

# ADAPTING TO CLIMATE CHANGE

## HAWAI'I and U.S. PACIFIC ISLANDS

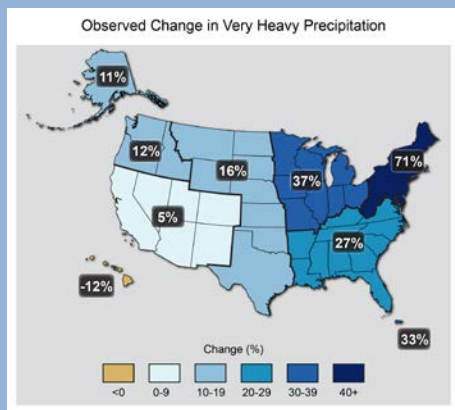
Hawai'i and the U.S. Pacific Island Territories include more than 2,000 islands spanning millions of square miles of ocean. Projected higher temperatures, varied patterns of precipitation, and sea level rise challenge communities working to prevent sewage contamination of surface water, protect aquifer-supplied drinking water and maintain wastewater and stormwater systems. Many communities are building resilience to the risks they face under current climatic conditions. This fact sheet provides examples of communities that are going beyond resilience to anticipate and prepare for future impacts.

### Moving Beyond Resilience to Adaptation

Climate change adaptation goes beyond resilience by taking actions to address future risks. Adaptation refers to how communities anticipate, plan, and prepare for a changing climate.

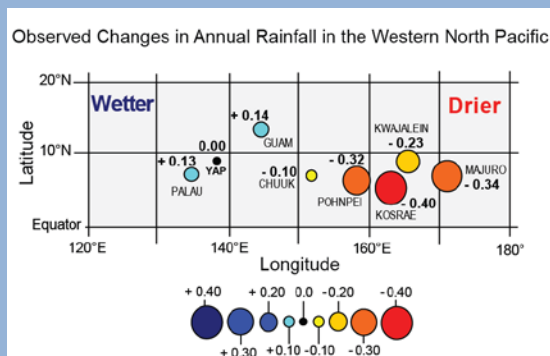
### Observed and Projected Changes in Hawai'i and the U.S. Pacific Islands

Intense storms have decreased



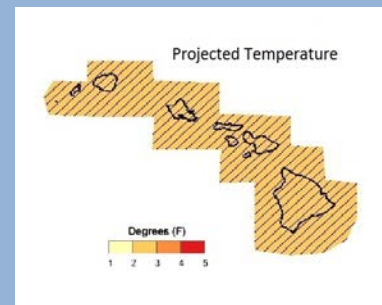
Hawai'i experienced a 12% decrease in the amount of precipitation falling in very heavy events (the heaviest 1%) from 1958 to 2012.

Precipitation varies among U.S. Pacific Islands



Islands in the western Pacific Ocean are getting slightly more rainfall than in the past, while islands more to the east are getting less (measured in change in inches of monthly rainfall per decade over the period 1950 to 2010).

Average Annual Temperature Increases



Hawai'i is projected to experience an increase in the average annual temperature for 2041 to 2070 compared to 1971 to 1999 under a high emissions scenario.

### Freshwater Quality and Availability

Climate change will affect areas of the region in different ways. In the western Pacific, a decline of 15% in annual rainfall has already been observed. Higher temperatures due to climate change will likely contribute to the further reduction of precipitation on these islands. Key vulnerabilities include:

- Less precipitation reduces the availability of freshwater sources for drinking water due to lower groundwater levels and aquifer recharge.
- Decreased precipitation also increases the likelihood of saltwater intrusion, which reduces the availability of freshwater, and may require additional water treatment.

Other islands, particularly those in the eastern Pacific, are expected to experience more frequent and intense storms due to climate change. Key vulnerabilities include:

- More frequent and intense storms due to climate change can overload water infrastructure.
- Climate-induced flooding is likely to result in more frequent water system contamination from uncontrolled wastewater.

### Adaptation in Action

The Pacific Adaptation to Climate Change (PACC) partnership of Pacific island nations, including the freely-associated states of the Republic of the Marshall Islands and the Federated States of Micronesia, helps member states develop climate-resilient water systems. Adaptation measures include upgrading water infrastructure to improve water capture, storage, and quality. PACC helps members perform climate, socio-economic, and cost-benefit analyses in the early planning stages of climate-sensitive projects. It also helps government departments of member countries mainstream climate change into national water policy and planning, and improve water management at national and community levels, as the climate changes.

## Ecosystem Approach to Climate Adaptation

Atoll islands consist of accumulations of sediment on top of coral reefs, and typically have highly dynamic shorelines that are constantly being reshaped by the forces of erosion and accretion. The low elevation and fragile equilibrium of atoll islands make them among the landforms most vulnerable to climate change. Key vulnerabilities include:

- Climate-induced storm surges and flooding threaten critical infrastructure.
- Saltwater intrusion from sea level rise effects the fragile freshwater lenses that sustain agriculture and ecosystems. These lenses are freshwater areas which float, due to the differences in the density of freshwater and seawater, in the upper part of the aquifer layer over seawater in small islands.
- Rising sea temperatures and ocean acidification with resultant coral bleaching threat subsistence fisheries.
- Sea level rise is projected to result in complete inundation and island disappearance.

### *Adaptation in Action*

Namdrik Atoll is the smallest and lowest-lying inhabited island in the Republic of the Marshall Islands, a sovereign associated state under a Compact of Free Association signed with the United States in 1986. To reduce dependence on declining fisheries and vulnerability to climate change, the Namdrik Atoll Local Resources Committee is promoting a model of community self-sufficiency, local food security and adaptation. The committee is using a multifaceted approach to conserve biodiversity, address invasive species, and improve agricultural resources.

Traditional crops have been reintroduced to protect and restore soil, diversify agriculture, and open value-added processing industries. A pearl farm provides jobs and revenues to fund projects in education and health. Training in rainwater harvesting provides safe drinking water, and solar technology provides renewable energy. Initiatives are in place to restore shoreline vegetation with native and traditionally-used species. In 2012, the project was awarded the UN Development Programs' Equator Prize for vetted and peer-reviewed best practices in community-based environmental conservation and sustainable livelihoods.

## Using Science and Traditional Knowledge to Prepare for Climate Change

The unique experiences and observations of indigenous peoples have contributed to an increased understanding of climate change. Many traditional customs and practices related to fishing, hunting and planting are dependent on the capacity to predict changes in weather and climate. Elders often rely on changes in plant and animal behavior to predict tropical storms and cyclones, and thus prepare communities to cope with changing conditions. Key vulnerabilities include:

- Climate change-induced drought threatens traditional food sources.
- Coral death from warming-induced bleaching threatens subsistence fisheries.
- Sea level rise and flooding threaten coastal cultural sites and structures.

### *Adaptation in Action*

Moloka'i is a culturally rich Hawaiian island that is home to fewer than 10,000 people and covers approximately 260 square miles. Much of Moloka'i's infrastructure, including culturally critical ancient fishponds, is located on the coast. The island is home to some of Hawai'i's most diverse native plant communities. The Pacific Islands Climate Change Cooperative (PICCC) is a self-directed conservation alliance of local, state, and federal agencies, as well as indigenous and non-governmental organizations working to prepare for climate change. PICCC brought together Moloka'i's traditional fishpond managers, climate scientists, and natural resource managers to share scientific and cultural knowledge. The project identified adaptive management strategies for two of Moloka'i's ancient fishponds, and for other key economic and cultural resources at risk from climate change.

The project conducted workshops, field trips, presentations, brainstorming sessions, and shared meals. These activities strengthened partnerships among participants to help the island respond to climate change challenges. Workshop results will be incorporated into the strategic plan for the ponds and upland areas. Participants are revising K-6 educational curricula to incorporate climate change, producing a climate change video featuring Moloka'i kūpuna (community elders), conducting community meetings, and developing a community engagement protocol to help scientists work with other small communities throughout Hawai'i and the Pacific. By sharing lessons from these projects, Moloka'i is helping anticipate, prepare and plan for climate change in cooperation with specialists in the scientific and cultural management communities.

**For a comprehensive view of projected climate changes in your region, consult:**

- *Climate Change Impacts in the United States: The Third National Climate Assessment*
- *EPA's Climate Change Adaptation Resource Center*

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