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## Coral Reef Ed-Ventures: An Environmental Education Program for School Children in San Pedro, Belize

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# ENCOUNTER

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## Coral Reef Ed-Ventures: An Environmental Education Program for School Children in San Pedro, Belize

### Introduction and Overview

The well-documented global decline of tropical coral reef ecosystems has sparked numerous surveys and many research projects, large and small, conducted by marine scientists over the past decade. Many, if not most, reef scientists live far from their reef study areas. On the long flight home following yet another reef survey or research trip to a distant tropical location, one might suspect that many readers of *Reef Encounter* have had thoughts like "hmmm... my next journal article is coming out in the upcoming issue of *Coral Reefs*; the big field survey is done but the report deadline is looming; I've just got to write a new grant proposal... *and, I wonder if anybody living in the community adjacent to my reef study area knows or cares about any of this.*" As environmental scientists, we know that processes of global extent are affecting coral reef ecosystems, but we also recognize that local community stakeholders can and will have a big effect on the future health of individual reef systems. So, the question is, are we as scientists doing enough to share our research findings and make our knowledge available to the people of tropical communities adjacent to reef ecosystems?

Our answer to this question was - "no, but we can do something about

it!" At Smith College, our experience in Belize began in the mid-1980s with field trips sponsored by the Five-College Coastal and Marine Science Program. However, it was our participation in the Atlantic and Gulf Rapid Reef Assessment Program (AGRRA) that added focus to our Belize research and caused us to think that we really could do more. In 1999, we initiated AGRRA surveys on the Mesoamerican Barrier Reef in south-central Belize and off Ambergris Caye in northern Belize. Our Ambergris surveys brought us in close contact with Mr. Miguel Alamilla, Jr., the Manager of the Hol Chan Marine Reserve in San Pedro. With this connection, Professors Al Curran and Paulette Peckol envisioned developing a marine environmental education program for the local school children. They then recruited Professor Susan Etheredge of Smith's Education & Child Study Department to join in the effort and contribute her expertise in inquiry-based science education for children.

The result of this collaboration is Coral Reef Ed-Ventures, an educational program for school children designed to increase awareness of the environmental and economic benefits of a healthy reef ecosystem. Smith College undergraduate students with backgrounds in coral reef science and education serve as the teachers for the program, with close supervi-

sion by the Smith faculty team. The program was launched in June 2000 when two Smith student teachers initiated the program for just seven local student participants. From this modest beginning, the program has grown significantly in both number of students and community support. In summer 2004, our fifth year of operation, over 60 students, ages 7 to 11, attended each day of the two-week program conducted by the five Smith student teachers.

### The Coral Reef Ed-Ventures Curriculum

The intent of the Coral Reef Ed-Ventures curriculum is to teach children what an ecosystem is, and, specifically, to guide them in developing an understanding of the coral reef ecosystem. The focus is on understanding the needs of a healthy reef, how various organisms interact with the reef, the threats to the reef, and how to protect the reef ecosystem. The following questions drive our curriculum development and instruction:

- What is an ecosystem?
- How is the coral reef an ecosystem?
- What are the needs of a healthy reef ecosystem?
- How do various organisms (including humans) interact with the coral reef ecosystem?

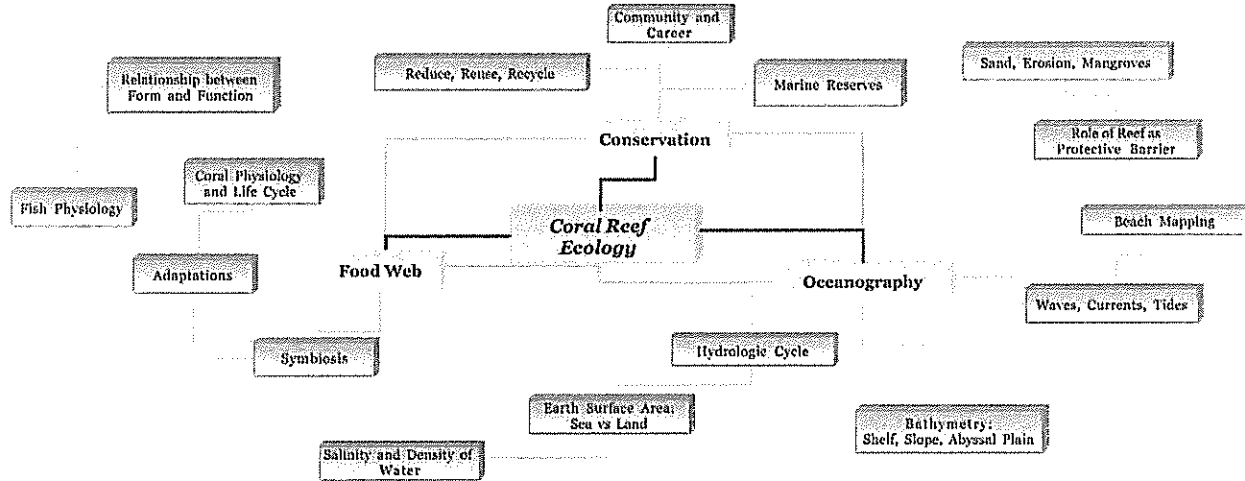


Figure 1. Concept map for the Coral Reef Ed-Ventures Program.

- What are the threats to this ecosystem?
- Why do we need to protect our coral reef ecosystem?
- What can I do to protect the coral reef? What can my community do?

The curriculum (see Figure 1) engages the children in active, hands-on classroom and field trip-based learning experiences. We visit local fisheries; explore and study beach, reef, and mangrove habitats and pursue in-class experimentation and demonstration. Our instruction teaches reef science through a multi-disciplinary approach that includes literature, the visual arts, crafts, and the performing arts. Some of the favorite activities of the children as well as our Smith student teachers are coral polyp "puppets" (purple rubber gloves with zooxanthellae dots); turtle hurdles (an outdoor game); acting out the foodweb; the night-time feeding the polyps dramatization (to illustrate the feeding habits of coral); producing a mural that represents reef ecology; making art from trash; and calculating the dollar value of the reef. Read aloud, songs, and games are favorite parts of each day. Children keep their own science journals, write and perform plays ("The Barracuda and the Zooxanthellae" is a recent one), write

poetry about the reef, and create t-shirt designs and conservation posters for the Hol Chan Marine Reserve. The daily participation of the Hol Chan Marine Reserve Education Coordinator and visits by Hol Chan rangers and other community members involved in reef-related activities, such as fishing, tourism, and sport diving, provide career examples and greatly enrich the program. More information about the structure and content of the curriculum can be obtained from Professors Curran and/or Etheredge.

#### Teacher Workshops

In addition to the two-week activities-based program for school children, we have expanded Coral Reef Ed-Ventures to include a program of teacher workshops. The primary objective of our 1- to 2-day teacher workshops is to integrate exploration and understanding of the local environment, specifically the Mesoamerican Barrier Reef, into the existing mandated curricula of the Belizean school system. In 2004, the Coral Reef Ed-Ventures team conducted our largest teacher workshop yet, attended by all 28 teachers from the San Pedro R.C. School, the only public elementary school on Ambergris Caye.

Beginning with a beach walk to

illustrate how much can be learned right outside the schoolhouse door, teachers discussed how exploring the local environment with their students can integrate all areas of the curriculum in active and engaging ways:

- The language and visual arts: listening, thinking, writing, communicating, creating, and constructing.
- The skills of science: observing, questioning, researching, hypothesizing, and experimenting.
- Mathematics: problem solving, measuring, classifying, and calculating.
- The social studies: becoming knowledgeable about the local community, developing a sense of stewardship, and exploring career possibilities and options.

Additionally, teachers explored the natural and human processes that created and continue to shape Ambergris Caye and the reef and addressed these processes through lessons in geology, biology, ecology, and economics. Discussions also addressed similar challenges that teachers in both the United States and Belize face, such as teaching the specifics students need to pass the required standardized tests while still teaching

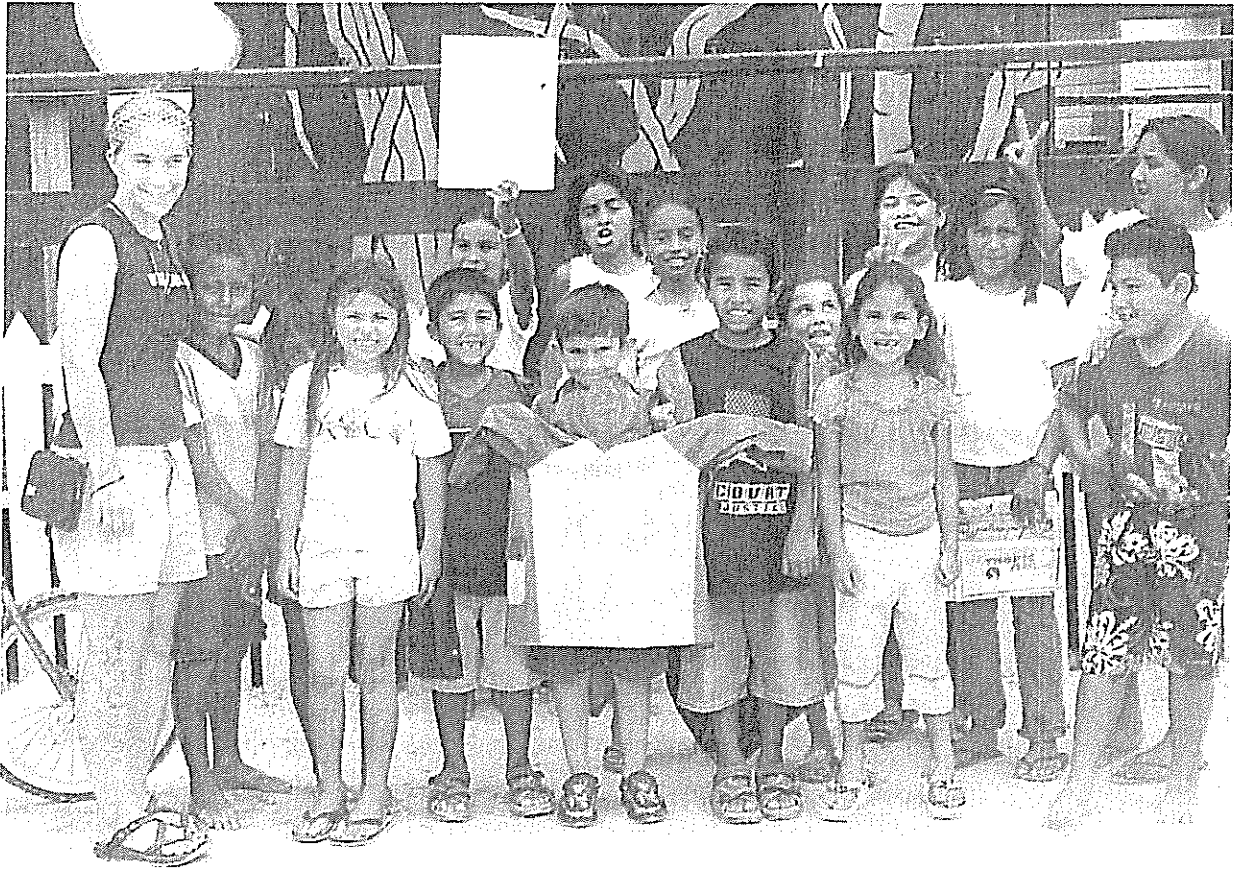


Figure 2. Coral Reef Ed-Ventures students and Smith College student teacher “Miss Erica” thank the community of San Pedro, Belize for support of the program in summer 2004. Photo by Emily Tynar.

them the critical skills they will need to think creatively and independently and apply what they know to new situations. In their evaluations of the workshop, participating teachers commented that they discovered ways to integrate materials from the reef into their curricula and noted the variety of ways that workshop activities could be adapted for any age group. Many expressed their eagerness for extended workshops in the future.

#### Conclusions and Future Goals

By the end of the Coral Reef Ed-Ventures program, the students are able to demonstrate significant knowledge of the Mesoamerican coral reef envi-

ronment and can identify many reef organisms and discuss their habits, adaptations, and symbiotic relationships. The program ends with a gala graduation ceremony held at the local Lion’s Club pavilion in the center of San Pedro and is well attended by student families. As part of the ceremonies, the students present skits based on their newly developed knowledge of the coral reef ecosystem. Each child who successfully completes the program receives a “coral expert” card signed and presented by Mr. Miguel Alamilla, Jr., Manager of the Hol Chan Marine Reserve.

Feedback from the San Pedro community has been highly positive regarding the program. It is inspiring

to witness the children’s increased awareness, knowledge, and excitement about the local marine environment and to observe it penetrate the San Pedro community. Furthermore, we are gratified that community involvement and support for the program has increased each year. An ongoing goal is to strengthen links with other reef ecosystem conservation efforts in San Pedro, such as the work of Green Reef and its Peace Corps volunteer, and the year-round educational efforts at Hol Chan, under the direction of Cordelia Shal and with the assistance of the Hol Chan Peace Corps volunteer. This year several students from Guardians of the Reef, a newly formed high school environ-



Figure 3. Belizean children from San Pedro conduct a beach mapping exercise with Coral Ed student teacher.

mental club started by the Hol Chan Education Coordinator and the Peace Corps volunteers, served as interns in our Coral Reef Ed-Ventures program. These interns were a valuable addition to the program, and we plan to expand their role in the program. The children of San Pedro, Belize are the future leaders of their community and, by extension, are front-line guardians

of the Mesoamerican Coral Reef Ecosystem.

#### Acknowledgments

We are indebted to our initial two student teachers, Catya Harrold and Kate Buckman, for their pioneering work in the San Pedro community and to all of our Smith College student teach-

ers who have followed their lead. We thank Miguel Alamilla Jr., Manager of Hol Chan Marine Reserve, Cordelia Shal, Education Coordinator at Hol Chan, and the Peace Corps volunteers in San Pedro for their strong and continuous support of our program. Finally, we are grateful to the island school principals, Roxani Kay, Lydia Guerrero, and Frank Nunez, for their





Figure 4. Children on a glass-bottom boat ride view a part of the Mesoamerican reef. For most, this is a first look at the reef that lies immediately offshore from their community.

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