



# Water Resources Research Center

University of Hawaii at Manoa

## 2<sup>nd</sup> Conference on Water Resource Sustainability Issues on Tropical Islands

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December 1-3, 2015

*Darren T. Lerner, PhD*  
*Director, Sea Grant College Program*  
*Interim Director, Water Resources Research Center*  
*University of Hawai'i at Mānoa*

# Introduction

1. Mission
2. Faculty Research
3. Funding & Support
4. Competitively Funded Research (104b)
5. Future Directions

# Mission

**WATER  
WATER  
WATER  
WATER**



**UNIVERSITY OF HAWAII'  
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# Mission

# FRESHWATER

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# Mission

**WHAT  
WHO  
HOW  
WATER**

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# Mission

To promote understanding of critical state and regional **water** resource management and policy issues through research, community outreach, and public education.



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# Program Management & Organization

## *Administrative Team*



**Interim Director**



**Associate Director**



**Admin & Fiscal  
Specialist**



**Office Assistant IV**



**Research Associate**



**Web Designer**



**Publications Specialist**



**Graphic Designer**



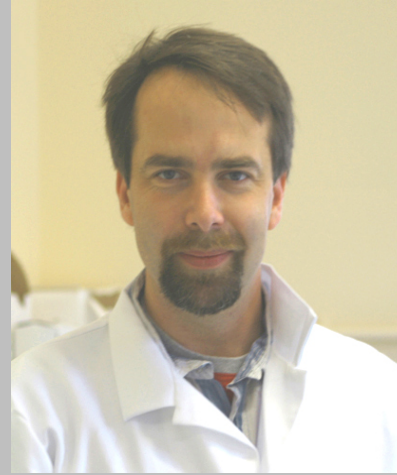
# Faculty Research



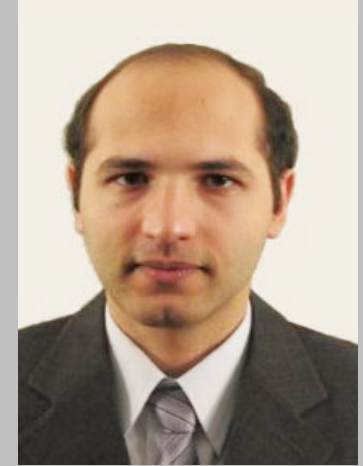
**Professor G&G  
Researcher WRRC**



**Assoc. Professor CEE  
Assoc. Researcher WRRC**



**Assistant Researcher  
WRRC**



**Assistant Professor CEE  
Assistant Researcher WRRC**



**Emeritus Professor**



**Tech Transfer Specialist**



**Assistant Specialist**



# Faculty Research

## *Partnerships*

- WRRRC & CEE (2.0 FTE)
- WRRRC & GG (1.0 FTE)
- WRRRC (2.5 FTE)



# Faculty Research

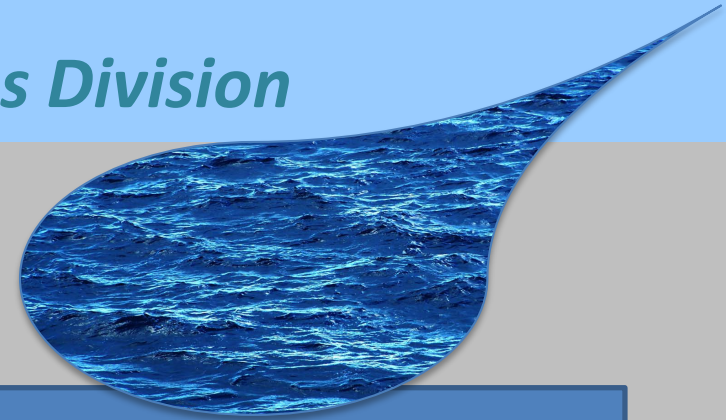
## *Research Divisions*

- Hydrological Sciences
- Water & Wastewater Engineering
- Human Dimensions & Economics
- Environmental Assessment & Protection
- Water Quality, Ecology & Public Health Sciences



# Faculty Research

## *Hydrological Sciences Division*

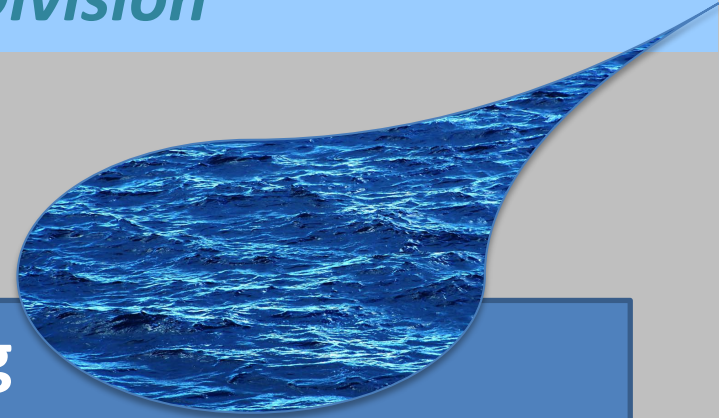


- Application and Assessment of Watershed & Groundwater Models
  - Flow and Transport in Field Soils
  - Databases and GIS
  - Bioremediation in Tidal Aquifers
  - Contamination by Agricultural and Cesspools
  - Modeling Multiphase Flow & Transport of Hydrocarbons

*See Sessions K & N*

# Faculty Research

## *Hydrological Sciences Division*



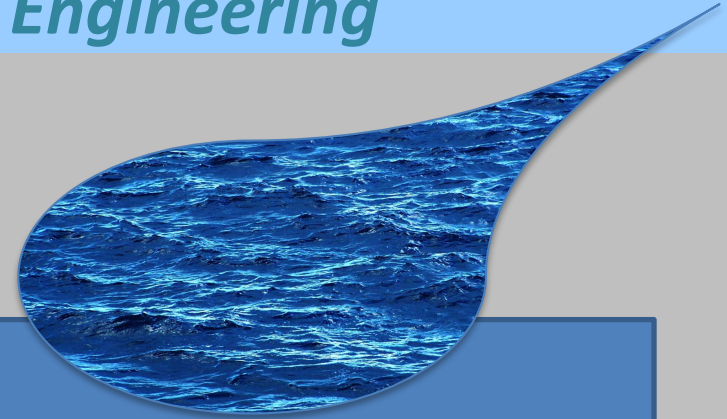
- Earth Remote Sensing
- Land-Atmosphere Interaction
- Data Assimilation: Techniques, Development and Applications
- Optimization Techniques and Parameter Estimation in Hydrology
- Application of Artificial Intelligence Methods



# Faculty Research



## *Water & Wastewater Engineering*



- Water Reuse
- Biodegradation of Toxic/Hazardous Waste
- Biological Water and Wastewater Treatment
- Membrane Separations

*See Session M*



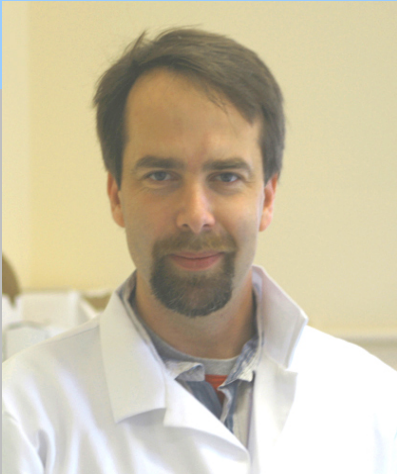
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# Faculty Research

*Water Quality, Ecology & Public Health Sciences*



- Environmental Microbiology
  - Microbial Source Tracking
  - Recreational Water Quality
  - Rapid Methods for the Quantification of Enterococci

*See Session J*



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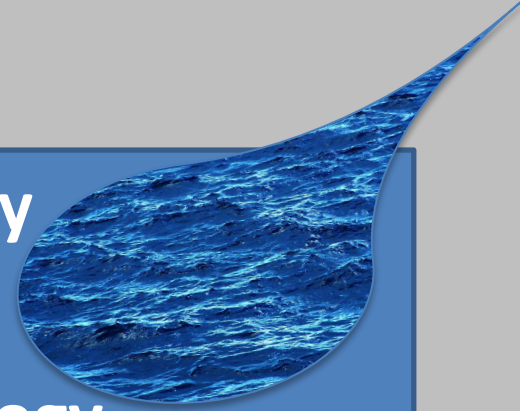


# Faculty Research

*Water Quality, Ecology & Public Health Sciences*



- Environmental Microbiology
- Environmental Virology
- Aquatic and Terrestrial Microbiology
- Public Health Microbiology
- Disinfection Toxins in Water
- Water Quality Standards
- Bacterial & Viral Contamination



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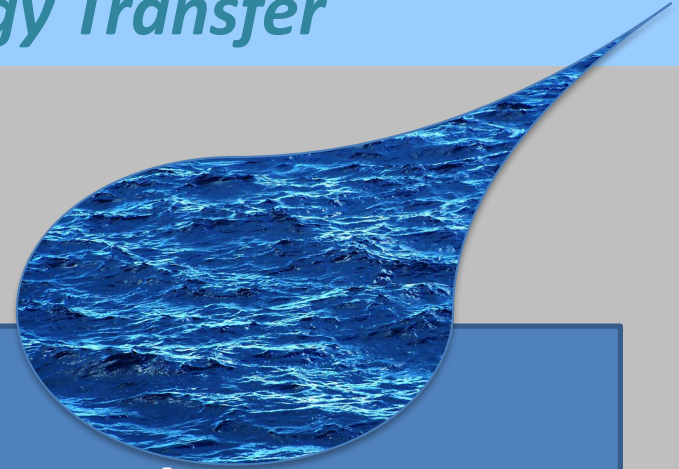
# Faculty Research

## *Information & Technology Transfer*



- **Environmental Health**

- **Contaminant Fate and Transport**
- **Groundwater Hydrology**
- **Land-Based Over-the-Horizon Ocean Radar**
- **Watershed Studies**
- **Water Supply and Sanitation**



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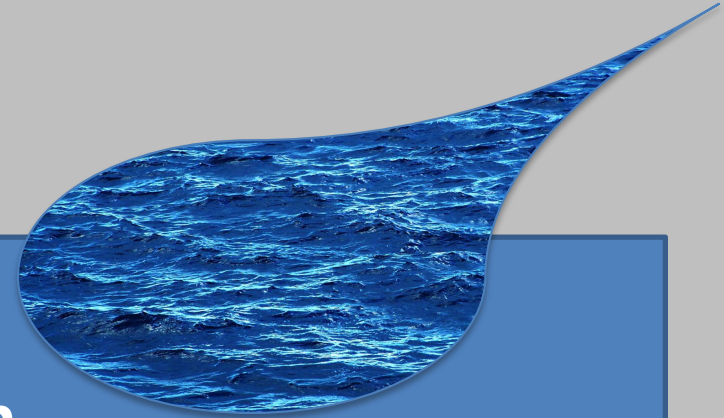


# Faculty Research

## *Environmental Assessment & Protection*



- Environmental History
- Environmental Education
- Protected Area Politics
- Ecotourism

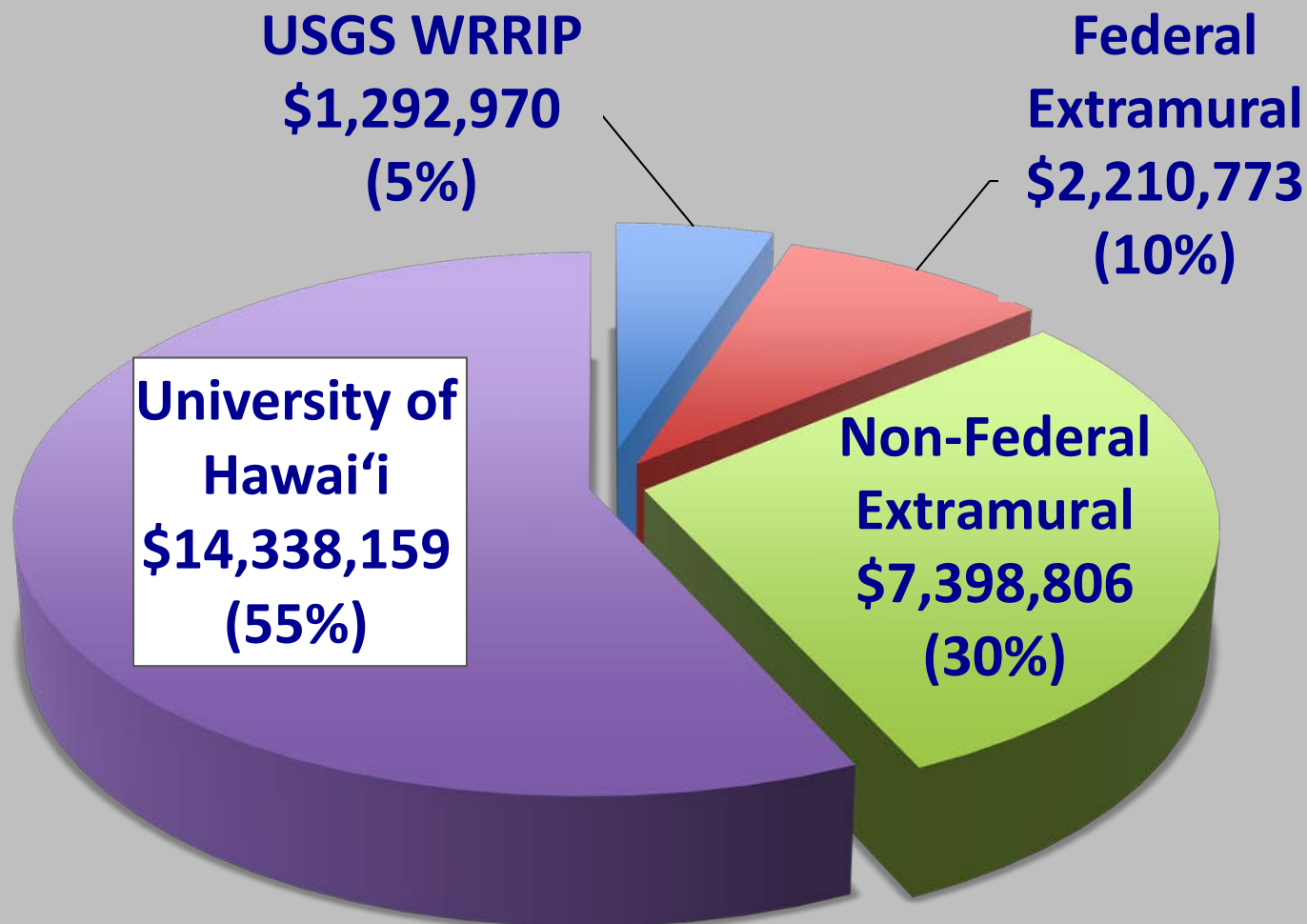


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# Funding & Support

2005-2015

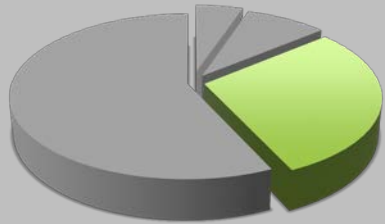


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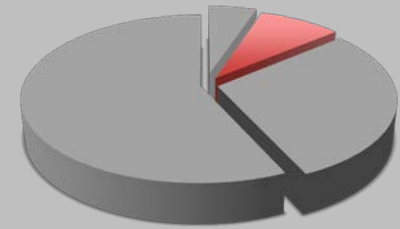
# Funding & Support

2005-2015



## NON-FEDERAL

- State Civil Defense
- State Department of Health
- Board of Water Supply
- DOT Highways
- DLNR
- HI Department of Agriculture
- C&C of Honolulu
- Korean Inst of Geoscience
- N Carolina State University
- Louisville Water Company
- Environet
- AECOM
- Clear Environment LLC



## FEDERAL

- US Fish & Wildlife
- USGS
- DOD Army
- NOAA-NMFS
- USDA-NIFA
- Federal Hwy Admin
- US Agriculture



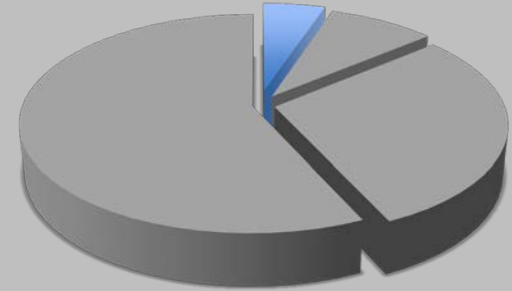
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# Competitively Funded Research (104b)

*Hawai'i*



*American Samoa*



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# Competitively Funded Research (2015)

**Water supply:** satisfying growing water demand, including desalination, reuse, transfer, conservation, demand management; identifying and assessing new water sources

**Water system infrastructure:** modeling of asset replacement; analysis of infrastructure integrity; forensic analysis

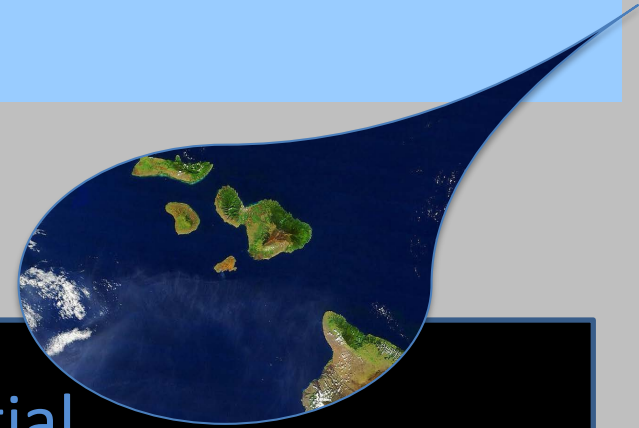
**Water quality:** methods to restore water quality, especially leading to increasing usable water supply, including models of the fate and transport of contaminants and methods of treating wastewater

**Water institutions, law, economics:** methods of increasing usable water supply through institutional refinement; water allocation laws and institutions in Hawaii; methods of planning for or pricing water to increase efficiency of use.



# Competitively Funded Research (2015)

*Hawai'i*



- Toward an Understanding of Residential Water Conservation Behaviors on Oahu
- A Novel Approach for Estimation of Evapotranspiration
- Numerical Simulation of Cold Intermediate Depth Seawater Circulation Through the Keauhou Aquifer in North Kona, Hawaii



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# Competitively Funded Research (2015)

## *American Samoa*

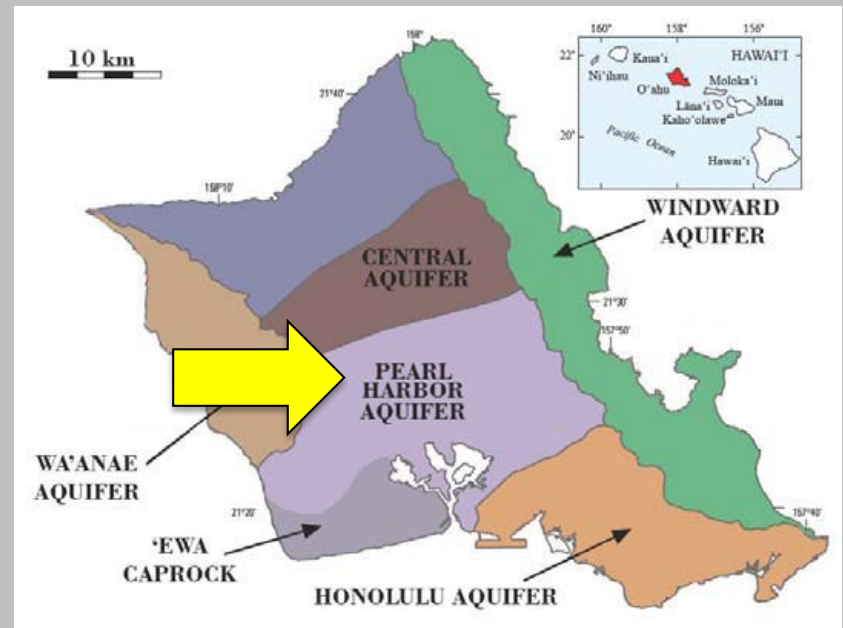
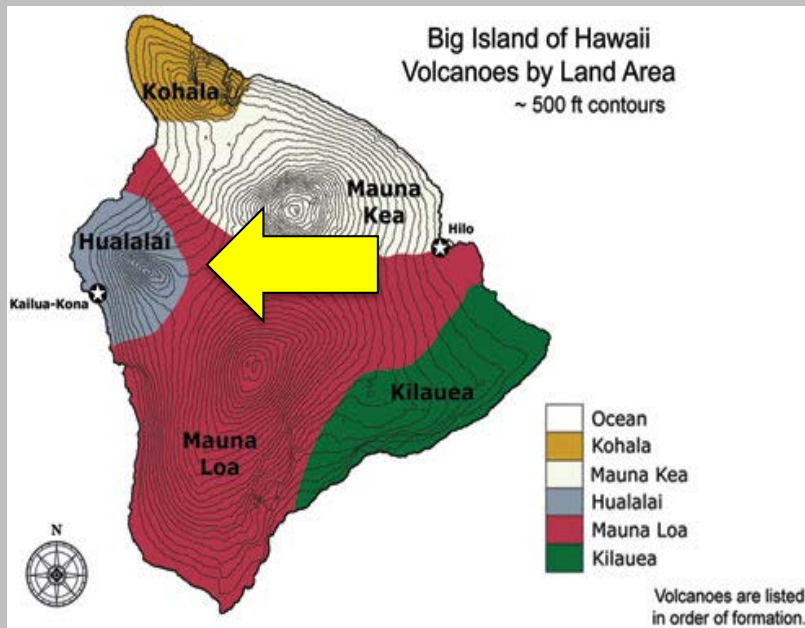


- Geochemical Delineation of Aquifer Boundaries and Assessment of Groundwater Quality on Tutuila Island, American Samoa
- Identifying Future Hotspots for Algal Blooms: A Multi-dimensional Analysis Evaluating Impacts of Potential Land-based Sources of Pollution
- Capacity Building and Science Communications for Groundwater Sustainability Work in American Samoa
- Rainwater Harvesting in American Samoa: Current Practices and Health Risks



# Future Directions

## National Science Foundation EPSCoR: Experimental Program to Stimulate Competitive Research



# Future Directions

## *EPSCoR Objectives*

1. Develop new conceptual models of subsurface water distribution and flow that account for the Pacific island volcanic geology and geophysics.
2. Develop tools to allow decision makers to make informed choices about water resource management.
3. Provide STEM pathways to develop diverse water scientists and policymakers.





# Future Directions

## *Faculty Hires*

### 50/50 Splits

**Hydro Geophysicist (HIGP)**

**Groundwater Hydrologist (CEE)**

**Economist (SSRI/UHERO)**



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# Future Directions

## A Blueprint for Action

Water Security for an Uncertain Future

2016-2018



“[Obtaining water security]

will be more readily achieved if an **entity dedicates itself to facilitating consistent metrics and tracking of measures** over time, ensuring that **data** from multiple sources is **harmonized in a centralized and secure location...**”



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# Future Directions

## *Partnerships & Leveraging University Assets*



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# Future Directions

## *University of Hawai'i Partnerships*

- Water Resources Research Center
- International Pacific Research Center
- Pacific Islands Climate Science Center
- Department of Geography
- Cyberinfrastructure & ITS
- Hawai'i Groundwater & Geothermal Resources Center



# MAHALO

