



Hawaii Water Resources Research Center

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Sampling water for fecal bacteria, Ka'elepulu Pond, O'ahu, Hawai'i



Inspecting municipal well, Kona, Hawai'i



Coral, fish, and invertebrates near the Wai'anae ocean outfall, O'ahu, Hawai'i

WRRRC Faculty

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Engineering

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Geography

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WHO AND WHAT WE ARE

The University of Hawai'i (UH) Water Resources Research Center (WRRRC) is one of fifty-four institutes throughout the U.S. created under the federal Water Resources Research Act of 1964. Our mission is to assemble and coordinate university faculty and other experts from diverse fields to find solutions to innately multidisciplinary water-resource issues, generating significant educational opportunities by allowing both undergraduate and graduate students to work directly with senior researchers.

Federal grant funding from the Water Resources Research Act allows WRRRC to leverage university funds, external grants, and

contracts. WRRRC typically receives between 55 percent and 65 percent of our annual support from external grants and contracts.

WRRRC currently has ten faculty researchers—many joint appointees active in such fields as botany, economics, engineering, geology and geophysics, and microbiology. Other UH faculty also serve as principal investigators on WRRRC projects. In FY2008 our projects employed sixteen undergraduate, thirteen master's, and twenty-two doctoral students. Facilities include well-equipped environmental chemistry and microbiology laboratories, administrative offices, and a library/conference room.

A SAMPLING OF 2008 WRRRC RESEARCH ACCOMPLISHMENTS

- UH Geology and Geophysics Professor Aly El-Kadi and a multidisciplinary team of students and other faculty completed a Source-Water Assessment study of the Nawiliwili watershed on the island of Kaua'i. The project was the first in Hawai'i to address the current EPA requirements and has been used as a model for other watershed plans in the state. The project's estimates of groundwater-recharge rates have been incorporated into sustainable-yield estimates by the Hawai'i Commission on Water Resource Management.
- UH Geography Professor Thomas Giambelluca has shown that the invasive forest species *Psidium cattleianum* Sabine (strawberry guava) generates 27 percent greater evapotranspiration than the native forest plants in Hawai'i Volcanoes National Park. As a result of the extensive growth of this invasive species much more water is now lost to the atmosphere than would be if the area contained only native foliage.
- UH Economics Professor James Roumasset and several graduate students developed a model for optimal groundwater extraction rates. This model brings specificity to the concept of sustainable water yield by showing not only how far the well-head levels may be drawn down but what extraction profile will accomplish the goal efficiently. This optimization of the aquifer provides a basis for valuing watershed conservation as measured by avoided losses in groundwater recharge. This effort has in turn spawned work on the specific effects of invasive *Miconia calvescens* on aquifer recharge and surface runoff. Extensions of the model evaluate the ecological benefits that the nearshore aquifer provides to offshore marine ecosystems via submarine groundwater discharge.
- Experts in crustaceans, mollusks, polychaetes, and larger aquatic organisms continue to monitor the coral reefs, fish, and ocean bottom in the vicinity of Honolulu's ocean outfall sites. Findings are compared to similar observations at distant sites, providing scientific support for the conclusions that the existing ocean outfalls are not harming the marine environment and that costly secondary wastewater treatment is unnecessary.
- In 1998 mollusk expert the late UH Zoology Professor E. Allison Kay located benthic samples in the British Museum taken by the 1879 British *Challenger* expedition from a location very near the site of a modern-day Honolulu ocean outfall. Despite years of effluent release through the ocean outfall, samples taken annually over the past twenty-five years contain much the same numbers and distribution of molluscan species as do those nearly 130-year-old samples.