



Identifying Watershed Discharge Patterns and Linkages with Ecological Assemblages in Nimpal Area, Yap State Federated States of Micronesia



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Throughout Micronesia the impacts of land-based sources of pollution to nearshore marine resources are increasing in severity. Numerous conservation planning documents cite land-based pollution among the highest priority items for improved science and management to address, evidenced through WERI's 2010 critical needs list. Briefly, much of the scientific insight to date surrounding land-based pollution and coral reef assemblages has emerged through examining 'heavily polluted' locales and drawing comparisons with 'pristine' locales to define somewhat obvious conditions on reef assemblages that are associated with watershed status. Yet, throughout Micronesia the overwhelming majority of sites lie somewhere between these extreme pollution endpoints. It is critical that we collectively build upon the science to identify more relevant thresholds for efficiently identifying and quantifying sources of water quality impairment. This should include building new science and using the existing body of evidence to approach numerous, site-specific management needs that exist.

Here, we propose to conduct coupled water quality and ecological sampling in Yap State, along the coastline associated with the Nimpal marine conservation area (MCA). The MCA was established in May 2008 by the community to address growing concerns of marine resource depletion and declining coral reef 'health'. Our project would build upon an existing community-led watershed project awarded by the Micronesian Conservation Trust (MCT) that led to the general characterization of discharge patterns and relative volumes of freshwater input, both inside and outside of the MCA. As a result of MCT-funded efforts, the extent of each sub-drainage is becoming better defined, paving the way for enhanced data collection within each to identify where, and what type of improvements to community-based management will best facilitate success. Here we propose to:

- Build a better statistical understanding of the pertinent water quality and discharge patterns in the nearshore environment,
- Enhance water quality data collection to begin approaching sub-drainage patterns,
- Draw affinities with the contemporary seagrass and macroalgae assemblages

Following these steps our project aims to approach local concerns regarding macroalgae proliferation over the years. The proposed methods are all collaborative in nature, with an underlying theme of producing sound science through partnerships that build local capacity. All data collection will be conducted with community-based monitoring teams that already have positive relationships with both principle investigators (PI's). Methods include:

- Surface current data collected using GPS-mounted drones,
- Water quality profiles collected using high-resolution, continuously-recording, water quality instrumentation. These data would be integrated with locational data to yield GIS layers for interpretive purposes,
- Enhanced nutrient sampling of priority nearshore waters,
- Ecological data collection to investigate ecological-environmental coupling.

Initially habitat maps will be created that will define the boundaries of relevant ecological assemblages. For this project we will focus on submerged aquatic vegetation habitats, and will establish several study locations in the project vicinity, parallel to shore. Each study site will consist of 5 x 50 m transect lines where replicate estimates of seagrass and macroalgae abundances, and associated datasets described within, are derived with statistical confidence.