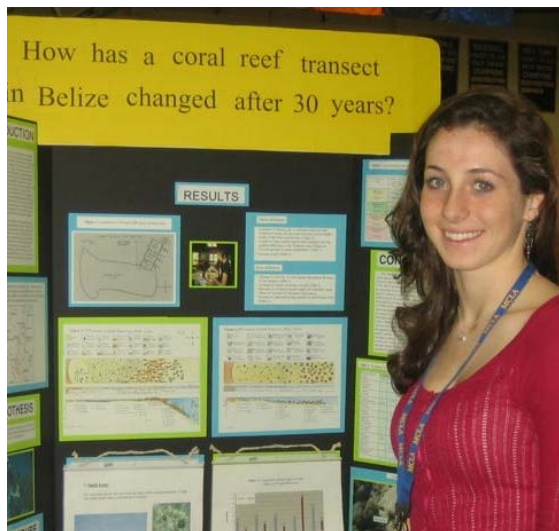




2010 MASSACHUSETTS CLEAN TECHNOLOGY AWARDS

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Region I: Western Massachusetts

Melanie Stier: Frontier Regional High School, South Deerfield

Honorable Mention, Climate Science: "How has a coral reef transect in Belize changed after 30 years?"

About Me:

I live in a household of five other family members and two dogs. I am the youngest in the family and have two older sisters. All three of us played competitive soccer, basketball and softball in high school as well as practicing the martial art of aikido.

I also enjoy the outdoors and being in the water. I became interested in studying coral reefs while obtaining my SCUBA license and hearing about my mom's previous trips to Belize. Thirty years ago, she was conducting an independent research study for a marine biology course that she was taking in college – she is currently a high school biology teacher. Looking at pictures of huge reefs and colorful corals made me very interested in learning more about it.

My Project:

The purpose of this study was to determine if the distribution and types of coral species have changed significantly over the past 30 years along a transect, which is a measured section along an area which is used to identify and quantify typical organisms for that site, in South Water Caye, Belize. (A caye is a soft sand island formed from a coral reef; these are common in Belize).

The transect was at the same location where my mother had conducted a marine biology experiment in June of 1979. I had the opportunity to travel to the same island 30 years later, also in June, which presented a unique opportunity to conduct the same research, during the same season, in the identical area.

Since this area of Belize is not frequented by tourists, the results found should reflect the overall condition of the reef which would be due to environmental stresses. There have been several factors which have affected the corals of Belize including Hurricane Mitch (1998); White band disease and



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coral bleaching (Bright, 1998, Aronson et al, 2002), some of which may be attributed to an overall increase in water temperature throughout the Caribbean. The ocean temperatures in July 2009 have reached their highest average and coral bleaching has been reported throughout the reefs in the Caribbean (Borenstein, 2009).

From this research material, I hypothesized that there would be an overall decrease in the number of coral species since 1979 along this transect. My procedure followed the same format as the 1979 study except that I focused primarily on common coral species, listed under the results. I measured the length at different zones and depths, tested for temperature, pH and nitrite concentration. The corals were identified, photographed and counted within each zone for comparison.

Results:

My data showed an increase in temperature and pH, which agrees with the literature and an overall decline in the *Acropora* species that made up much of the framework in 1979. There was also a decrease in other coral species as well as a decrease in the biomass as identified in the map. Surprisingly, there was an increase in biodiversity in the coral rubble and coral boulder zones; several more species of corals were identified but fewer in total.

White scroll algae were predominant throughout the reef and a noticeable decline in their major predator, the black spiny sea urchin (*Diadema antillarum*) was also noted. Some bleaching was noticeable on *Acropora cervicornis* and *Porites porites* corals and possible white band disease on several of the *Montastraea annularis* coral heads. Soft corals were abundant and appeared healthy and numerous. Although there was a greater number of coral species identified, the noticeable decrease in density of the larger framework species (*Acropora cervicornis*, *Acropora palmata*) and increase in algae suggests that this reef is showing signs of stress and it should be closely monitored.