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Testimony of Dr. Sam 'Ohukani'ōhi'a Gon,
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The Nature Conservancy of Hawai'i is a private non-profit conservation organization dedicated to the preservation of the lands and waters upon which life depends. The Conservancy has helped to protect nearly 200,000 acres of natural lands in Hawai'i. We manage 40,000 acres in 14 preserves and work in 19 coastal communities to help protect the near-shore reefs and waters of the main Hawaiian Islands. We forge partnerships with government, private parties and communities to protect Hawai'i's important watershed forests and coral reefs.

Aloha, I am Dr. Sam Gon and I am the Senior Scientist and Cultural Advisor for The Nature Conservancy of Hawai'i. The Nature Conservancy of Hawai'i is the state chapter of The Nature Conservancy, a private non-profit conservation organization dedicated to the preservation of the lands and waters upon which life depends.

Hawaii's native ecosystems once extended from the mountains to the sea, with forests of several types extending from near sea level to as high as nearly 9000 feet on our tallest mountains. Hawaiian cultural traditions reflect a long, close relationship with native forest, and Hawaiians saw themselves as part of, not separate from, nature; considering themselves direct kin of the plants and animals that shared their world. The land was 'āina, "that which feeds," and its rich diversity helped shape an equally rich and thriving island culture. The forested upland watersheds were considered wao akua, the realm of the gods, and not for human incursion except for very specific needs and under strict ceremonial protocols. Water came from this sacred forested realm fed lo'i (taro fields) and fishponds. Forest trees provided wood for houses, canoes, and tools. Forest plants were gathered for medicinal and many other purposes.

Today, roughly half of our native land cover is gone and the vast majority of Hawaii's native plants and animals find refuge in the upland forests, in large native landscapes across the islands. The Islands' native forests are among the world's biological treasures, sheltering more than 10,000 native species – more than 90% of which are endemic, that is, found only in these islands. Today, many of these species are rare, threatened and endangered with Hawai'i holding one of the highest percentages of endangered plants and animals in the nation. Several of these now endangered species were once so common that they were culturally important; examples include rare hardwoods like kauila and uhiuhi.

People still depend on native forests for their survival and well-being. Forested lands are our islands' primary watersheds, supplying us with hundreds of billions of gallons of fresh water each year. Our forests protect our reefs and beaches from destructive run-off and sediment, clean and cool our air, and are our best defense against flood and drought. While the historical impacts from agriculture, grazing, logging, and development are responsible for much of the loss of native habitat, the greater threat today is the destruction wrought by invasive plants and animals. Invasive animals prey upon native plants and animals and spread diseases. Invasive plants crowd out native species and compete with them for food and habitat. Over time, these pests transform the forests they invade, simplifying their structure, altering soil composition, increasing the risk of fire, and endangering our future water supply.

Easily available fresh water is not a limitless resource here in the middle of the Pacific. On the latitude of Hawai'i it doesn't rain much in the Pacific Ocean. But for the topography and forest cover on our Hawaiian high islands, we would have very little fresh water. Warm trade winds blow across the ocean. When they encounter the steep windward slopes of the Hawaiian Islands they are pushed upward, cool and condense creating cloud moisture and rain. Upland Hawaiian forests that are not overrun by

invasive species act like a sponge, collecting that rain and moisture, slowly delivering fresh water into aquifers and streams, absorbing greenhouse gases, and reducing runoff and siltation into near shore waters during storm events. The native 'ōhi'a and koa forest canopy along with a diverse native understory creates the watershed system that collects fresh water, feeding surface and groundwater systems, making life in these islands possible.

Cloud and fog interception by Hawaii's forests increase total precipitation by as much as 50% above the base annual rainfall. On O'ahu (where 85% of Hawaii's population lives), the Ko'olau Mountains provide 135 billion gallons of fresh water annually, or about half of O'ahu's groundwater recharge. East Maui mountains provide 60 billion gallons of fresh water per year. The University of Hawai'i estimated that the cost to replace lost fresh water, runoff control, recreational, cultural, aesthetic and other ecosystem service values from O'ahu's Ko'olau forest would be \$7.4 - \$14 billion.¹

Though we have had some reprieve during the last two El Niño years, several locations in the state have experienced prolonged drought and that is beginning to happen again. We are seeing other likely effects of climate change which science indicates likely will include:

- More frequent and more severe storms that can increase runoff and siltation; but
- Overall, less rainfall in many locations and therefore less fresh water; and
- Higher temperatures that affect watershed health and can be beneficial to pests.

The University of Hawaii's Rainfall Atlas² catalogues a century of declining rainfall, with an increase in the rate of that decline in recent decades and fewer trade wind days. Summer temperature records have been broken across the state and a record number of storms took aim at Hawai'i over the last few years. In 2014, tropical storm Iselle hit Hawai'i island hard. Fallen invasive albizia trees left the Puna area a quagmire of damaged houses, blocked roads and downed power lines. At the same time, native 'ōhi'a and koa forests in the area were virtually undamaged. These same native forests are also showing that they are better at capturing rain water and recharging aquifers than invasive species such as strawberry guava.³

In response to these conditions, we must plan and implement mitigative and adaptive measures to ensure the resilience of our natural and human systems. One of the most effective tools we have to help address the effects of climate change in Hawai'i is to protect our forests. Healthy and diverse Hawaiian forests 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 Conservancy is working with our conservation partners—public and private—throughout the islands to protect our precious forested watersheds. Our strategic approach is focused on:

- Managing our statewide network of forest preserves;
- Helping to build and manage Watershed Partnerships that include our preserves; and
- Advancing new methods and technologies to control invasive animals and weeds.

¹ Roumasset, J., J.B. Kaiser, N. Krause, D. Mecham and J. Wooley. 1997. Draft Environmental Valuation and the Hawaiian Economy. University of Hawai'i Economic Research Organization, UH- Mānoa.

² <http://rainfall.geography.hawaii.edu/>

³ Giambelluca, T. W., Delay, J. K., Asner, G. P., Martin, R. E., Nullet, M. A., Huang, M., Mudd, R. G., Takahashi, M. 2008. *Stand Structural Controls on Evapotranspiration in Native and Invaded Tropical Montane Cloud Forest in Hawai'i*. American Geophysical Union, Fall Meeting 2008, abstract #B43A-0422.

There are a number of opportunities for greater collaboration and support:

- Congress should reauthorize and provide full dedicated funding for the Land and Water Conservation Fund. (See, Attachment 2) We thank Senator Hirono for leadership in this regard.
- Congress should pass the Wildfire Disaster Funding Act for a stable budget approach to wildfire suppression without raiding other important forest health programs. (See, Attachment 3)
- Hawai'i should receive an equitable share of federal endangered species recovery funding such that it more proportionately represents the numbers of threatened and endangered species here.
- Enhanced local, state and federal support is needed for public-private watershed partnerships (www.hawp.org), forest management tools and infrastructure like fencing.
- Continued development of leading edge technologies and tools are critical for forest management.
- Enhanced federal partnerships and funding are needed for the U.S. Depts. of Agriculture, Interior and possibly the Defense Department for research, technology development, biosecurity, biocontrol research, disease management, and watershed partnerships.

Mahalo for the opportunity to testify today. Having dependable supplies of clean fresh water is of critical importance not only to an island state like Hawai'i, but to the nation and the world as we work together to address and adapt to the effects of a changing climate.

Attachments

1. Before and After Hawaiian Watershed Photos
2. Land and Water Conservation Fund Handout
3. Wildfire Disaster Funding Act Handout