

Pacific Islands Climate Change Cooperative



A decision support tool for watershed management: selecting the best actions to protect water supply and water quality

In Hawai‘i, researchers and land managers are not just preparing for the future effects of climate change. They are confronting its effects now, in the form of increased air temperatures at high elevations, lower levels of rainfall and streamflow that has declined since 1970. Recent downscaled climate modeling for Hawai‘i suggest that the windward sides of the Hawaiian Islands will continue to experience warmer conditions, with fluctuating rainfall potentially reducing flow into streams and the recharge of groundwater. The spread of thirsty invasive plants such as the strawberry guava (*Psidium cattleianum*) will further deplete water in streams.

To help resource managers and land owners be more proactive in meeting these challenges, a diverse team of researchers have developed a watershed management decision support tool (DST). The tool shows how climate change and invasive species impact water yield, water quality, and aquatic habitat. It also prioritizes watershed restoration for maximum benefit to selected target species and/or people, and it determines the best management activities for achieving those objectives under various management limitations.

Clean, plentiful water threatened by climate and invasive species

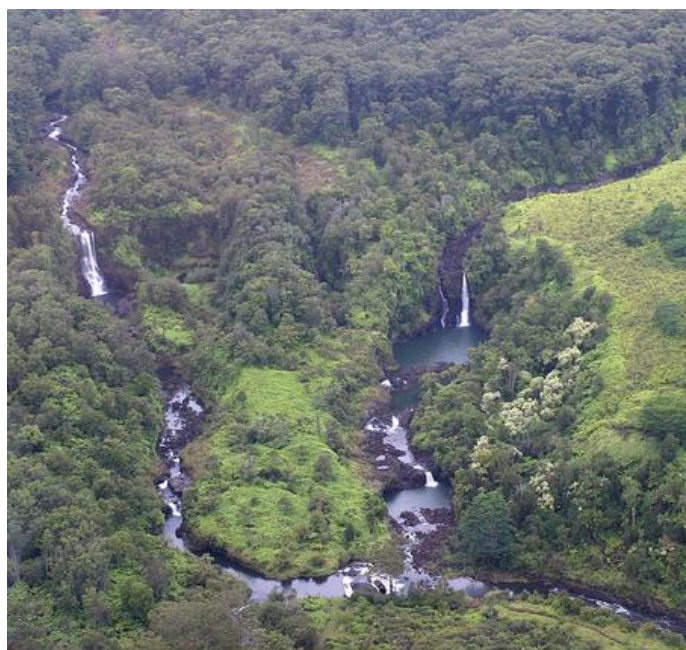
On island ecosystems, healthy watersheds and clean flowing streams provide critical habitat for native organisms as well as water for drinking and agriculture. Water quantity, quality, and in-stream habitat are all

threatened by the effects of spreading invasive plants, deforestation, development, and climate change.

In Hawai‘i, native forests are being quickly replaced by single-species stands of invaders such as strawberry guava that suck up water at a much higher rate. While many studies have focused on these issues, there is an urgent need to apply this knowledge to guide exotic species control, ecosystem restoration, best management practices, and education programs in the most cost-efficient manner possible.

Multiple partners achieving multiple goals

Federal and state agencies in Hawai‘i, several universities, the Kamehameha Schools, the Mauna Kea Watershed Alliance, the [Pacific](#)



[Islands Climate Change Cooperative](#) and even some foreign governments have teamed up to develop various parts of this multi-faceted project. The project combines field-based measurements with remote sensing (satellite data) and modeling. It is also establishing new stream flow monitoring stations on Hawai‘i Island. The DST initially focuses on the Hilo-Hāmākua region of Hawai‘i Island, but will be tested on Pohnpei Island in the Federated States of Micronesia.

Understanding how climate change and invasive species can impact water yield, water quality, and aquatic habitat is the first step in effectively addressing these problems. The DST goes further by showing the most cost-effective ways that impacts can be lessened through restoration (such as weed control and reforestation) or habitat protection (fencing). This research project is delivering various educational materials; peer-reviewed journal publications and presentations; and a web-based GIS model that can highlight recommended actions to benefit targeted species or water supply needs. More information at piccc.net/our-projects.

Principal Investigators

Richard A. MacKenzie and Christian Giardina

*[Institute of Pacific Islands Forestry](#), USDA Forest Service

Project Partners

[Hawai‘i Department of Land and Natural Resources](#)

*[Hawai‘i Division of Aquatic Resources](#)

[Hawai‘i Natural Area Reserve System](#)

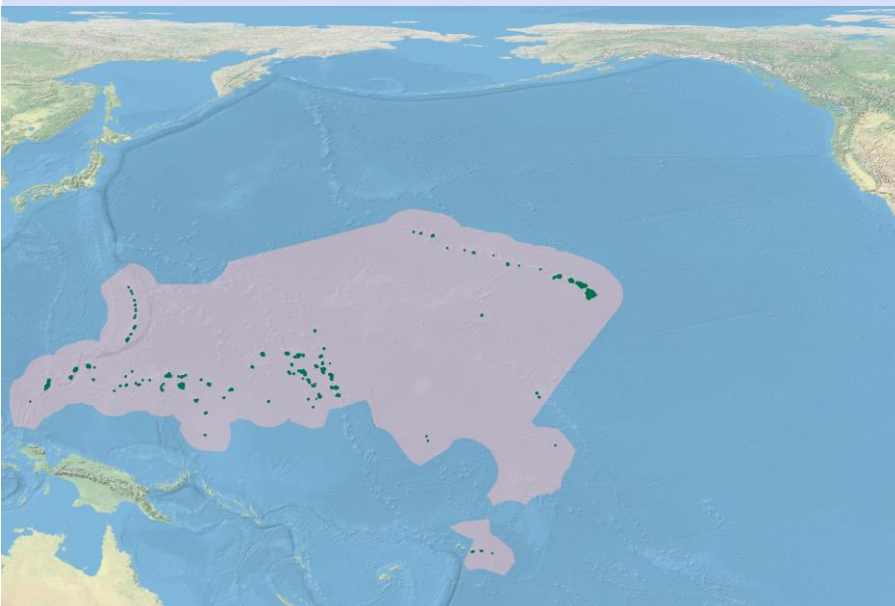
[Kamehameha Schools](#)

[Mauna Kea Watershed Alliance](#)

[Michigan State Univ.](#)

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The map below depicts the PICCC geography, which includes Hawai‘i, American Sāmoa, Guam, the Northern Mariana Islands, the Marshall Islands, the Federated States of Micronesia, Palau and 4 Marine National Monuments.



Project Partners continued

[National Science Foundation, REU](#)

[Pacific Northwest Research Station,](#)

[USDA Forest Service](#)

[Hakalau National Wildlife](#)

[Refuge, US Fish & Wildlife Service](#)

[US Geological Survey](#)

[Univ. of Hawai‘i - Hilo](#)

[Univ. of Hawai‘i - Mānoa](#)

[The Pacific Islands Climate Change Cooperative \(PICCC\)](#) was established in 2009 to assist those who manage native species, island ecosystems, and key cultural resources in adapting their management to climate change for the continuing benefit of the people of the Pacific Islands. The PICCC provides a range of services and tools to help managers in Hawai‘i, the Mariana Islands, American Sāmoa, and other Pacific Island groups make informed decisions for conservation of natural and cultural resources including climate models at the scale of islands and archipelagos, ecological response models, and implementation and monitoring strategies for island species, resources, and communities. Our goal is to help managers reach explicit biological and cultural conservation objectives in the face of climate change and ongoing threats such as fire, land conversion, and invasive species.

Contact:

Jeff Burgett

PICCC Science Coordinator

jeff.burgett@piccc.net

677 Ala Moana Blvd., Suite 320

Honolulu, HI 96813

Phone: 808-687-6175

Fax: 808-664-8510

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