

# Pacific Islands Climate Change Cooperative



## Understanding Future Climate Changes in Hawai'i

Scientists working in Hawai'i are using detailed local climate data to simulate future island climates using state-of-the-art global climate models. Their results clearly show that many of the state's wet, windward-facing regions are expected to maintain or slightly increase their wet-season rainfall. However, most parts of the Hawaiian Islands are likely to experience a continued trend towards less wet-season precipitation.

### Downscaling global climate models to Hawai'i

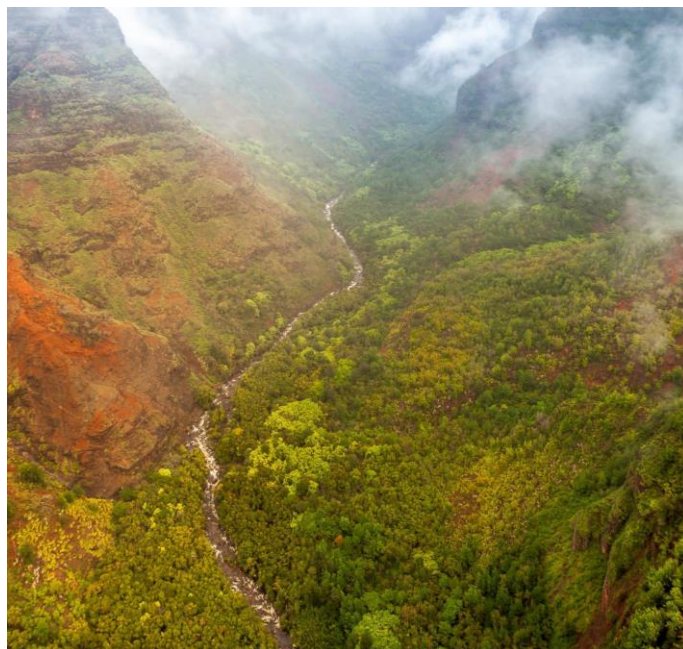
To anticipate how weather is likely to change as a result of increasing concentrations of greenhouse gases (such as carbon dioxide) in the atmosphere, geophysical and meteorological scientists from the University of Hawai'i-Mānoa and University of Colorado-Boulder have developed a unique method to transfer the results of the latest global climate models down to the fine scale climate patterns observed on small island groups such as Hawai'i. This "downscaling" is critical to understanding future climate in areas with complex terrain and a wide variety of micro-climates.

Downscaling global climate models so that results apply to a specific region is a sophisticated process that requires local climate data. In Hawai'i, some of the best data come from HaleNet, a network of monitoring stations on Maui that has a 22-year time series of climate observations. By incorporating HaleNet and an extended, dense network of rainfall stations into their study, researchers analyzed the relationship of past

rainfall with global processes in order to predict future rainfall patterns. They found that the decades-long decrease in rainfall seen in arid and semiarid regions of Hawai'i during the rainy season (November-April) is likely to continue.

### Different islands, different futures

The model results show that all of the Hawaiian Islands get drier overall in the 21<sup>st</sup> century. As the future unfolds, the degree to which Hawaiian rainfall patterns are altered will depend on the amount of greenhouse gases in the atmosphere, so differences are stronger later in the century and under scenarios with no reductions in emissions. Of all the islands, Kaua'i shows the strongest reductions in rainfall in these models, losing approximately 30% of its wet season rain by



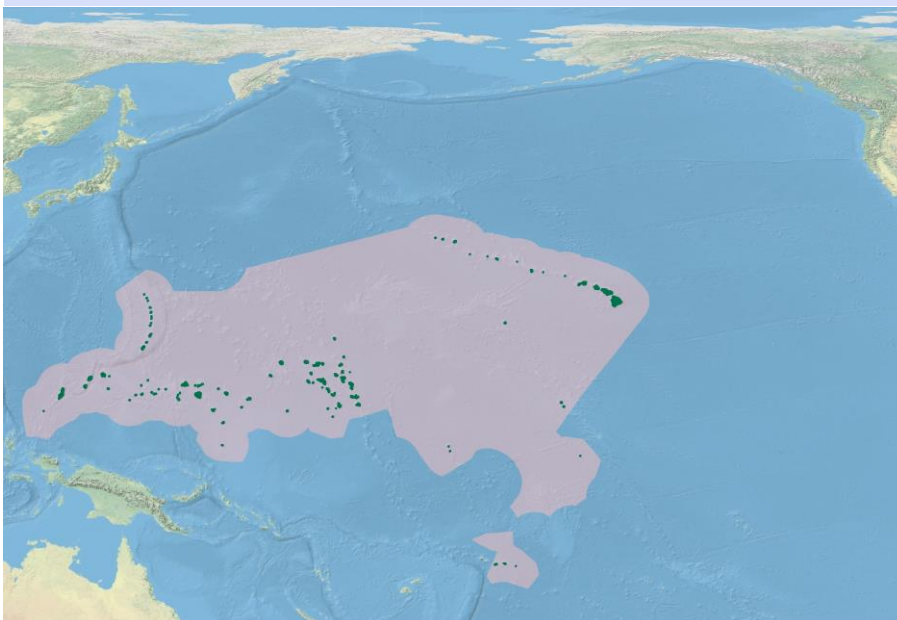
mid-century. Reductions on O‘ahu are projected to be around 20%. Smaller rainfall losses are projected in Maui county and on Hawai‘i Island, where some windward areas would actually get up to 10% wetter over time. These results imply that managing water will become more important with time, and that drying could be an important stress factor for terrestrial ecosystems and agriculture in leeward regions.

### Future climate made visible

Funded by the [Pacific Islands Climate Change Cooperative](#), this project includes a series of [interactive dynamic maps projecting the results of the statistical downscaling](#), which have been published via the Asia Pacific Data Research Center. The site also provides public access to the datasets behind the maps. In addition, one early career scientist has received her training in climate downscaling, and the work has resulted in at least three scientific papers published in peer-reviewed journals.

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



Banner photo of taro by Starr Environmental on Flickr; Kaua‘i aerial by Chris Chabot on 500px

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### Project Partners

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[Japan Agency for Marine-Earth Science and Technology](#)  
[NOAA](#)  
[Univ. of Colorado - Boulder](#)  
[Univ. of Hawai‘i - Mānoa](#)

[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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