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Cover photograph – “Little Ricky” - juvenile dolphin, San Salvador, Bahamas (courtesy of Sandra Voegeli, 2003)

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CELEBRATING BIODIVERSITY – 2002 CONSERVATION EDUCATION: A RESPONSIBILITY OF HIGHER EDUCATION

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ABSTRACT

Environmental degradation is, unfortunately, widespread in the Bahamas, as elsewhere in the Caribbean region. Population expansion and concomitant development continue to threaten sensitive environments. Intensified scientific research and public and decision-maker education are needed at a national level. However, we must also convey a conservation message to those most likely to impact sensitive ecosystems—the local communities. These communities are in the best position to ameliorate problems and safeguard their environments. Without effective local education, well-intended conservation programs can quickly be rendered futile. Believing that the greatest impact will be left with the next generation, we developed an innovative, hands-on experience for the educators and students of San Salvador Island. In April 2002, all children from grades 4-10, and their teachers, participated in one of three, one-day programs titled Celebrating Biodiversity 2002, funded by the Disney Conservation Program and hosted at the Gerace Research Center. Following an introductory multimedia presentation, each of the ca. 150 participants spent a full day engaged in three primary activities that groups rotated through. One involved a boat trip to visit the endangered iguanas on Green Cay and the nearby seabird colonies; the majority of participants had never visited an offshore cay nor seen a live iguana. A second activity provided hands-on learning about research tools at a mock field camp at the GRC. Participants became acquainted with ra-

diotelemetry, optics, a laser thermometer, data loggers, calipers, and other data-collection methods. The highlight was “burrow-scope” examination of an imitation iguana nest, and subsequent discovery that they had “trampled” a nearby nest. The third activity comprised hands-on discovery of the island’s rich biodiversity (invertebrates, plants, seabirds, reptiles), and included a transect survey to estimate land crab burrow density. At the end of each day, we gave participants a t-shirt, a certificate, and a challenge to become better-informed stewards of their unique but fragile ecosystems. We believe that our program serves as a model education program for a nation seeking to develop a stronger conservation ethic, and challenge other visiting researchers to similarly reach out to local communities.

INTRODUCTION

Education is central to the protection and reestablishment of self-sustaining ecosystems. The need for education is particularly urgent for those stakeholders living near or within ecologies in crisis. In this article, we call upon researchers and academics, especially those who conduct studies and classes within the islands, to develop new ways to contribute to conservation education efforts in the Bahamas (Fernandez-Juricic, 2000).

The Workshop

In April of 2002, iguana researchers from Loma Linda University and the Gerace

Research Center, funded by the Disney Foundation, conducted a one-day biodiversity workshop on San Salvador Island for approximately 130 students and their teachers. The full day workshop was repeated three times to accommodate the diverse educational needs of students grades 4-9 and to create ideal group sizes for the various hands-on activities.

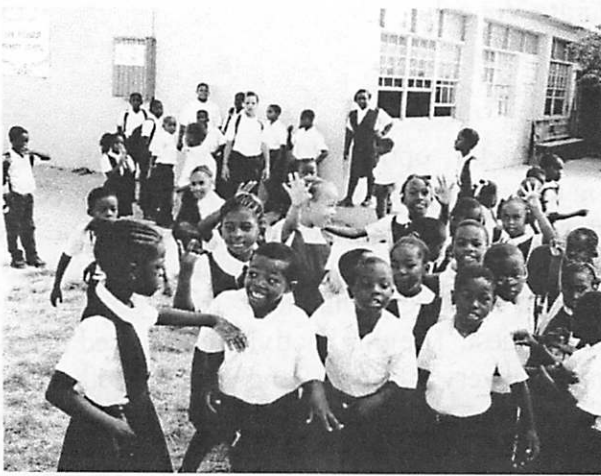


Figure 1 School children boarding the GRC bus.

Students, approximately 50 per day, were bused from the two San Salvador public schools to the Gerace Research Center. Each daily workshop consisted of four sessions: (1). Introduction to biodiversity, (2). Green cay boat trip to observe iguanas and their habitat, (3). Iguana camp research, and (4) Activities experiencing biodiversity.

The *Celebrating Biodiversity 2002* workshop was designed to provide hands-on experiences that would introduce students to the many ways to value and measure biodiversity and the importance of biodiversity to the long term person and economic health of the Bahamas. During the workshop introduction, puppets, videos, and nature slides were used to stimulate students to explore levels of biodiversity ranging from genes to ecosystems. Much of the data and examples presented were from studies published on San Salvador plants and animals. Students and local teachers were particularly impressed with the large number of endemic organisms to San Salvador, mostly

plants and invertebrates, but including several reptiles.

The workshop emphasized the beauty and special importance of the ecosystems in which the students live. Two repeated themes throughout the day were (1) reasons why students could take pride in their homeland and (2) that they are ultimately responsible for protection of their ecosystem. In simple ways we presented principles of environmental ethics and conservation economics and addressed practical means by which students could help protect their local environment and its biodiversity.

The students particularly appreciated a report of conservation activities conducted by fellow classmates and boyscouts. After hurricane Floyd, the devastating storm of 1999, much of Green Cay's (an offshore islet) iguana nesting habitat was washed away. Volunteers from San Salvador's Boy Scout troop, under the leadership of Don Gerace (Chief Executive Officer of the Gerace Research Center), assisted us in habitat restoration efforts. Seven young men



Figure 2. Habitat restoration with Boy Scouts from San Salvador, Island.

spent many hours carrying heavy buckets of sand from the intertidal zone to nesting sites high on the cay to replenish soils lost during the hurricane. The sense of pride and stewardship engendered among these volunteers has been measurable and significant.

After the introductory session, participants were divided into three rotating groups that would experience the three major activities throughout the day. One activity greatly en-

joyed was the boat trip to Green Cay. In this session, many of the students and staff saw rock iguanas for the first time. For some it was their first trip to an outer cay in which they could see sea birds and other small island creatures in relative absence of human disturbance.

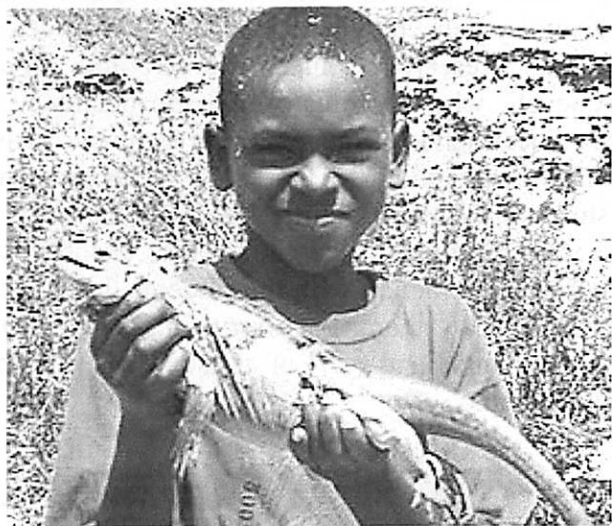


Figure 3. A student taking pride in a unique Bahamian treasure.

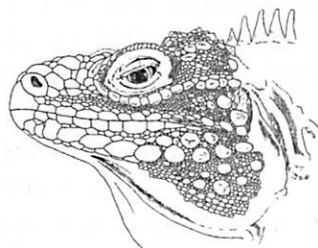
Another session brought students to a simulated "Iguana Research Camp," which was established in the center field of the Field Station. All the equipment needed to camp long-term on an outer cay and to conduct conservation studies on iguanas and seabirds was set up. Students were introduced to the principles of data collection and treatment of organisms. Accurate and detailed field notes and the respectful care for all living organisms were emphasized. The importance of taking body measures, DNA sampling, and mark-and-recapture procedures was demonstrated. Biodiversity at the individual level was addressed and reasons to appreciate the individual differences that each organism held innately was discussed. Participants especially enjoyed learning how to find plastic model iguanas outfitted with transmitters and radio collars. For some, the most poignant moment came when they were able to use a "burrow-scope" to investigate a simulated iguana egg chamber constructed at the edge of the Research Center's grounds. Even though many participants knew that the eggs were only store-

bought chicken eggs, they were dramatically impacted when one of us, on cue, stepped off-trail and collapsed a hidden, simulated nest. Students then investigated the destruction that can occur when humans (researchers and local inhabitants) walk around iguana nesting areas during the nesting season. The impact on the students was palpable.

The focus of the third session was to experience biodiversity through sampling approaches. Students constructed transects and calculated diversity and abundance measures. In addition, they visited displays on the diversity of life set up for them in the Center's library, museum, and in the seawater room. Students were encouraged to handle specimens (preserved and alive) and to ask questions. During this session, color digital pictures were taken of each student and staff, and color photos were printed at the end of the day to emphasize the significance and beauty of diversity at every level, including the special uniqueness of each human individual.

Display-quality certificates of completion and t-shirts were given at the end of the day to each participant completing the four sessions. Mr. John Bendon, an artist and iguana conservationist, donated artwork for the t-shirts. Two of his iguana drawings were used boldly on the red-and-black t-shirts to declare the message that we all need to help protect our environment and specifically to protect the endangered rock iguanas.

The Endangered
San Salvador Rock Iguana
Cyclura rileyi rileyi



Needs Our Protection!

Figure 4. Bright-red T-shirts with black figures were a hit with the Bahamian students.

The success of *Celebrating Biodiversity 2001* was assessed by a post-session conducted

on the fourth day in which teachers and administrators met at the Gerace Research Center for additional information on conservation issues. The teachers reported student appreciation and academic excitement from their students. Some young people expressed new interest in becoming scientists. Others said this event was the highlight of their school year. It was particularly rewarding for us to note that teachers detected among the students a new level of local pride and a determination to help in the survival of the organisms around them. The Head Principle of the local middle school embraced the workshop fully and invited us and other researchers and visiting educators to interact more with the public schools in the future.

Disney Grant

Financial support for the *Celebrating Biodiversity 2002* workshop was provided by the Disney Foundation. A Disney grant of \$20,000 was given to Loma Linda University, Department of Natural Sciences, to support iguana conservation research and to provide conservation education to local residents. Approximately 1/3 of the grant was dedicated to support for the biodiversity workshop. The remainder of the grant was used to fund iguana nesting site restoration on hurricane-ravaged Green Cay and ongoing iguana behavior ecology studies. The budget for our biodiversity workshop was \$6,600. The largest non-travel expense for the workshop was the quality t-shirts. The cost of 140 shirts printed and transported to the Bahamas was \$1,120. While this expenditure was appreciated by all participants, the educational experiences provided were not dependent on this gift. More than four thousand dollars was spent to bring six researchers to the biodiversity workshop. Their participation as lecturers and student supervisors in the field was essential to the success of the workshop. These funds directly benefited our iguana conservation efforts since these workshop travel monies were used to coincide with our spring data collection season. In addition to shirts and travel, workshop costs included \$200 for producing personal photos for each student during the workshop,

certificates of completion (with gold Loma Linda University seals), food and lodging during the workshop and round-trip boat trips between San Salvador Island and Green Cay.

Celebrating Biodiversity 2002 was successful primarily due to its staff and support personnel. We acknowledge the invaluable help given by Vincent Voegeli - Executive Director, Gerace Research Center Director, and Sandy Voegeli, who coordinated logistic details with the local schools and provided valuable assistance in planning the workshop. Our graduate students, Naomi Balduff, Jeremy Johnson, and Tony Trimm, provided enthusiastic lectures and positive interaction with the students throughout the day. We thank Pat Barry for her contribution as nurse and clerical assistance during the workshops.



Figure 5. Sandy Voegeli with friend.

Purpose

The primary motivation for conducting this workshop came from our desire to “give back” and from our commitment to education. For more than 10 years we have studied *Cyclura rileyi* in its natural setting and have delighted in the privilege afforded us, not by birthright, but by permission, to study the fascinating biodiversity of the Caribbean. The people of the Bahamas, its government, and the Gerace Research Center have been supportive colleagues and hosts. For these reasons and because of our pas-

sion to study iguanas, we appreciate the privilege to conduct research in the Bahamas and wish to contribute to the larger issues of conservation through participating in local conservation educational programs.

We fully support the widely held notion expressed by Feinsinger, *et al.* (1997) who aptly stated that the "last best hope" for a sustainable biosphere is an ecologically literate public, and therefore a partnership between ecologists and educators may be the best hope.

We invite the many visiting colleges and universities that use research and teaching facilities in the Bahamas to assist in island conservation efforts. We recommend that those groups that regularly come to the Bahamas take responsibility for finding new ways to assist in-country conservation efforts. Most specifically we ask for researchers and professors to provide educational assistance to family island schools, particularly those islands that are near where research and teaching is conducted. Many colleges and universities have provided books and other publications (i.e., reprints of publications, dissertations, copies of grant proposals, and reports of research and class projects). We encourage the continuation of these efforts and propose that, as institutions of higher education come to the Bahamas for research or field teaching, a renewed interest in contributing to the education of the island residents be considered. Schools may consider inviting Bahamian students who have special interests in science to attend lectures and/or field trips, or to give selected lectures/presentations open to the public, specifically to local students. Our experience with the Boy Scouts and other volunteers has been rewarding and we recommend such activity as one useful way to involve and encourage young minds.

We are convinced that an ecologically literate public is needed to understand the mutual dependency of nature and the necessary steps required to protect and manage fragile ecosystems. More effective ways need to be developed to communicate new environmental knowledge to all stakeholders. The greatest success in this effort may come from interdisciplinary approaches where economists, basic sci-

entists, ecologists, and education specialists work together to inform politicians, the business community, and local residents of the great need for and benefits of a conservation-minded society. The role of higher education is essential, especially as the need for greater communication among specialists and society increases. It is to this end that we recommend greater educational support for local Bahamian schools and populace. Environmental education in the Bahamas in the past and more so in the future will benefit by partnering with and empowering existing teaching and policy-making groups. Zoos, zoological gardens, aquariums (Whitehead, 1995; Marcellini, 1998), conservation groups (e.g., IUCN, ISG, NGOs), Colleges and Universities, and Government Ministries and Departments are effective vehicles for addressing biodiversity and conservation issues. In the Bahamas, civic clubs talk radio shows and churches play a significant role in the island's social fabric and should be enlisted into the ongoing conservation education process (Fernandez-Juricic, 2000). These institutions should be informed by and coordinate with the existing biodiversity and conservation educational initiatives ongoing in the Bahamas and throughout the Caribbean.

The Gerace Research Center, in our estimation, is an ideal institution to begin new creative partnerships between visiting institutions of higher learning and the local Bahamian people. They have already shown support through programs such as their initiative to exchange room and board charges for researchers who come from Universities that will provide tuition for qualified Bahamian science students.

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