

# Drought in the U.S. Affiliated Pacific Islands: Impacts to Water Resources



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## Water Resources in the USAPI

The U.S. Affiliated Pacific Islands (USAPI) is comprised of the Territories of American Samoa and Guam, the Commonwealth of the Northern Mariana Islands, the Federated States of Micronesia (FSM), the Republic of the Marshall Islands (RMI), and the Republic of Palau. These islands, which contain water resources of significant economic and ecological importance, can generally be classified as either high islands (i.e., volcanic or limestone islands with an elevated land mass) or low-lying islands (i.e., islands along the perimeter of a coral atoll). Most of the islands typically receive more than 100 inches of rain annually, but rainfall can vary substantially from year to year and season to season (van der Brug, 1986). Water resources in the USAPI include rainwater, groundwater, and intermittent or perennial streamflow. Maintaining adequate freshwater supplies in the islands is of critical concern as demographic and climatic changes place stresses of uncertain magnitude on already fragile water resources (Keener et al., 2012). Populations on low-lying atoll islands are particularly vulnerable to freshwater-supply shortages and agricultural-crop losses during droughts. Hydrologic drought associated with El Niño events complicates the understanding and management of water resources in the USAPI.

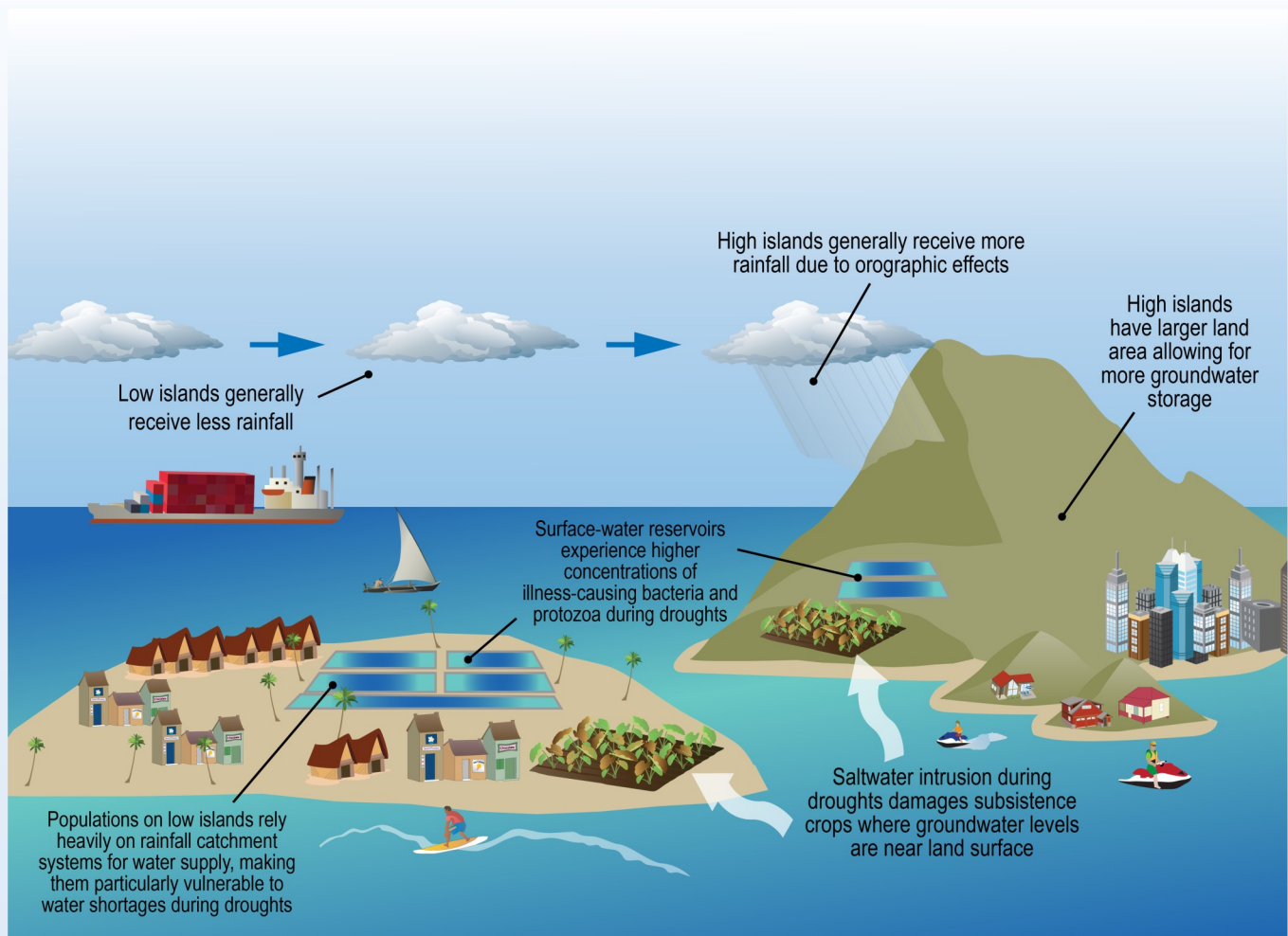


Diagram produced by the Integration and Application Network, University of Maryland Center for Environmental Science ([ian.umces.edu](http://ian.umces.edu)).

# Drought Impacts on Water Resources in the USAPI

Drought impacts tend to be most severe during the winter and spring months following El Niño events. Several of the more populated areas of high islands are served by municipal water-supply systems. In contrast, populations living in rural areas, particularly on low-lying atoll islands in the FSM and RMI, are dependent on groundwater from shallow wells or rain from private catchment systems. Where surface water is used for public supply, drought impacts are more severe than impacts where groundwater is used.

Water resources on most atoll islands are extremely vulnerable to droughts of any severity. Contamination of water resources commonly occurs during drought conditions. Surface-water reservoirs may experience lower levels of oxygen, contributing to higher concentrations of illness-causing bacteria and protozoa. Groundwater contamination from saltwater intrusion during droughts and inundation during periods of high sea level threaten subsistence crops such as taro, breadfruit, and bananas.

## Short- and Long-Term Impacts

- Water supplies that rely on rainfall and surface water are the first to be impacted by drought; often after 2-3 months of little to no rain
- Water rationing is common for populations dependent on rainfall- and surface-water-supply systems
- Bacteriological contamination of surface-water supplies is common during extended droughts and can threaten human health
- Multi-year droughts can significantly impact groundwater storage and salinity
- Long-term droughts could cause abandonment of farming activities and emigration
- Intrusion of saltwater into groundwater systems impacts production of subsistence crops

## Cross-Sector Impacts

Droughts impact not only water supply but also human health and ecosystems:

- **Human Health:** Droughts lead to human-health challenges caused by water shortages and associated food shortages, and those caused by contaminated water, which people may be forced to drink when water is scarce.
- **Ecosystems:** Nutrient/sediment inputs and reduction of freshwater flows during droughts have the potential to negatively affect the structure and function of mangrove forests (Drexler and Ewel, 2001).

## References

- Drexler, J.Z. and Ewel, K.C., 2001, Effect of the 1997–1998 ENSO-related drought on hydrology and salinity in a Micronesian wetland complex. *Estuaries*, 24(3), pp.347-356.
- Keener, V.W., Izuka, S.K., and Anthony, S.S., 2012, Freshwater and Drought on Pacific Islands. In V.W. Keener, J.J. Marra, M.L. Finucane, D. Spooner, and M.H. Smith (Eds.), *Climate Change and Pacific Islands: Indicators and Impacts*. Report for the 2012 Pacific Islands Regional Climate Assessment (PIRCA). Washington, DC: Island Press.
- van der Brug, O., 1986, The 1983 drought in the western Pacific. U.S. Geological Survey Open-File Report 85-418, 89 p.