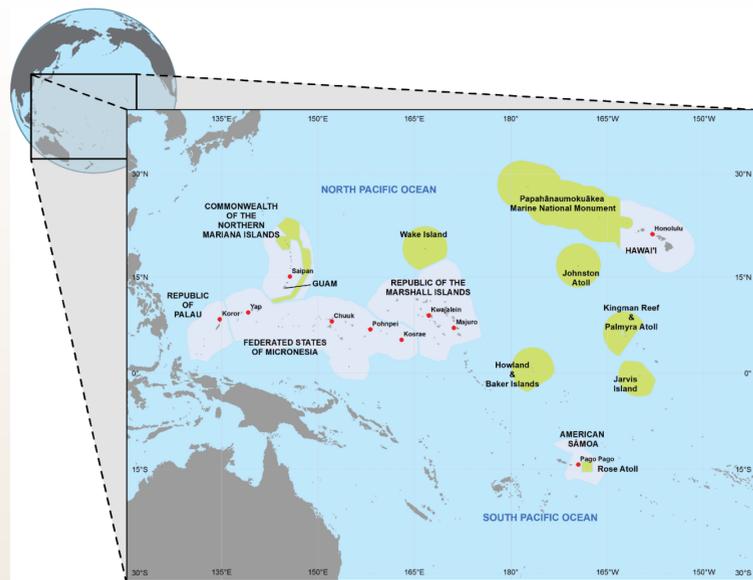


FOURTH NATIONAL CLIMATE ASSESSMENT: HAWAII AND U.S.-AFFILIATED PACIFIC ISLANDS



Pacific Islands Region Map

Figure 1. The U.S. Pacific Islands region includes the state of Hawai'i, as well as the U.S.-Affiliated Pacific Islands (USAPI): the Territories of Guam and American Samoa, the Commonwealth of the Northern Mariana Islands, the Republic of Palau, the Federated States of Micronesia, and the Republic of the Marshall Islands. On the map, shaded areas indicate the Exclusive Economic Zone of each island, including Marine National Monuments (in green). Source: adapted from Keener et al. 2012.

THE REGION

The U.S. Pacific Islands are culturally and environmentally diverse, treasured by the 1.9 million people who call them home. Pacific islands are particularly vulnerable to climate change impacts due to their exposure and isolation, small size, low elevation (in the case of atolls), and concentration of infrastructure and economy along the coasts.

The Pacific is known internationally for its tourist destinations, yet living in the islands carries climate-related risks and other challenges. Hawai'i has the highest electricity rates in the United States, and imports 85-90% of its food. El Niño and La Niña dramatically affect climate patterns and cause year-to-year changes in precipitation, air and ocean temperature, sea surface height, storminess, waves, and winds. Severe droughts are common, and water shortage is among most important climate-related issues in the region. Though the islands are small, they are seats for key military commands and home to rich biodiversity and important marine protected areas.

New observations and projections indicate that there is less time than previously thought for decision-makers to prepare for severe impacts from climate change.

Climate Change Indicators and Impacts

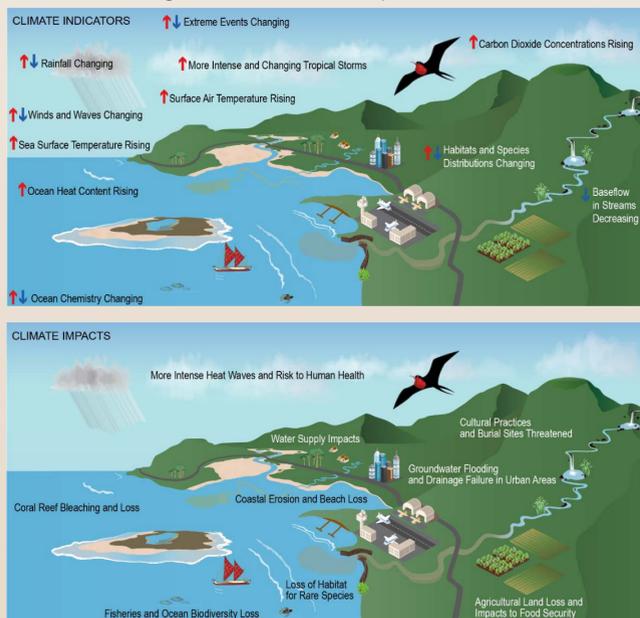


Figure 2. Observed changes in key climate indicators such as carbon dioxide concentration, sea surface temperatures, and species distributions (top panel) in the U.S. Pacific Islands region result in impacts to multiple sectors and communities, including built infrastructure, natural ecosystems, and human health (bottom panel). Source: adapted from Keener et al. 2012.

CHAPTER KEY MESSAGES



1. Water Supplies Dependable and safe water supplies for Pacific island communities and ecosystems are threatened by rising temperatures, changing rainfall patterns, sea level rise, and increased risk of extreme drought and flooding. Islands are already experiencing saltwater contamination due to sea level rise, which will catastrophically impact food and water security, especially on low-lying atolls. Resilience to future threats relies on active monitoring and management of watersheds and freshwater systems.



2. Ecosystems and Biodiversity Pacific island ecosystems are notable for the high percentage of species found only in the region, and their biodiversity is both an important cultural resource for island people and a source of economic revenues through tourism. Terrestrial habitats and the goods and services they provide are threatened by rising temperatures, changes in rainfall, increased storminess, and land-use change. These changes promote the spread of invasive species and reduce the ability of habitats to support protected species and sustain human communities. Some species are expected to become extinct and others to decline to the point of requiring protection and costly management.



3. Coastal Systems The majority of Pacific island communities are confined to a narrow band of land within a few feet of sea level. Sea level rise is now beginning to threaten critical assets such as ecosystems, cultural sites and practices, economics, housing and energy, transportation, and other forms of infrastructure. By 2100, increases of 1-4 feet in global sea level are very likely, with even higher levels than the global average in the U.S.-Affiliated Pacific Islands. This would threaten the food and freshwater supply of Pacific island populations and jeopardize their continued sustainability and resilience. As sea level rise is projected to accelerate strongly after mid-century, adaptation strategies that are implemented sooner can better prepare communities and infrastructure for the most severe impacts.



4. Oceans and Marine Resources Fisheries, coral reefs, and the livelihoods they support are threatened by higher ocean temperatures and ocean acidification. Widespread coral reef bleaching and mortality have been occurring more frequently, and by mid-century these events are projected to occur annually, especially if current trends in emissions continue. Bleaching and acidification will result in loss of reef structure, leading to lower fisheries yields and loss of coastal protection and habitat. Declines in oceanic fishery productivity of up to 15% and 50% of current levels are projected by mid-century and 2100, respectively, under the higher scenario (RCP8.5).



5. Indigenous Communities Indigenous peoples of the Pacific are threatened by rising sea levels, diminishing freshwater availability, and shifting ecosystem services. These changes imperil communities' health, well-being, and modern livelihoods, as well as their familial relationships with lands, territories, and resources. Built on observations of climatic changes over time, the transmission and protection of traditional knowledge and practices, especially via the central role played by Indigenous women, are intergenerational, place-based, localized, and vital for ongoing adaptation and survival.



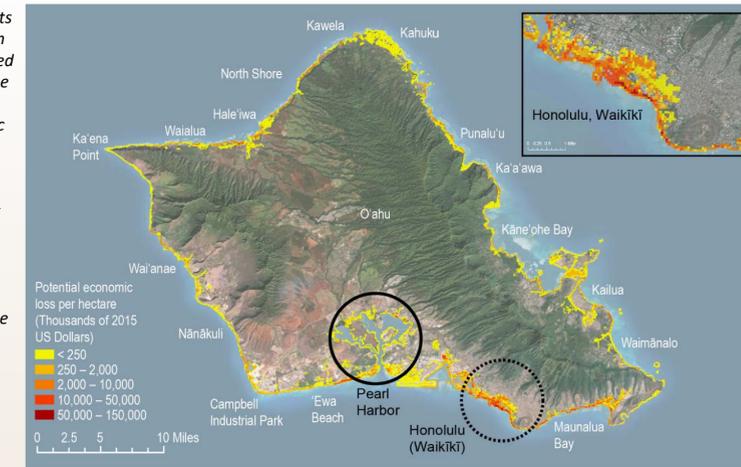
6. Cumulative Impacts and Adaptation Climate change impacts in the Pacific Islands are expected to amplify existing risks and lead to compounding economic, environmental, social, and cultural costs. In some locations, climate change impacts on ecological and social systems are projected to result in severe disruptions to livelihoods that increase the risk of human conflict or compel the need for migration. Early interventions, already occurring in some places across the region, can prevent costly and lengthy rebuilding of communities and livelihoods and minimize displacement and relocation.

ACKNOWLEDGMENTS

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Potential Economic Loss from Sea Level Rise, O'ahu, Hawai'i

Figure 3. This map highlights potential economic losses in the exposure area associated with 3.2 feet of sea level rise on the island of O'ahu, Hawai'i. Potential economic losses are estimated from impacts to land and residential and commercial infrastructure. Areas at risk of large economic losses include the U.S. Pacific Command and military infrastructure at Pearl Harbor (black circle) and the tourist areas surrounding Waikiki (dashed black circle). Source: adapted by Tetra Tech Inc., from the Hawai'i Climate Change Mitigation and Adaptation Commission, 2017.



ADAPTATION

Across the region, groups are coming together to minimize damage and disruption from climate-related impacts. Adaptation actions include improving food and water security, managing drought impacts, protecting coastal environments and relocating coastal infrastructure, accommodating climate-induced human migration, and increasing coral reef resilience. Social cohesion is already strong in many communities, making it possible to work together. This assessment finds that early intervention can lower economic, environmental, social, and cultural costs and reduce or prevent conflict and displacement from ancestral land and resources.

CHAPTER DEVELOPMENT

The 11-member regional NCA4 author team met regularly in person and via conference calls to review findings and collaboratively develop and refine the chapter Key Messages. To gather evidence and understand the nature of climate change risks, they conducted a literature review and an informal survey, and held workshops and town hall meetings.

Six half-day workshops convened technical experts in the key sectors. In all, 75 participants, including some virtual, attended the workshops, held in March 2017. Two National Climate Assessment town hall events, in Honolulu and Guam, were open to the public and drew approximately 110 in-person and virtual participants. In all, the regional author team received input from more than 350 stakeholders. In the absence of downscaled climate projection scenarios and products available to the contiguous U.S., authors drew on regional climate model projections, user engagement, and peer networks.

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