

High and Dry: Learning from the 1997-1998 El Niño's effects on water resources in American Samoa

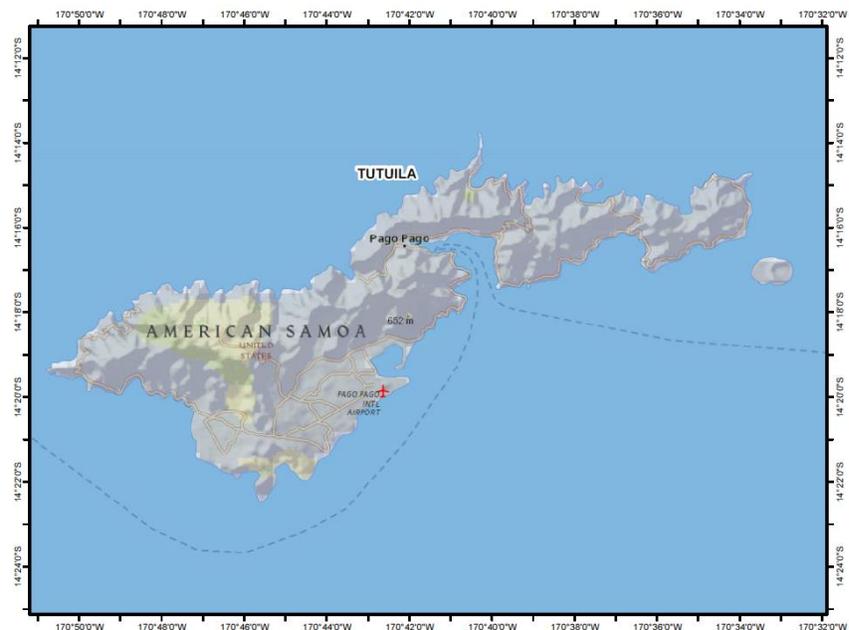
In January 1997, scientists at the Pacific ENSO Applications Climate (PEAC) Center based in Hawai'i began to detect signs of an oncoming El Niño in their climate models. Residents of the island of Tutuila, American Samoa, in the South Pacific, had yet to see any changes in weather indicative of an El Niño – and they wouldn't for another 6 months until a severe drought caused by the El Niño was well upon them. The scientists at PEAC knew they needed to alert residents of Pacific Islands, such as Tutuila, about the expected weather changes quickly before it was too late to prepare.

Despite high annual rainfall on Tutuila, clean fresh water is already a limited resource in normal weather conditions so droughts can be devastating. Five high islands and two atolls comprise American Samoa, but the majority of the territory's population resides on Tutuila, which is a high volcanic island with a network of jagged ridgelines that join along a crooked spine down the center of the island. The island is intensely green, with the exception of rooftops and rock faces that slope steeply to the ocean. Much of the surface water on Tutuila has been

contaminated by piggeries waste and development along streams, as has some of the groundwater. Most of Tutuila's piped fresh water is supplied by a single aquifer under Tafuna Plain, the most densely populated part of the island. In the past, some groundwater wells in this aquifer have been mandated to be shut down because of contamination or intrusion of brackish water caused by overdrawn.

American Samoa's freshwater aquifers are recharged by rainfall largely derived from a dense strip of clouds called the South Pacific Convergence Zone (SPCZ) that hovers over the islands. The SPCZ tends to move away from American Samoa in a strong El Niño due to altered wind patterns and pressures, leaving Tutuila high and dry. An El Niño is the warm phase of an almost cyclical climate phenomenon called the El Niño -Southern Oscillation (ENSO), which is characterized by changes in the geographic distribution of rainfall, wind and water temperature in the Pacific. The Pacific experiences El Niños with some regularity – every 3 to 7 years. An El Niño typically lasts between 6 and 18 months before reverting back to normal or switching to the cold phase, La Niña.

In 1982 and 1983, an El Niño had brought crippling drought to American Samoa and many other Pacific Islands. During the El Niño, Tutuila received less than three quarters of its average annual rainfall. The PEAC



Center had yet to be established so Pacific Island residents were given little to no warning about the El Niño. The drought incurred widespread consequences for American Samoa, from limiting water use by residents to halting production at tuna canneries, which account for a quarter of the water consumed in the territory.

The same impacts were feared fifteen years later in 1997. “We didn’t want the fish canneries to shut down as they did in the years before,” said Utu Abe Malae, Executive Director of the American Samoa Power Authority (ASPA). “The fish canneries are the main employers on the island.”

The El Niño’s effects were delayed in reaching American Samoa in 1997, but the extremity of the drought far exceeded that of 1982. “The place started to turn brown, which is very unusual for a tropical island. It doesn’t look right,” described Mr. Malae.

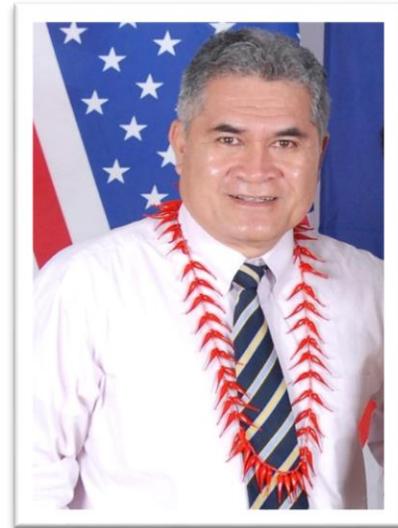
In April, May, and June 1997, Tutuila received only 64 percent of its typical rainfall. The drought became more extreme in the spring and summer of 1998, reaching lows of 6 percent and 17 percent of monthly averages in April and May, respectively. It was the worst drought on record since American Samoa began keeping rainfall records in 1966.

“Really dry and dusty. The crops weren’t growing so well without moisture. You know, in the islands the topsoil is very thin so it doesn’t take much for low rainfall to affect the growth of crops,” recalled Mr. Malae.

By measure of rainfall, this drought should have had serious repercussions for American Samoa’s residents and businesses. Yet Tutuila’s residents did not feel the severity of the drought as intensely as in previous droughts because the island was better prepared. Working with representatives from local Weather Service Offices (WSOs), the PEAC Center had spread the word across the Pacific about the strong El Niño that was on its way by holding government briefings with island-specific predictions.

“We were told what was going to happen and we just took off with it,” said Mr. Malae of ASPA’s response to the El Niño warning. “We made public announcements; we set up a war room; we let people know about the low rainfall. And then we started to lower the pressure on the system. We hired all the plumbers on the island to go out and help families fix their plumbing – some had leaks – in order to try and keep the water consumption down.”

Messages about conserving water, including installing water catchments and preventing forest fire and water-borne diseases, were circulated on the radio and television by ASPA, the WSO, and the Territorial Emergency Management Coordinating Office.



Local author Utu Abe Malae, Executive Director of the American Samoa Power Authority (ASPA).
Source: ASPA.

KEY MESSAGE

Engage with the community and other stakeholders early and often – building community ownership and participation from the beginning leads to more positive, sustainable outcomes.

“And then we advised the two canneries, the main economic source of revenue for the island and employment. We had people go in with plumbers and engineers and inspect the usage and try to cut down on the water consumption as much as possible.”

With leaks plugged and communities well informed, the government did not have to impose limits on water use or close canneries or schools. Where the drought was more extreme, some communities resorted to drawing unsanitary water from wells and it was necessary to employ filtration and purification equipment to make it potable. Through a US Department of Agriculture loan, ASPA obtained two micro-filtration plants to make use of fresh water from streams. Some other Pacific Islands had to impose limits on freshwater use – such as in the Marshall Islands, where water use was restricted to 7 hours every 2 weeks. Largely, though, American Samoa had enough water to operate as usual.

This El Niño illustrated the value of the PEAC Center’s constant monitoring of the regional climate, which enabled early forecast and warning of the drought in American Samoa. Early forecasting alone, however, would not have allowed Tutuila to be so prepared. The chain of communication starting with the localized forecast briefings that the PEAC Center conducted on many islands let governments plan ahead for the pending drought. The government, in turn, engaged the public in water conservation, which was crucial to preventing debilitating water scarcity.

KEY MESSAGE

Commit to robust and sustained monitoring and assessment - the maintenance and expansion of existing monitoring networks will lead to an improved ability to understand and predict a changing climate and associated impacts over both the short and long term.

Though the 1997 to 1998 drought was more severe – as measured in rainfall – than the drought of 1982 to 1983, the impacts were less debilitating. The key difference between the two events was the early detection and communication of the oncoming El Niño, which enabled American Samoa to engage the public in preventative measures.

After the rain returned in September and October, ASPA continued to monitor rainfall conditions. They continue to receive and contribute to the regular PEAC ENSO forecasts and summaries as well as information from other climate services providers in the Pacific Islands. “We also increased the number of sites to take rainfall readings,” said Mr. Malae. “We installed rain gauges all over the island ourselves.”

Tutuila now has a clear success story of the importance of climate early warning paired with effective community engagement, and even more rainfall monitoring on the island. The Pacific hasn’t seen a strong El Niño since – though one threatened to develop in the fall of 2014. The next time a drought does hit, Mr. Malae said, “we will definitely be better prepared.”

The Pacific Islands Climate Storybook can be found at: <http://pacificislandsclimate.org/csdialogs/>
Climate Stories can be found at: <http://www.pacificislandsclimate.org/csstories/>

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