Section 319
NONPOINT SOURCE PROGRAM SUCCESS STORY
American Samoa

Outreach and Enforcement Reduce Instream *E. coli* Levels and Disease Risk

Waterbody Improved

Small-scale pig farms with improperly constructed waste management systems caused Afuelo Stream to be contaminated with high levels of bacteria and exposed the public to the disease leptospirosis. In 2004, the stream was placed on the American Samoa 303(d) list for impairment due to bacterial indicators. Regular stream water monitoring, public education and outreach, facility inspections, and enforcement of environmental and public health regulations helped reduce the leptospirosis risk and led to impressive declines in average *Escherichia coli* concentrations, with preliminary data indicating the stream is now meeting water quality standards.

Problem

The Territory of American Samoa lies 14° south of the equator, about 2,300 miles southwest of Hawaii. The territory is composed of seven islands, with Tutuila being its largest (53 square miles) and most populated (approximately 60,000). The Matu'u watershed (population 694) is on the southern shore of Tutuila between Pago Pago Harbor and the Tafuna-Leone Plain, the two most densely populated and industrialized areas in the territory.

Pigs are an important cultural resource in American Samoa. There are approximately 35,000 pigs on 2,700 pig farms on Tutuila alone, mostly in private backyards. Local small-scale pig farms (1-20 pigs) commonly consist of makeshift open-sided buildings placed on concrete slabs or packed earth floors. Farmers typically clean out these facilities by flushing the floor with pressurized water, which is then discharged as waste/water slurry into an unlined cesspool or directly into streams or wetlands. There has been a lack of community and political will to support proper pig waste management, and the impacts of pig waste on human health and water quality are now critical. Large volumes of untreated and uncontrolled pig urine and feces contaminate drinking water, streams, and nearshore ocean water in 31 of the 41 watersheds in American Samoa.

Matu'u waterfront, the site of Afuelo Stream in American Samoa.

In 2003, a construction worker exposed to water in Afuelo Stream was diagnosed with the disease leptospirosis. This case prompted an effort to assess the stream's water quality and pollution sources. Inspections in Matu'u found that every pig farm was noncompliant with environmental and public health laws. Bacteria monitoring revealed *E. coli* concentrations exceeding 40 times the allowable single sample most probable number (MPN) criterion of 576 per 100 ml. As a result of these findings, Afuelo Stream was listed on the American Samoa 303(d) list for impairment due to bacterial indicators in 2004.

Project Highlights

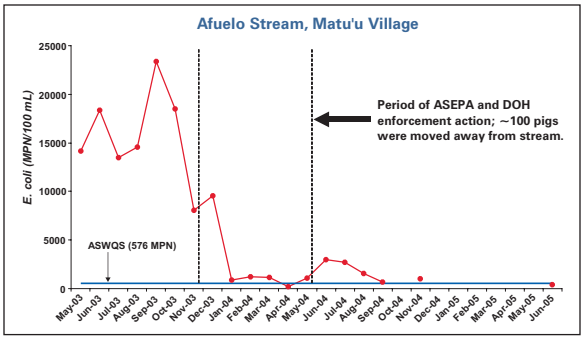
American Samoa received full approval of its 319/6217 Coastal Nonpoint Source Pollution Control Program on July 24, 2003. The program implemented several best management practices (BMPs) throughout Matu'u watershed, including facility inspections and improved enforcement of environmental and human health regulations. In addition, the program implemented regular water quality monitoring and developed educational materials and placed newspaper, television, and radio advertisements to increase public awareness of the issue.

Program staff worked with landowners to implement practices to meet American Samoa's water quality standards and public health regulations applicable to confined animal feeding operations. In compliance with a 50-foot setback requirement from waterbodies and structures, they installed walls and other structures to contain and direct runoff to waste management systems including portable pens, dry litter systems, septic tanks and leach fields, and a new composting system. This effectively moved over 100 pigs away from the stream and reduced contaminated runoff.

Finally, the U.S. Centers for Disease Control and Prevention (CDC), with support and assistance of the American Samoa EPA, LBJ Medical Center, and U.S. Environmental Protection Agency, conducted an island-wide leptospirosis study. The 2004 study found a 17 percent leptospirosis infection rate among the American Samoan population—approximately 1.5 times the world average. The study also determined that pigs are the major reservoir of leptospirosis in American Samoa and the disease is passed on to humans through pig urine. Officials supplied the medical center with leptospirosis test kits and the center documented illnesses and deaths due to pig-related disease.

Results

The beneficial effects of the BMPs on water quality have been dramatic. Average *E. coli* concentrations in the stream declined 91 percent (see figure), with preliminary data indicating the stream is now meeting water quality standards. Public awareness of water quality problems and the health threat from leptospirosis has driven community and political will to improve pig waste management throughout the territory.



Weekly stream samples reflect declining instream *E. coli* levels following a collaborative educational and enforcement effort by the American Samoa EPA and the American Samoa Department of Health. American Samoa water quality standards call for a single-sample most probable number (MPN) criterion of 576 per 100 mL.

This success shows how the American Samoa NPS program can effect real improvements in water quality and public health protection. The success of the Afuelo Stream project has led to 28 other watersheds implementing similar BMPs.

Partners and Funding

The cooperation of the people of Matu'u Village, American Samoa Environmental Protection Agency, American Samoa Department of Health, U.S. Environmental Protection Agency Region 9, U.S. Centers for Disease Control and Prevention (including $50,000 in-kind services), and LBJ Medical Center (with $5,000 in-kind services) have contributed to the success of this project. Partners contributed approximately $150,000 in section 319 and other funds to the effort.

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