Expedition: Coral Resilience in the Face of Climate Change

Field Study: Coral Ecology

Summary: Scientist and filmmaker Gaelin Rosenwaks spent two weeks in the Republic of Palau documenting how local coral reefs and their symbiotic algae have adapted to conditions that are similar to the predicted global ocean conditions the entire region is expected to face in the future. She and a team of scientists studied the relationships between corals and their algae in two distinct reef systems with the expectation of revealing how some corals have adapted to increasing and unstable water temperatures. This project is part of Gaelin's work to understand the broad impacts of climate change on our ocean ecosystems and how nature is responding to these rapid changes to our planet.

THE EXPEDITION

Dr. Dustin Kemp and Kira Turnham collect coral samples from the offshore study site

This expedition explored the inshore and offshore reefs surrounding Koror State in Palau. The team had two study areas, the inshore reefs of the Rock Islands and Rebotel Reef, an offshore reef. The inshore reefs are warmer, nutrient rich and acidic, mirroring what will be seen in the future, given climate change predictions. The offshore reef has cool clear water, representative of most coral reef habitats today. In the middle of a multi-year experiment, this expedition focused on collecting corals from both reef locations and analyzing samples of corals previously transplanted from inshore to offshore and vice versa. These reciprocal transplants of the same species of corals will help the scientists to understand how the inshore corals are adapted to the harsh conditions seen there. Specifically, the team is focused on the relationship of the symbiotic algae with the coral animal and what trade-offs exist for the corals hosting this symbiont. They also looked at other adaptations of the corals to determine how

Map of Palau (Source: Compare Infobase Ltd.)

the corals are able to survive in these conditions.

EXPEDITION GOALS

The survival of coral reefs is under threat from global climate change. This expedition to explore a distinct set of reefs unique to Palau focuses on understanding how a particular group of corals and their symbiotic algae have adapted to conditions that are analogous to the predicted global ocean conditions the entire region will face in the future. This cutting-edge work is a hopeful story amongst many negative stories about the threats to coral reefs in the face of climate change.

The team set out to examine the relationships between corals and their symbiotic algae in two unique reef systems, an offshore reef with current ocean conditions and an inshore reef with high temperatures analogous to predicted future ocean conditions. By exploring these two systems and performing a series of experiments on the corals including transplanting corals from the inshore reefs to the offshore and vice versa,

WHO
Gaelin Rosenwaks

WHAT
Film production of coral reef study

WHEN
May 5 - 19, 2018

WHERE
Republic of Palau

WHY
To study and document how coral reefs and their algae are adapting to climate change

Gaelin Rosenwaks

the team hoped to understand if and how the inshore corals have adapted to increasing and unstable water temperatures. This research will provide insight into how corals will respond to climate change from the molecular to the ecosystem level and provide insight into the long-term success of coral reefs.

The Rock Islands of Palau

The majority of Gaelin's research focuses on big picture problems, and climate change is certainly one of them. Previously she has worked in the Arctic, Bering Sea and the mountains of Peru on this topic. As a photographer and filmmaker, she seeks to discover how these various geographic regions respond to these changes in order to see a larger overall picture of what is happening on our planet and in our oceans. Her goal is to create a visual record of what these regions look like now while documenting what the scientists are doing to understand these rapidly changing environments.

CHALLENGES FACED

The biggest challenge during the expedition was getting all of the work accomplished in the time allotted. As always, there is never enough time, but the team was able to conduct the necessary work and get the footage needed for the film.

EXPEDITION RESULTS

The experiments are ongoing and many of the samples are not yet processed and analyzed. The team has so far learned that the inshore corals have a thermally-tolerant symbiotic algae identified as Symbiodinium trenchi, a dinoflagellate that lives within the coral tissue. Unlike its offshore counterparts, the inshore corals do not bleach despite the harsher conditions, and one reason for this may be their symbiotic algae. In addition, the team has discovered that the inshore corals are eating more particulate matter from the water, so they are actively feeding to gain nutrients unlike their offshore counterparts which rely on their symbiotic algae for food. This understanding will hopefully gain insight into how corals may survive in a warmer ocean and provides a glimmer of hope that at least some corals survive into the future. We may lose a good amount of diversity in our coral reef ecosystems, but corals in some form can survive. Gaelin's film is in the final stages of completion, and she is in the process of entering it into film festivals and determining distribution opportunities.

EXPEDITION FUNDING

The expedition was funded by the National Science Foundation, as well as a grant from WINGS WorldQuest.

ABOUT THE FLAG CARRIER

Gaelin Rosenwaks is a marine scientist, explorer, photographer and filmmaker. Always fascinated by the marine world, Gaelin began diving at 14 and has since continued exploring ocean ecosystems. She began her career at the Woods Hole Oceanographic Institution where she researched over-wintering patterns of Southern Ocean zooplankton. Gaelin earned her Master's Degree in Coastal Environmental Management from Duke University working with the Tag-A-Giant program and conducting research on the migratory movements of Giant Bluefin Tunas. Alarmed by the changes happening in the oceans, Gaelin founded Global Ocean Exploration Inc (GOE) to share her passion for ocean exploration, marine conservation and photography. She now participates in and conducts expeditions in every ocean to alert the public not only to the challenges facing the oceans, but also to what science is doing to understand these changes. Gaelin is a US Coast Guard Licensed Captain, and a Fellow of both the Royal Geographical Society, the Explorers Club and the Society of Women Geographers. She has published articles in scientific journals, newspapers and magazines and has delivered lectures at many institutions including the Explorers Club, Patagonia, Inc, and Yale University. She has also appeared as a scientific consultant and angler on the National Geographic Channel Series, Fish Warrior.

The team prepares corals to transplant to the reef

Gaelin Rosenwaks with Dusty Kemp and Todd LaJeunesse, and their trusty guide, Melvin

EXPEDITION TEAM

Filmmaker: Gaelin Rosenwaks

CONTACT INFORMATION

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