Water Worlds: Revitalizing Diminishing Underwater Communities

While coral reefs may seem like merely beautiful oceanic landscapes, they are actually worlds unto themselves – providing food and shelter and sustaining ecosystems of countless species that thrive on the coral-built structures. Often compared, in value, to rain forests, their beauty attracts tourism that sustains coastal economies. Their structure buffers hurricane damage, protecting coastlines from intense storm activity. And the uniqueness of this environment certainly harbors equally unique organisms – some known, many more still to be identified.

Unfortunately, both man-made and natural factors have played into coral reef destruction. Facing threats from El Niño, heat stress, disease, and hurricane wave forces to ship groundings, sediment runoff, and dynamite and chemical fishing, it’s not easy to be a coral reef. It has been reported that 20 percent of the world’s coral reefs have been effectively, and possibly permanently, destroyed. Without question, recovery will be extremely challenging, so Rosenstiel School coral reef researchers are working to learn more about this rare and special ecosystem.

Coral reef resilience
Coral reefs are facing a global decline. The consensus is that the corals today are not as healthy or as diverse as they were 50 years ago. Most scientists point to increased exploitation of reef resources or other negative, human-induced influences as the cause for this change. Researchers at the School are hard at work studying how coral’s ability to host different types of algal symbionts (also known as zooxanthellae) might give them the flexibility they need to adapt to environmental variability. Studying the genetic variations of the symbionts growing in specially designed labs, and samples taken all over the world, coral scientists are conducting work that will have global implications.

Watching coral grow
Several Rosenstiel School researchers have focused specifically on monitoring the health of Caribbean corals. They estimate age and partial mortality by coral species and analyze the abundance or lack of symbiotic algae. Several scientists have also studied how various coral species interact. While they seem like immobile rocks to the untrained observer, coral spawning and algae expulsion in response to warm water temperatures and prior to bleaching, disperse DNA, pathogens, or other material with unclear consequences.

To learn more about the factors that help coral grow and thrive, Rosenstiel School scientists have cultivated more than 20 species of important reef-building corals in their labs. It’s their success and failures at sustaining these species that will help them learn more about what affects coral growth, development, resistance, and resilience.

Predicting the impact of climate change
Housed at the Rosenstiel School, the South Florida Corals and Climate Change Laboratory is the first of its kind to tackle the global problem of the impact of climate change on corals. Fully operational in 2007, the lab facilitates the study of how corals respond to the combined stress of greenhouse warming and ocean acidification. Using two Caribbean coral species as study subjects, Montastraea faveolata (mountainous star coral) and Porites furcata (finger coral), the lab simulates environments similar to what corals might experience in the next 50 to 100 years to see if the skeletal development is affected.

Assisting the coral reef caretakers
If a hurricane sweeps through the area, what happens to our coral reefs? How do Florida officials decide whether a “no-take” zone would be beneficial to the coral reefs? How does a marine life sanctuary evaluate if it’s having an impact? A unique, new, user-friendly, online tool called Data Navigator: South Florida is one of the most recent additions to Rosenstiel School’s complement of coral reef research tools. It provides ready access to literally hundreds of digital layers of environmental and socioeconomic information via maps, charts, and databases and allows users to combine this data in ways that make, as clear as possible, the potential impacts of a disturbance or change in regulations in one part of the ecosystem on other parts of the reef, and on the people to whom the reef is important. Because this tool is available on the Internet (http://www.ncoremiami.org), anyone can access it, allowing for better understanding among coral reef enthusiasts and caretakers.

Managing coral reef ecosystems is complex, with countless variables factoring into their health. With its broad range of research tools and approaches, Rosenstiel School seeks to reduce the threats to these unique water worlds.