



Internship Project Description

1. Mentor/Co-mentor name(s): Mark Torchin/Heather A. Stewart
2. Title of Project: Ecology of mangrove communities
3. Project description:

Worldwide, vital ecosystems are at risk of disappearing and with them, the biodiversity that they support. Global environmental changes due to anthropogenic disturbances and climate change impact species composition and diversity which could alter ecosystem function. Foundation species, such as red mangroves (*Rhizophora mangle*) and corals, are organisms that play a strong role in structuring communities. These species are an integral part of the ecosystem and form a model system to understand the role stress and disturbance play in altering community composition.

This project examines mangrove island and coral reef systems to understand what the implications of stress and disturbance are on biodiversity, specifically focusing on epibionts (sessile organisms growing on red mangrove prop roots). We study the differences in epibiont communities between sites with varying stress and the changes in such communities over time. We hope to understand how marine biodiversity changes over time and whether there are ways to mitigate loss of species.
4. Mentorship goals and benefits to the intern:

During this internship, there will be opportunities to learn an array of marine survey techniques as well as monitoring and analysis software (e.g., LI-COR, CoralNet, R). The intern will work with various taxonomic groups of marine invertebrates, identifying these organisms as well as their ecological importance within the mangrove community. The intern will gain science communication skills and allowed the opportunity to give public presentations as part of the Smithsonian Tropical Research Institute (STRI) Bocas del Toro Research Station education program. Further, the intern will develop and lead hands-on educational programs for local students related to the mangrove ecology project. Through this internship, the intern will gain experience in investigating the ecology of mangrove islands and the surrounding coral reef. This internship will develop and hone research skills to produce stronger researchers with the ability, expertise, and confidence to excel in future research and dissemination of findings and their importance.

5. Desired intern background:

We seek at least one highly motivated, ambitious, hardworking, adaptable, and collaborative person who will take advantage of, and grow from, the rich research environment provided by STRI. The intern will work closely with STRI Fellows, technicians, and other interns on biodiversity studies of mangrove island systems. The intern will be involved in collecting data from the field (e.g., visual and photographic surveys, monitoring environmental factors), setting up experiments, and collecting data in the lab (e.g., identification of marine epibionts). The intern should be a strong swimmer and comfortable being in the water for 8 hours a day. The intern should also be prepared to climb through mangrove trees. Field work will be conducted around the entire archipelago of Bocas del Toro, Panama and will entail frequent travel between islands.

*Experience with identification of marine organisms (e.g., anemones, hydroids, sponges, and ascidians, barnacles, bivalves, and coral), Spanish fluency, previous experience working in mangroves or coral reef systems, snorkeling or diving, experience with underwater photography, and/or experience with photo software are preferred, but not required.

6. Duration and location of internship: 3 months; Bocas del Toro, Panama

7. Additional opportunities:

The intern will join both the mangrove research group as well as the larger STRI community and have one on one daily interactions with staff researchers and visiting scientists. The intern will also be part of weekly lab meetings to discuss research goals, current status/results, and problem solve issues related to scientific productivity. There will be seminars at the Bocas del Toro STRI research station and in Bocas Town as well as weekly seminars on the mainland of Panama (i.e., at Tupper, BCI, Ancon, Naos, and Gamboa).

8. List of suggested readings related to this project:

Bingham, B. L., & C. M. Young. Stochastic events and dynamics of a mangrove root epifaunal community. *Mar. Ecol.* 16(2), 145–163 (1995).

Diaz, M. C., Smith, K. P. & Rützler, K. Sponge species richness and abundance as indicators of mangrove epibenthic community health. *Atoll Research Bulletin* 518 (2004).

Ellison, A. M., Farnsworth, E. J. & Twilley, R. R. Facultative mutualism between red mangroves and root-fouling sponges in Belizean mangal. *Ecology* 77, 2431–2444 (1996).

Farnsworth, E. J. & Ellison, A. M. Scale-Dependent Spatial and Temporal Variability in Biogeography of Mangrove Root Epibiont Communities. *Ecol. Monogr.* 66, 45–66 (1996).

Guerra-Castro, E.J. & J.J. Cruz-Motta. Colonization and succession as drivers of small-scale spatial variability in epibionts on mangrove roots in the Southern Caribbean. *Mar Ecol Prog Ser* 588, 15-27 (2018).

Janiak, D.S., R.W. Osman, C.J. Freeman, & V.J. Paul. Artificial structures versus mangrove prop roots: a general comparison of epifaunal communities within the Indian River Lagoon, Florida, USA. *Mar. Ecol. Prog. Ser.* 607, 85-98 (2018).

Rogers, C. S. High diversity and abundance of scleractinian corals growing on and near mangrove prop roots, St. John, US Virgin Islands. *Coral Reefs* 28, 909 (2009).

Yates, K. K. et al. Diverse coral communities in mangrove habitats suggest a novel refuge from climate change. *Biogeosciences* 11, 4321–4337 (2014).

How to apply: Please send 1) a brief cover letter describing your interest in the position and why you are a good fit, 2) a copy of your CV, and 3) a list of three references to Heather Stewart (hadar.stewart@gmail.com). Please include your relationship to all references as well as their email address and phone number. If selected for the second round, applicants will be required to provide a brief Spanish resume, a copy of their passport, and sign a release of responsibility.

Deadline to apply: March 15th, 2019