Pacific Islands Climate Change Cooperative

PACIFIC ISLANDS CLIMATE CHANGE COOPERATIVE

Sea-level Rise impacts to coastal wetlands and beaches at three wildlife sites in Hawai‘i

Resource managers of coastal wetlands in Hawai‘i must begin planning now for future impacts of sea-level rise (SLR), the majority of which are expected to occur from 2040 - 2100, according to a study sponsored by the Pacific Islands Climate Change Cooperative. Researchers at the University of Hawai‘i - Mānoa (UH) have provided decision makers with tools to assist in adaptively managing the impacts of SLR at three coastal wetland environments at Keālia National Wildlife Refuge (south Maui), Kanahā State Wildlife Sanctuary (north Maui), and James Campbell National Wildlife Refuge (north O‘ahu).

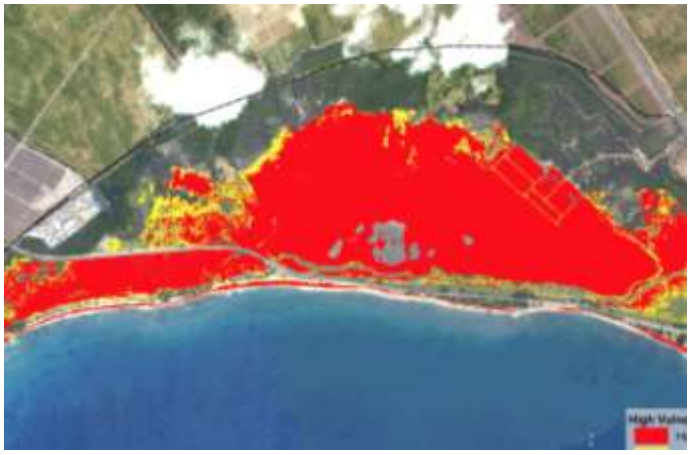
They conclude that decision makers have less than 15 years on south Maui, and less than 40 years on North Maui and O‘ahu to conceive, develop, and implement adaptation strategies that meet the challenges of SLR in advance of the largest impacts. Adaptation is a process that leads to the reduction of risk or harm from climate change through actions that increase ecosystem or species resilience and benefits.

Thresholds of rapid flooding

Due to the low and flat nature of most coastal plains, the impacts from SLR will rapidly accelerate once sea height exceeds a critical elevation. For each natural area, the researchers calculated a local SLR critical elevation that marks the end of the slow phase of flooding and the onset of rapid flooding.

They also ranked threats on the basis of input from wetland management experts to develop maps of sea-level rise impacts and vulnerability. The maps will serve as a primary means of identifying SLR adaptation and conservation priorities. A key impact was the transition of current freshwater wetlands into salt water wetlands, which would not support as many rare species.

Areas were mapped and ranked from high (80%) to low (2.5%) risk based upon the probability of flooding from sea level rise associated with low, mid-range, and high greenhouse gas emissions scenarios. These scenarios lead to different rates of projected warming, and therefore SLR, by the end of the century. The analysis found areas at highest risk of flooding would be 2 to 7 times more likely to flood under the high emissions scenario compared to the low scenario.



High vulnerability areas at Keālia mapped at high confidence (red = 80% probability) and low confidence (yellow = 50% probability) assuming a best case SLR scenario (.3 m by 2040 and 1.04 m by 2100).

purposes. Impacts associated with SLR exacerbate flooding of nearby coastal communities during storm events. For example, in Kahului, Maui, a 0.75 meter (2.5 feet) rise in sea-level would flood an estimated $57.5 million dollars' worth of property and buildings. SLR also accelerates habitat loss, which is widely used as a measurement of the risk of extinction. Specifically, increased water levels, erosion, salinity, and flooding associated with SLR threaten coastal and wetland habitats of endangered waterbirds, sea turtles, monk seals, and migratory shorebirds in Hawai'i.

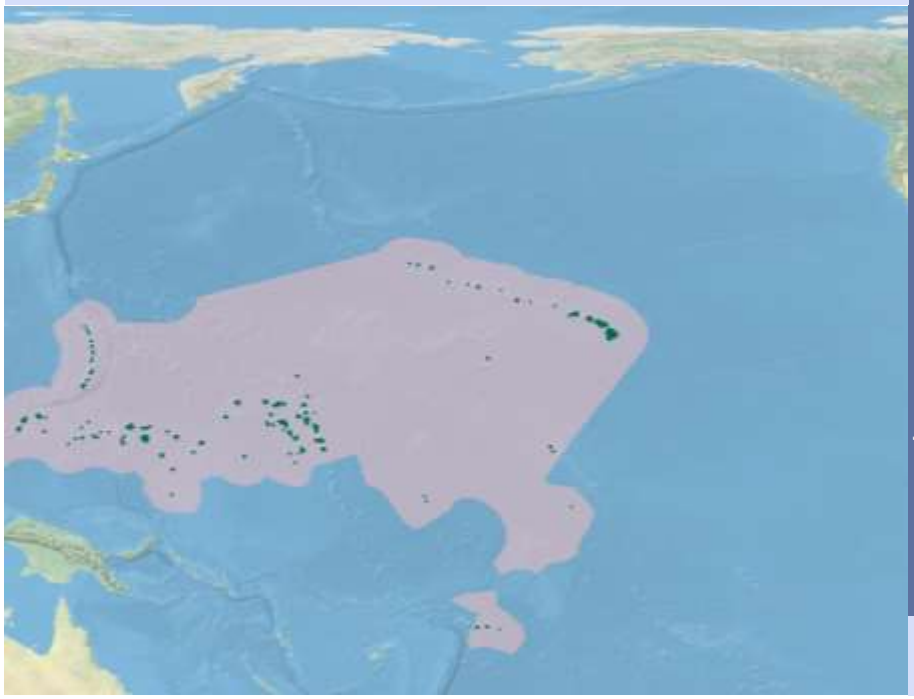
Planning for adaptation

Researchers conclude that coastal decision makers should begin prioritizing conservation actions in response to climate change now. Natural resource managers also need to extend their planning beyond the 15-year horizon they currently use.

Cooperators who provided guidance and/or data to this study include the Hawai'i Wetland Joint Venture, the U.S. Fish and Wildlife Service, the State of Hawai'i Department of Land and Natural Resources, U.S. Army Corps of Engineers, State of Hawai'i Office of Planning, and the National Oceanic and Atmospheric Administration Coastal Change Analysis Program. As a result of this study, UH science teams developed a series of 6 scientific papers addressing various aspects of sea-level rise impacts in Hawai'i.

For more details about this project, visit the PICCC projects page: http://piccc.net/our-projects.

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.



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Project Partners

US Army Corps of Engineers
USFWS National Wildlife Refuge System

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.

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