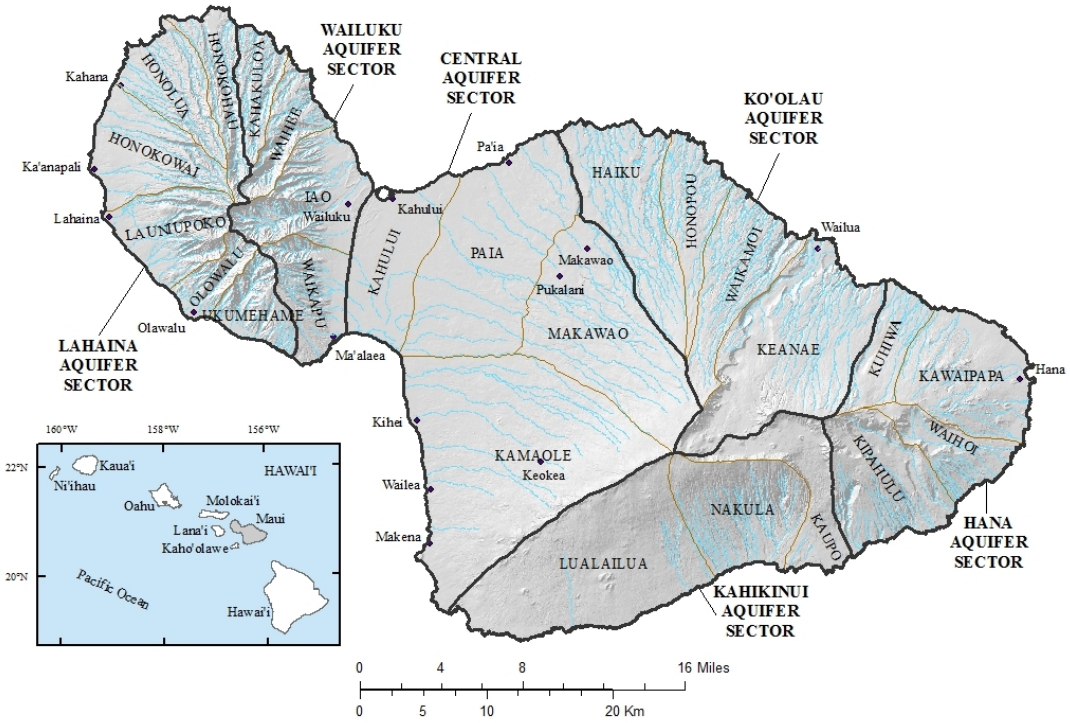
Pacific RISA

Pacific Regional Integrated Sciences and Assessments

Informing Decisions About Groundwater Resources in Maui Under Future Climate Conditions

What is this study about?

The Pacific RISA research team is conducting interdisciplinary research to inform decisions about the sustainability of groundwater resources in Maui under future climate conditions. Since the introduction of pumping, ground water levels have declined and the chloride concentrations of pumped water have risen above predevelopment levels. In addition, the transition zone between freshwater and saltwater has been moving upward. Hydrologic models have already been developed for the island. These models will be used to assess the impact of climate and land cover change on groundwater recharge. To ensure that the modeling analyses directly address the needs of decision makers and reflect a possible set of future management conditions, we are soliciting input and assessing water managers' potential use of climate information and hydrologic model output.



Map: State of Hawai'i Commission on Water Resource Management aquifer-management sectors and systems, Maui, Hawai'i.

What are this study's specific objectives?

1. To integrate projections of climatic and management conditions on Maui with a water budget model to inform adaptation and county-scale planning through freshwater availability assessments.
2. To assess factors affecting the current and potential use of climate and other uncertain information by water resource managers by addressing questions such as: What are water managers' understandings of climate vulnerabilities and adaptation decisions? Who are trusted sources for which kinds of information? What are the barriers to using climate information in adaptation planning?
3. To examine how different descriptions of uncertainty about the effects of climate change on ground water resources might influence water managers' (a) understanding of the potential impacts of climate change on the sustainability of water resources and (b) preferences among the proposed management solutions.

What are the study methods?

Researchers at the USGS Pacific Islands Water Science Center and the University of Hawai'i (UH) Water Resource Research Center (WRRC) will use forecast rainfall and other meteorological parameters generated by the UH International Pacific Research Center (IPRC) as input to a soil-water balance model to calculate the Maui water budget, particularly groundwater recharge, under a range of future management conditions. Based on input from Maui planners, water managers, and decision makers, a set of future climate and land cover scenarios will be developed by East-West Center researchers to incorporate plausible future urban and agricultural development, and watershed restoration. Groundwater recharge will then be quantified for each future climate and land cover scenario. Maps and data based on future recharge and climate scenarios will be provided to assist managers in evaluating and making informed decisions with respect to potential future impacts of management and climate change on water supply.

Why do we need your involvement?

As part of this research, we are assessing the extent to which the information about climate change impacts directly addresses the needs of water resource managers and other potential users. We will interview decision makers who represent various agencies and organizations such as the Maui County Department of Water Supply, the Maui County Office of Economic Development (including agriculture and energy), and the Hawai'i Commission on Water Resource Management (CWRM). We will assess decision makers' climate information needs, current sources of climate information, capacity to use uncertain information, and barriers to information use. We will also examine decision makers' preferences for alternative ways of describing uncertainty about the effects of climate change on groundwater resources.

What is the practical value of the results?

The Hawai'i CWRM currently assesses the sustainability of groundwater resources using simplified models. However, a recent water budget from USGS indicates changes to CWRM's estimates of sustainable yield may be warranted for several aquifer systems on Maui. The current research is expected to enhance decision processes by integrating climate, land use, and hydrological information. Example management decisions include determining areas that are most vulnerable to climate change in terms of recharge and sustainable yields.

Who is funding this study?

The Pacific RISA program is funded by a grant from the US National Oceanic and Atmospheric Administration (NOAA).

Who is the core research team?

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