The genetics of mangrove ecosystem services

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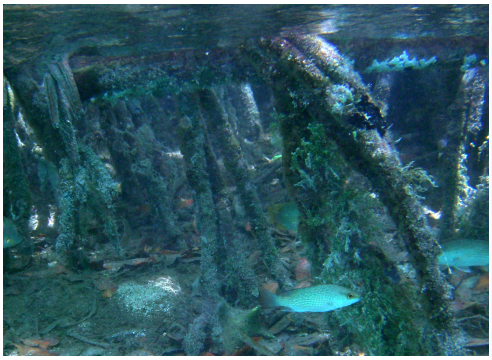
Introduction: Loss of ecosystem services is a contemporary cost of human habitat conversion and overuse of natural resources. One of the major tropical and subtropical marine systems that provides multiple ecosystem services are shoreline mangrove stands. These ecosystems provide nurseries for many reef and commercially fished species. Mangroves also provide major shoreline defences against storm damage. Unfortunately shoreline mangrove systems have been removed in many areas, often with severe consequences when storms occur. Both the effective functioning of existing mangroves and replanted areas may depend on levels and patterns of genetic variation in the mangrove trees. Genetic variation may directly influence resistance and resilience of mangroves to disturbance (e.g. pathogens or storms). Genetic variation may also be important in the influence that mangrove genotypes have on the associated communities, especially the nursery communities found in mangrove roots.



Mangroves influence both marine….

… and terrestrial ecosystems

Project Summary: This project will use an ecological genetics approach to determine the importance of genetic variation in mangrove stands. The project will examine both direct (e.g. resilience to disturbance) and indirect (e.g. influence on associated fish communities) effects of genetic variation in mangroves. Initial work will involve sampling of trees in areas of the Caribbean and potentially the Galapagos to determine levels and patterns of genetic variation. The second major step will be the documentation of associated communities in select stands of mangroves using both classical taxonomy and genetic barcoding. Manipulative experiments will be used to establish stands of mangroves with known genotypic patterns and to examine effects on the establishment of associated communities, as well as the resistance and resilience of both mangroves and associated communities to disturbance. Projects will be conducted in collaboration with local conservation charities and governmental organisations and results are intended to feed directly into management practices.

The student will acquire an extensive range of conservation genetic techniques, a working knowledge of ecosystem service quantification and direct experience in conservation management practice. Applicants should have a degree in ecology, conservation, applied genetics or environmental science. Applicants should be capable of undertaking marine fieldwork and experience in that area is desirable. PADI or equivalent diving certification is desirable but training can be provided if needed.

References

1. Zytynska SE, Fay MF, Penney D, Preziosi RF. Genetic variation in a tropical tree species influences the associated epiphytic plant and invertebrate communities in a complex forest ecosystem. Philos Trans R Soc Lond, B, Biol Sci. The Royal Society; 2011 May 12;366(1569):1329–36.
2. Rowntree, J., Shuker, D. & Preziosi, R (2011). Forward from the crossroads of ecology and evolution.*Philosophical Transactions of the Royal Society B-Biological Sciences*, 366(1569), 1322-1328. eScholarID:160234 | DOI:10.1098/rstb.2010.0357