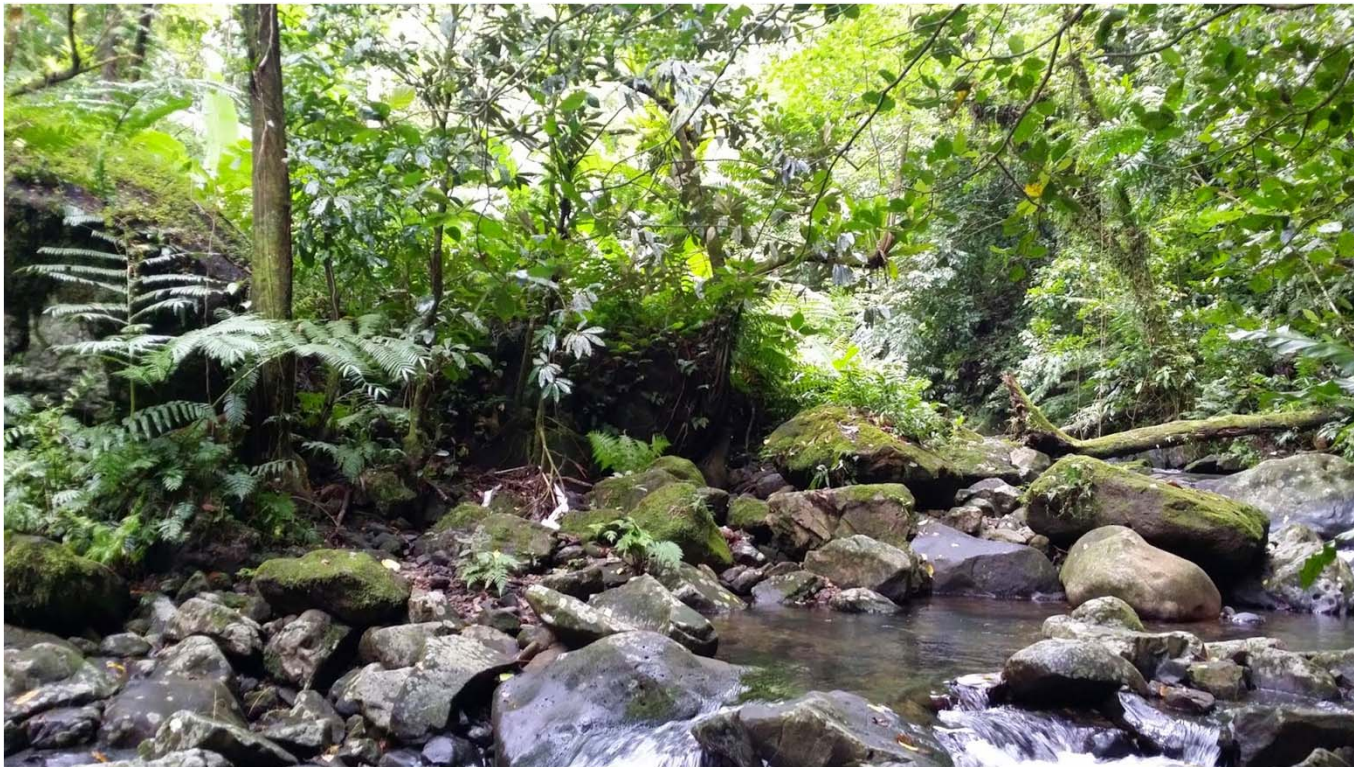


Water Quality Monitoring in American Samoa: status of nutrients at the watershed level



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- **What do we know so far?**

- In 2014, 33 out of 41 watersheds were monitored for water quality and coral/fish/benthic monitoring
- Causes of degradation: *non-point sources of pollution, improper land use designations, and increased production of solid waste and sewage* (Tuitele & Buchan 2014, Tuitele *et al.* 2014)
- *Pathogen indicators from collection system failure and intensive animal feeding operations* have led to impaired streams in watersheds and surrounding coastal waters (DiDonato *et al.* 2009, Tuitele & Buchan 2014, Tuitele *et al.* 2014)
- Seven identified point sources: Starkist, Samoa Packing Trimarine, Utulei Waste Water Treatment Facility, Tafuna Waste Water Treatment Facility, British Petroleum, Satala Power Plant, and the American Samoa Shipyard Services Authority. ***All facilities meet the requirements established by individual National Pollutant Discharge Elimination System (NPDES) permitting program.***



- Previous studies

Bardi et al. 2005: *Stream Water Chemical Parameters for Tutuila Island*

- sampled 44 perennial streams for 2 years and tested for pH, conductivity, turbidity, temperature, dissolved oxygen, calcium, magnesium, potassium, sodium, reactive phosphorus, ammonium-N, and nitrate-N levels. *Seven streams possibly comply with current water quality standards for phosphorus and nitrogen for fresh surface waters, while none comply with the standard for turbidity.*

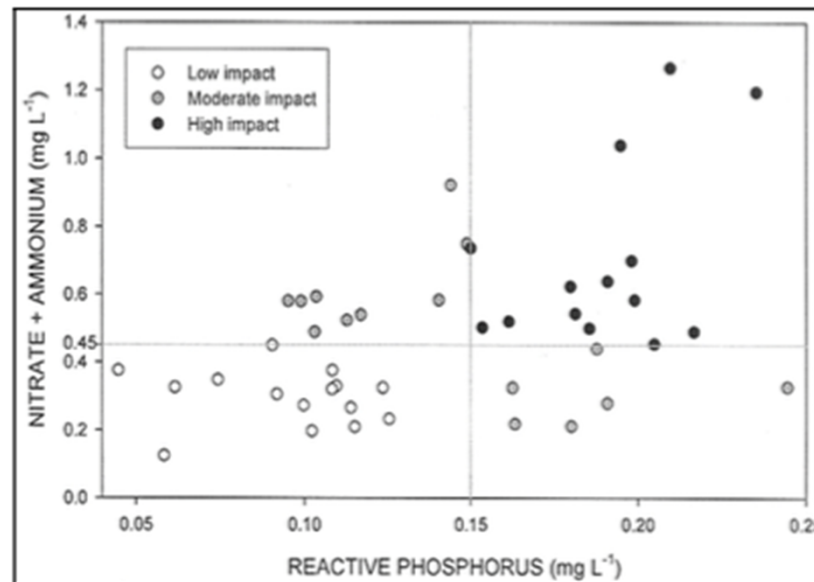


Figure 2. Distribution of 44 streams based on cutoffs of 0.15 mg L⁻¹ for reactive phosphorus medians and 0.45 mg L⁻¹ for soluble nitrate-plus-ammonium nitrogen medians.



- Previous studies

DiDonato et al. 2009: *Assessing coastal waters of American Samoa: territory-wide water quality data provide a critical “big-picture” view for this tropical archipelago*

- Study presents first broad-scale investigation of water quality in coastal waters in the Territory
- Nutrients: Territorial waters satisfied the standards for total nitrogen and phosphorus

Table 3 Results from the assessment of American Samoa's coastal water quality

Parameter	Pass	Fail	Not assessed
Total P (mg/L)	92 ± 10%	1 ± 10%	7%
Total N (mg/L)	72 ± 17%	21 ± 10%	7%
Chlorophyll (µg/L)	66 ± 18%	34 ± 18%	
Light penetration (feet)	54 ± 18%	42 ± 7%	4%
DO (%sat, mg/L)	81 ± 15%		19%
pH	100%		
<i>Enterococcus</i> (MPN)	64 ± 18%		36%

Percent area (±95% CI) of Territorial waters corresponding to each outcome (pass/fail) was calculated. In the case of missing data, the percent area that could not be assessed is listed



AS-EPA water quality monitoring and assessment programs:

- Stream Water Quality Monitoring
- Nearshore Marine Water Quality Monitoring (Beaches)
- Piggery Compliance Program
- National Coastal Assessment of Reef Flats



American Samoa Piggery Compliance Program

- Since 2006
- Number of pigs kept in illegal piggeries reduced by 70% (8,373 to ~2,500)
- Cumulative load reductions of **216,725 lbs** of Nitrogen and **86,574 lbs** of Phosphorus
- Reduction in bacterial loading in streams and beaches
- **465** number of open piggeries (as of May 2015)



<http://rdcdesign.net/project/dry-litter-piggery-project/>



Collaborative projects:

Nutrients

- UCSD (Nutrients in streams)
- NOAA (Vatia nutrients)
- UH (nutrients)
- Nutrient Analyzer will be up and running this year
- Grant proposal submitted to do a ridge to reef ecosystem health index around Tutuila (streams and coastal waters) with DMWR, CRAG

Future work:

- Run nutrient analysis on a monthly basis following stream monitoring protocol
- Compile and analyze water quality data and integrate with watershed and reef condition monitoring datasets
- Map areas of concern: high nutrient loads, degraded reef condition from nonpoint sources

Research ideas:

- Track changes of water quality condition over time
- Determine factors of water quality variability within watersheds, identify significant drivers of threat



Thanks for your attention! Questions?

