

Measurement of Sediment Loading, Turbidity and Nutrients in Two Rivers that Drain to the Achang Reef Flat Marine Preserve, Guam



What Are We Doing in This Project?

Working closely with local partners, the National Oceanic and Atmospheric Administration (NOAA) is conducting a project in southern Guam to monitor sediments and nutrients in the Ajayan and Liyog rivers (Figure 1), which flow from the Manell watershed and empty into the Achang Reef Flat Marine Preserve in Cocos Lagoon. The current plan is to monitor sediments and nutrients weekly and after storm events over the course of one year. The Laolao River is also being considered, however, it appears this river may not have adequate flow much of the time, but may be monitored after storm events.



Figure 1. Two rivers in the Manell watershed that will be monitored for the project.

Why Are We Doing The Project?

Local resource managers are concerned that erosion from the Manell watershed is impacting adjacent coral reefs, and have asked for an assessment of sediment and nutrient discharges from these two rivers. The sediments eroded from the steep hillsides in the watershed (Figure 2) can make their way into the streams and rivers, and then out onto the reefs in the Achang Preserve, and to other parts of Cocos Lagoon. High enough concentrations of sediments can smother live corals, or at the very least result in the corals having to expend energy to get rid of the sediments “raining” down upon them. The presence of high concentrations of sediments in the water column can also impact other organisms in the area such as sea grasses and fish. In addition to sediments, nutrients eroded along with the sediments or discharged from failing septic systems in the area, can impact surrounding reefs as well by encouraging the growth of algae which can overgrow existing corals. Finally, the sediments could also contain elevated levels of other contaminants such as heavy metals.



Figure 2. View of the Manell watershed from within the Achang Reef Flat Marine Preserve.

Partners

A number of groups and individuals are participating in this project. They include Guam EPA, the University of Guam and University of Guam Marine Laboratory, along with local NOAA Coral Reef Conservation Program (CRCP) and NOAA National Marine Fisheries Habitat Conservation Division scientists.

What Are We Measuring?

For this project, a Guam-based field scientist will be monitoring turbidity (cloudiness of the water), along with the suspended sediment concentration (SSC), and nutrients near the mouths of the Ajayan and Liyog rivers (Figures 1 and 3). Turbidity will be measured using automated turbidity loggers for continuous monitoring, as well as a hand-held turbidity meter to check on the accuracy of the loggers, and perhaps to assess turbidity on areas further upstream. SSC is a measure of the amount or weight of sediment in the water column. Elevated concentrations of SSC result in greater amounts of sediment being transported down the rivers and out into Cocos Lagoon, including nearby coral reefs and other habitats. SSC will be measured by collecting and filtering a known volume of water and then weighing the sediment trapped by the filter. In addition to the SSC, flow in the rivers will be monitored and from these two measurements, sediment loadings from the rivers will be estimated during normal or base flow, as well as after storm events. Water samples will also be collected for nutrient analysis on a monthly or weekly basis and also after storm events. Finally, bottom sediment samples will be collected one time to assess the level of chemical contaminants (e.g., hydrocarbons and pesticides) near the mouths of each of the rivers.



Figure 3. View near the mouth of the Ajayan River.

How Will the Information Be Used?

The information generated from this project will help establish a baseline of conditions during normal and high flow periods. In addition, the baseline information will be used to assess the benefits of restoring vegetation on the hillsides within the Manell watershed. The results may also provide information on the differences in sediment and nutrient loadings between the two rivers to help inform restoration efforts, and the information generated will also be compared with similar work that has been conducted in the nearby Geus watershed, by the University of Guam.

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