders to participate in planning and implementation of climate change policies;
**3.** Invest in continued monitoring and research of Hawai'i's climate and the impacts of climate change on the State;
**4.** Consider Native Hawaiian traditional knowledge and practices in planning for the impacts of climate change;
**5.** Encourage the preservation and restoration of natural landscape features, such as coral reefs, beaches and dunes, forests, streams, floodplains and wetlands, that have the inherent capacity to avoid, minimize or mitigate the impacts of climate change;
**6.** Explore adaptation strategies that moderate harm or exploit beneficial opportunities in response to actual or expected climate change impacts to the natural and built environments;
**7.** Promote sector resilience in areas such as water, roads, airports and public health, by encouraging the identification of climate change threats, assessment of potential consequences and evaluation of adaptation options;
**8.** Foster cross-jurisdictional collaboration between county, state and federal agencies and partnerships between government and private entities and other non-governmental entities, including nonprofit entities;
**9.** Use management and implementation approaches that encourage the continual collection, evaluation and integration of new information and strategies into new and existing practices, policies and plans; and
**10.** Encourage planning and management of the natural and built environments that effectively integrate climate change policy.

## County and Community Adaptation Measures

■ Water Availability Policy. In 2007, the Maui County Council adopted a Water Availability Policy (WAP) to protect, preserve and manage water resources and a natural and cultural public trust resource. (Ordinance 3502, 2007).

■ County Shoreline Setback Rules. Maui and Kaua'i counties adopted the nation's first coastal erosion rate-based setback policies, which better protect coastal communities from coastal erosion hazards by taking into account site-specific shoreline changes, rather than establishing a fixed setback distance for all properties. Kaua'i's policy also incorporates the average lifespan of structures (70 years) as a setback formula factor and can be adjusted by 10 percent to accommodate future accelerations in sea-level rise (Shoreline R. § 12-203-6, 2007; Ordinance 863, 2008).

■ County Level Efforts. In 2009, the City and County of Honolulu Board of Water Supply released the Ko'olau Loa and Wai'anae watershed management plans, which address climate change impacts on water resources. The 2010 Maui County general plan includes policies to "[r]estrict development in areas that are prone to natural hazards, disasters, or sea-level rise" and to "[d]iscourage new entitlements for residential, resort, or commercial development along the shoreline" (Ordinance 3732, 2010). The 2010 Hilo, Hawai'i County, community development plan update includes a strategy for preparing for climate change impacts by, among other actions, incorporating "sea-level rise data in long-term implementation strategies" (Resolution 352 10).

## Traditional Knowledge for Impact Monitoring and Place-Based Resilience Planning.

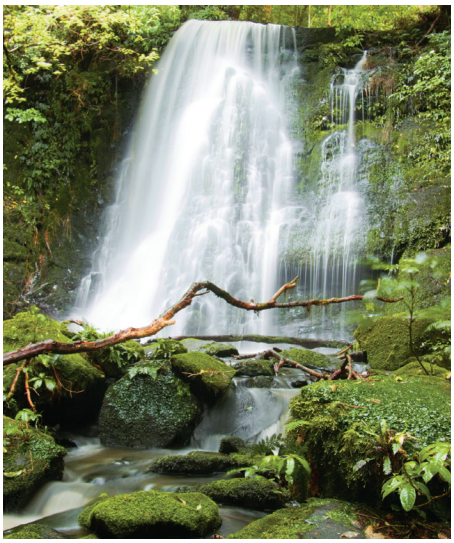
Two participatory projects in Ka'ūpūlehu tapped into local ecological knowledge for monitoring impacts and informing adaptation by developing a "timeline of adaptation" and "seasonal calendar" based on a biocultural history passed

down through generations. The Hanalei Watershed Hui collaborated with UH's Hazards, Climate & Environment Program to conduct a Community Resilience Survey and develop Community-Based Disaster Resilience Plans that integrate natural resource management, social capacity and disaster risk reduction facilitated through multi-sector community leadership boards.

## Hawai'i's Natural Resilience: Ecosystem-Based Adaptation

### WATER

Wai is the Hawaiian word for water. Waiwai means wealth, which demonstrates a profound indigenous understanding of water as a foundational value and asset for all people. In 1978,



the people of Hawai'i amended the Hawai'i State Constitution (art. XI, sec. 7) to declare "The State has an obligation to protect, control and regulate the use of Hawai'i's water resources for the benefit of its people. . . [and] provide for a water resources agency which . . . shall set overall water conservation, quality and use policies. . . . ." In 1987, Hawai'i adopted a progressive, forward looking State Water Code (Haw. Rev. Stat. Chapter 174C) that established a State Commission on Water Resources Management to integrate water and land use planning and comprehensively manage all water resources in the state. The Hawai'i Supreme Court later interpreted Hawai'i's water traditions and laws as part of the Public Trust Doctrine, an ancient and modern protection of water and natural resources for public purposes, In Re Waiahole, 94 Haw. 97 (2000), which recognized the precautionary principle in natural resources management.

As important as fresh water resources are, local governments throughout the world are coming to realize that reusing and reclaiming wastewater is an important source of water for irrigation and landscaping and an innovative way to reduce pollutants and clean up river and ocean waters at the same time. Integrating water and energy policies will have profound implications for both natural resource management and overall public finance. It is a frontier that deserves immediate attention and experimentation.

### FORESTS

Hawai'i is investing in its natural capital as an adaptation strategy through watershed protection and management. In November 2011, Governor Abercrombie unveiled The Rain Follows the Forest: A Plan to Replenish Hawai'i's Source of Water, a State of Hawai'i Department of Land and Natural Resources (DLNR) initiative that addresses climate change impacts on fresh water resources. The plan acknowledges, "[w]hile climate change is a problem on a global scale, simple, local actions can safeguard Hawai'i's declining water sources."[30] Protecting watershed forests

both mitigates and facilitates adaptation to climate change. Healthy and diverse forests that are not overrun by invasive species act like a sponge, collecting rain and moisture from passing clouds, slowly delivering fresh water into streams and aquifers, absorbing greenhouse gases, and reducing runoff and siltation into near shore waters during storm events. The plan aims to double the state's protected forest acreage within the next decade. Restored forests are, not surprisingly, the most cost effective means of protecting, storing, and enhancing water supplies.

### OCEAN

The 2013 Hawai'i Ocean Resources Management Plan (ORMP) is a state plan that provides guidance to state agencies

Source photo D. Spooner, USFWS

with responsibilities relating to ocean and coastal zone management, including climate change adaptation.[25] The purpose of the ORMP is to provide a framework and implementation strategy for state agencies and others working with state agencies. The ORMP complements Hawai'i's vision for a healthy, productive, and sustainable ocean ecosystem that fosters economic growth while preserving and protecting Hawai'i's values and needs. Updated every five years, the ORMP identifies management priorities and maps pathways towards goals through the implementation of actions. The ORMP acknowledges that partnerships are critical to making progress towards implementation of these goals and emphasizes interagency relationships between state, county, and federal partner agencies and stakeholders from non-profit organizations and the community. Continued collaboration and engagement with key agencies and organizations remains a critical aspect of this implementation phase of the ORMP.

### Tools in Hawai'i for State and Local Resilience

*Hawai'i's 2013 Hazard Mitigation Plan* (Hawai'i State Civil Defense).[32] The State of Hawai'i has been dedicated to hazard mitigation for decades. This most recent plan developed goals and objectives to provide a foundation for mitigation actions and policies, which includes climate change variability and impacts.

*Sea-Level Rise and Coastal Use in Hawai'i: A Policy Tool Kit for State and Local Governments* (UH Sea Grant-Center for Island Climate Adaptation and Policy).[33] This Tool Kit identifies and explains key land use policy tools for state and local government agencies and officials to facilitate leadership and action in support of sea-level rise adaptation in Hawai'i.

*Climate Change and the Visitor Industry: People, Place, Culture and the Hawai'i Experience* (UH Sea Grant, Center for Sustainable Tourism).[34] This report identifies impacts on tourism resources, feasible adaptation strategies and priority sectors that should be involved.

*Water Resources and Climate Change Adaptation in Hawai'i: Adaptive Tools in the Current Law and Policy Framework* (UH ICAP).[35] This Tool Kit identifies adaptive characteristics embedded within Hawai'i's existing water law and policy regime and proposes twelve tools to improve climate adaptation for the benefit of Hawai'i's water resources.

# Hawai'i's Initial Task Force Recommendations

In response to the Task Force's charge to advise the Administration on how the Federal Government can best support resilience efforts, this report proposes initial recommendations in the areas of actionable information, coordination and implementation. These recommendations build on existing leadership and regional collaboration in Hawai'i and the Asia-Pacific region for a global-federal-local approach to resilience.

## ACTIONABLE INFORMATION

- First Step: Support Task Force members' engagement of local stakeholders to develop specific recommendations and expedite the development and delivery of priority technical assistance
- Support modeling efforts to develop climate projections for islands. Adequate spatial and temporal resolution is critical if model outputs are to be used to assess impacts and support climate adaptation planning.
- Identify barriers to the use of climate information by decision makers to facilitate development of visualization tools, implementation gap analyses and decision support systems that address real-world problems that understand how public and private decision makers utilize real-time and projected climate information

## COORDINATION

- Convene an International Climate Change Resilience Forum at the East-West Center to improve coordination, communication and collaboration between domestic and international resilience efforts, especially in the Asia-Pacific region, "Think Globally, Act Locally"
- Establish a National Climate Change Network to continue ongoing vertical coordination and facilitate state-to-state, local-to-local best practice sharing in real time
- Proactively engage state and local governments in federal adaptation planning and decision making to ensure alignment of place-based and culturally appropriate resources and priorities

## IMPLEMENTATION

### Funding

- Fund state and local governments for place-based planning processes, tools and implementation
- Increase funding for state and local agency data collection to develop locally-based information needed for adaptation, including human and ecosystem responses to change. Increase the ability to monitor change by restoring and enhancing critical high-quality and long-term monitoring stations.
- Effectively leverage private finance and reduce procurement barriers that increase cost of partnerships. Adapting to climate change is a multi-sector effort that requires public and private investment, innovation and solutions. Procurement should allow governments to efficiently leverage private finance to support critical investments in integrated natural and built infrastructure systems. Support new partnerships that capture efficiencies and mobilize large-scale private finance. Engage a broad range of stakeholders, from philanthropies to institutional investors and pension funds. This will

also help governments, non-profits and the private industry to more effectively work together to tailor climate responses that take short-term, medium-term, and long-range costs and benefits into account.

### Planning and Policy Tools

- Support development of island-specific adaptation tools that address the unique needs and context of Hawai'i and other U.S. island territories and islands receiving aid.
- Support development of plans for and connect federal efforts to local and state governments to proactively move public facilities (airports, harbors, waste water, highways) away from areas impacted by sea level rise and storm generated waves in a coordinated fashion
- Create mechanisms to provide technical assistance and increased data sharing between federal/state/local agencies to build local capacity for data management and informed decision making

Better alignment between the federal family and the international community will yield key benefits such as: (1) enhanced communication that supports sustained iterative dialogue among diverse science, service and user communities as a means to nurture essential partnerships and facilitate the co-production of knowledge; (2) improved access to information that is consistent, reliable, and addresses issues and problems of greatest relevancy to decision makers; (3) increased ability to generate regionally relevant guidance and decision support tools for regional and local climate change vulnerability assessment and adaptation planning; (4) better integrated climate change and variability scenario development, training and technical assistance; and (5) connect foreign donor support for climate change efforts in the Pacific (from Australia, the European Union, Germany, France, Norway, Japan, the United Kingdom, etc.) to relevant work in Hawai'i and other U.S. island territories.

# Next Steps For Hawai'i On The Task Force

Governor Abercrombie will convene a ***Resilient Hawai'i Forum*** in early 2014 to engage more local stakeholders, including Native Hawaiian organizations, natural resource managers, the military, tourism officials, agricultural representatives, researchers and government at all levels to identify specific recommendations for the Task Force, as well as for County and State officials. Hawai'i hopes to share successes with and learn from other U.S. state and local governments and islands around the world to better prepare for the impacts of climate change.

[1] Keener, V. W., Marra, J. J., Finucane, M. L., Spooner, D., & Smith, M. H. (Eds.). (2012). *Climate Change and Pacific Islands: Indicators and Impacts. Report for The 2012 Pacific Islands Regional Climate Assessment.* Washington, DC: Island Press.

[2] Mora, C. et al (2013, October). The projected timing of climate departure from recent variability. Nature , 183-187.

[3] *See* PIRCA report, *supra* note 1; *see also* T. W. Giambelluca, et. al, *Secular Temperature Changes in Hawai'i,* Geophysical Research Letters, 35:L12702 (2008).

[4] *See* P. S. Chu & H. Chen, *Interannual and Interdecadal Rainfall Variations in the Hawaiian Islands*, J. Climate, 18:4796-4813 (2005) (measuring a decline in rainfall in Hawai'i from 1980 to 2000); see also D. S. Oki, Trends in Streamflow Characteristics at Long-Term Gauging Stations, Hawai'i, U.S Geological Survey Scientific Investigations Report 2004–5080 1, 23 (2004), *available at* http://pubs.usgs.gov/sir/2004/5080/pdf/sir20045080.pdf (observing a decline in rainfall at twelve of fourteen gauge stations throughout the Hawaiian Islands from 1933 to 2002).

[5] *See* R.S. Nerem et al., *Estimating mean sea level change from the TOPEX and Jason altimeter missions*, 33(S1) Marine Geodesy 435-46, doi:10.1080/01490419.2010.491031 (2010); *see also Mean Sea Level Trends for Stations in Hawai'i*, Nat'l Oceanic & Atmospheric Admin., http://tidesandcurrents.noaa.gov/sltrends/sltrends_states.shtml?region=hi (last visited Mar. 7, 2012); *see also* S. Jevrejeva et al., *Recent global sea level acceleration started over 200 years ago?*, Geophysical Research Letters, 35:L08715 (2008).

[6] Fletcher, C.H., Romine, B.M., Genz, A.S., Barbee, M.M., Dyer, M., Anderson, T.R., Lim, S.C., Vitousek, S., Bochicchio, C., and Richmond, B.M., 2012, National assessment of shoreline change: Historical shoreline change in the Hawaiian Islands:

[7] http://www.eenews.net/stories/1059986860 Mulkern, A. (2013, September 9). As distant Pacific islands flood, a climate-driven exodus to the U.S. grows. *ClimateWire*.

[8] http://www.fas.org/irp/agency/dod/dsb/climate.pdf

[9] http://seagrant.soest.Hawai'i.edu/sites/seagrant.soest.Hawai'i.edu/files/publications/web-hta-climatechange-visitorindustry_0.pdf

[10] http://www.pacom.mil/

[11] http://www.fas.org/sgp/crs/natsec/R42448.pdf, Congressional research service report R42448

[12] http://www.pacom.mil/media/news/2013/02/08-adm-locklear-us-indonesia-society-resilience-asia-pacific-rebalance.shtml

[13] http://www.bostonglobe.com/news/nation/2013/03/09/admiral-samuel-locklear-commander-pacific-forces-warns-that-climate-change-top-threat/BHdPVCLrWEMxRe9IXJZcHL/story.html Bender, B. (2013, March 9). Chief of US Pacific forces calls climate biggest worry. *The Boston Globe*.

[14] http://www.pacom.mil/media/news/2013/02/08-adm-locklear-us-indonesia-society-resilience-asia-pacific-rebalance.shtml

[15] https://www.sandiego.gov/environmental-services/pdf/sustainable/security.pdf

[16] http://governor.hawaii.gov/wp-content/uploads/2012/09/AFG_ANewDayinHawaii_2010.pdf

[17] The first was California, when it adopted the Global Warming Solutions Act in 2006. Cal. A.B. 32, 2006 Cal. Stat. ch. 488 (codified at Cal. Health & Safety Code §§ 38500-38599).

[18] 2007 Haw. Sess. Laws, 24th Leg., Act 234, § 8 (codified at Haw. Rev. Stat. ("H.R.S.") § 342B-71).

[19] 2007 Haw. Sess. Laws, 24th Leg., Act 234, § 1(a).

[20] Memorandum of Understanding Between the State of Hawai'i and the U.S. Dep't of Energy 1 (Jan. 28, 2008), *available at* http://apps1.eere.energy.gov/news/pdfs/hawaii_mou.pdf

[21] PUC issued its Final Decision and Order to approve a decoupling mechanism through Docket No. 2008-0274.

[22] Act 176, 25th Leg., Reg. Sess. (2010) (codified at Haw. Rev. Stat. § 196-6.5 (2010))

[23] PUC has issued orders approving feed-in tariffs through Docket No. 2008-0273

[24] Act 204, 26th Leg., Reg. Sess. (2011) (codified at Haw. Rev. Stat. § 269-125 (2011))

[25] Act 211, 27th Leg., Reg. Sess. (2013) (codified at Haw. Rev. Stat. §§ 269-161 to 176 (2013))

[26] Act 37, 27th Leg., Reg. Sess. (2013) (codified at Haw. Rev. Stat. § 269-6 (2013))

[27] 2010 Haw. Sess. Laws, 25th Leg, Act 73.

[28] http://www.capitol.hawaii.gov/session2012/bills/GM1403_.PDF

[29] http://hawaii2050.org/images/uploads/HRS226_StatePlanningAct.pdf

[30] http://hawaii.gov/dlnr%26/chair/pio/nr/2011/The-Rain-Follows-the-Forest.pdf

[31] http://files.hawaii.gov/dbedt/op/czm/ormp/ormp_update_reports/final_ormp_2013.pdf

[32] http://www.scd.hawaii.gov/documents/HawaiiMultiHazardMitigationPlan2010PUBLIC.pdf

[33] http://www.islandclimate.net/wp-content/uploads/2012/05/icap-sealevelrisetoolkit_web.pdf

[34] http://seagrant.soest.Hawai'i.edu/sites/seagrant.soest.Hawai'i.edu/files/publications/web-hta-climatechange-visitorindustry_0.pdf

[35] http://www.islandclimate.net/wp-content/uploads/2012/05/Water_Resources_Adaptation_HI_1.pdf

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