EIGHT YEARS OF CORAL REEF DATA FROM MELANESIA AND SOUTH EAST ASIA: VITALITY, PERCENT COVERAGE, REEF AREA AND THE EFFECTS OF AN EARTHQUAKE

M. Katie Olds[1,2], Phil Dustan[1,2], Abigail Alling[2]

[1] Grice Marine Laboratory, College of Charleston, Charleston, South Carolina, USA

[2] Planetary Coral Reef Foundation, Pacific Palisades, California, USA

Abstract

Recent reports show that coral reefs are facing significant environmental stresses most of which are anthropogenic origin. The Planetary Coral Reef Foundation (PCRF) set up a long-term coral reef data collection project using methods developed by Dr. Phil Dustan in 1995. Since 1995, PCRF's research vessels visited coral reefs worldwide returning to several study sites. In this study we aim to determine long term changes regarding vitality, percent live hard coral coverage and reef area. In addition, we aim to determine how the earthquake on 1 April 2007 in the Solomon Islands impacted our study site there. The epicenter of the earthquake was only (??how many??) klometres away from the study site for which we have pre-earthquake and post-earthquake data sets. Findings of this study will identify local and planetary stresses to coral reefs and reveal the levels of stresses these reefs may have faced over the past eight years.

Repeated Study Sites

Melanesia

SE Asia

Sagharughombe Reef

June 2000, Sept. 2002, Jan. 2006, Jan. 2008

Renggis Island

May 2001, Nov. 2006

Kavieng

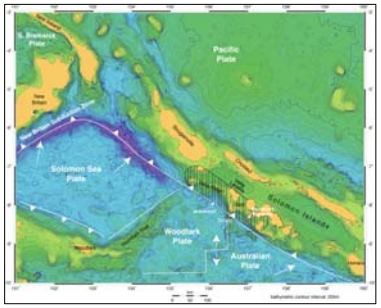
Aug. 2000, April 2002

Milne Bay

March 2006, April 2007

1 April 2008 Earthquake

Sagharughombe Reef, a study site visited four times over the past 8 years is located at 08°07.0' S, 156°54.7' E, just 10 km east of Gizo. The three pre-earthquake and one post-earthquake studies set up a rare opportunity to attempt to determine the effects on this coral reef habitat in regards to hard coral percent coverage, vitality and total reef area.



The tsunami event on 1 April 2007 resulted from an undersea earthquake of magnitude 8.1 located along the Solomon Islands subduction zone at 08° 27.6' S, 157° 02.6' E, just 45 km SSE of the island of Gizo. In the case of this earthquake the Solomon Sea Plate, Woodlark Plate and the Australian Plate were subducted beneath the Pacific Plate.

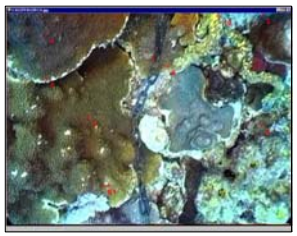
Methods

At each study site, four 20m X 4m transects were chosen and data were collected using the following methods:

•**Vitality** of coral colonies is measured through VitaReef methods, which comprises a set of codes that represent almost all states of health and conditions found on hard corals. Divers examine colonies along the transects and record the following visual symptoms of hard coral vital conditions on slates:

Unblemished	Damaged but Healed
Edge Damage	Damage to Tissue and Skeleton
Slight Sedimentation	Biological Predation
Bleaching	Mucous
Black Band Disease	Filamentous Algae Overgrowth
White Plague Disease	Sedimentation with Tissue Death
Recently Dead Colony	Healed with 2º Algae Growth
Macroalgae Overgrowth	Colony Decreasing in Size
Almost Unblemished	Invert Overgrowth

•An estimate of **percent cover** (projected to the surface) of corals, algae, sponges, substrate, and other functional groups is provided using random point counting. Each transect is recorded as series of photographic images which are analyzed with PointCount99.



•Reef area is recorded using GPS and GIS mapping techniques.

Expected Results and Significance

Results will indicate planetary patterns in coral reefs. We may find no change in coral reef percent coverage, vitality or area which may indicate that over the past eight years no significant changes have occurred in their environments or that corals have been resilient in facing changes. On the other hand we may find changes of various magnitudes at the different reefs we are investigating. While each reef faces different levels of stress depending on its proximity to coastal development, pollution sources, destructive fishing practices and deforestation and farm runoff, all reefs are facing the planetary stress of rises in global CO_2 levels (Bryant et al. 1998, Wilkenson et al 2000). The results of this study will test the predictions set forth by the "Reefs at Risk" model and improve our baseline knowledge of coral reef habitats.

References

Bryant, D., Burke, L., McManus, J., Spalding, M. 1998. Reefs at Risk: A Map-Based Indicator of Potential Threats to the World's Coral Reefs. World Resources Institute.

Wilkinson, C. 2000. Status of Coral Reefs of the World. Global Coral Reef Monitoring Network.

NOAA / PMEL / Center for Tsunami Research

Acknowledgements

I would like to thank all officers and volunteers of the Planetary Coral Reef Foundation for the collection of this vast set of data.

Funding for this project is being provided by the College of Charleston and Conservation International.