

Sapodilla Cayes Research and Management Priorities Workshop **May 15-18, 2005**

A workshop in Punta Gorda, Belize was held to identify how best to focus a field research program to support local management efforts for the Sapodilla Cayes Marine Reserve (SCMR). These proceedings present the research priorities as discussed by stakeholders and scientists. Based on these priorities, scientists have developed a multi-species comprehensive field research project to investigate management issues and factors influencing the SCMR. A dissemination network was discussed, and collaborations between local, national, and international scientists and educators were discussed as a way to build local capacity for community members, stakeholders, and local agencies.

The results of the workshop also provided Earthwatch Institute with a basis to develop its strategic plan for the Belize Conservation Research Initiative (CRI) through research, education and public engagement.

Background

The Sapodilla Cayes form an important complex of reefs and cayes at the southern end of Mesoamerican Barrier Reef. Designated as a Marine Reserve and a UNESCO World Heritage Site in 1996 because of their extraordinary natural value and socio-economic significance, the Sapodilla Cayes Marine Reserve (SCMR) is currently co-managed by the Department of Fisheries and the Toledo Association for Sustainable Tourism and Empowerment (TASTE). A draft management plan has been produced and is due to come into effect shortly. The plan identifies certain key issues and goals pertaining to the Sapodilla Cayes Marine Reserve (SCMR) that need to be addressed.

In May 2005, the Toledo Association for Sustainable Tourism and Empowerment and the Sapodilla Cayes Marine Reserve (TASTE-SCMR) and Earthwatch Institute convened a workshop which brought together key stakeholders, scientists and research organizations to prioritize issues pertinent to the SCMR, including those most important to a sustainable environment and to formulate research questions that addressed these issues.

Thirty-five individuals representing 19 organizations participated in the workshop from May 15-18 at the Sea Front Inn in Punta Gorda, Belize. Representation included local researchers, managers, landowners, high schools, community representatives, governmental agencies; local and international universities, research institutions, non-governmental conservation agencies, and international experts in conservation research (see Appendix A).

Following the workshop, Earthwatch Institute reviewed the list of potential issues and research questions identified by workshop participants and began to narrow down the list to those Earthwatch felt it could support with its model of volunteer-based science, as detailed in this document.

Workshops Aims

The aims of the workshops were to work with local community leaders, local and international researchers, conservation workers, and government management representatives to:

- ❑ Generate a prioritized list of critical environmental issues facing the Sapodilla Cayes Marine Reserve and identify those for which research and monitoring data and analysis are critical.
- ❑ Identify existing and/or needed research and monitoring projects that address the priority list of environmental issues and that would contribute toward a management plan, policy or intervention.
- ❑ Work with Earthwatch scientists and others to generate research projects that Earthwatch could start supporting in 2006 and that fit the needs assessment done above.
- ❑ Develop a plan for local engagement and capacity-building.

Agenda

On Sunday, May 15, participants visited the Sapodilla Cayes to see potential sites for the research station and snorkelled and dove to determine potential field research sites.

The workshop began on Monday, May 16, at the Sea Front Inn in Punta Gorda with a welcome and introduction to the workshop by Jack Nightingale of TASTE and Dr. Mark Chandler of Earthwatch. Mr. Nightingale then gave a presentation of TASTE-SCMR and issues facing the area.

TASTE was created in 2000 to co-manage the SCMR and is working to implement the newly revised SCMR Management Plan. This plan has five main goals and objectives:

1. Develop sustainable fisheries in the SCMR
2. Manage tourism within the SCMR's carrying capacity
3. Conserve and protect the biodiversity and habitat of the SCMR
4. Address uses and activities outside the SCMR that affect the marine reserve
5. Ensure proper administration and implementation of the SCMR Management Plan

Mr. Nightingale raised the issue that this management plan must be put into law in order to enforce the proposed "zoning plan". He also pointed out that the SCMR management plan should account for the need of economic return for stakeholders.

Dr. Celia Mahung gave a presentation about the University of Belize program in Toledo district, followed by a presentation by Dr. Mark Chandler about Earthwatch's Conservation Research Initiative program in Belize.

Participants then discussed environmental issues in the SCMR, using the SCMR Management Plan's five priorities as a guide. During the discussions, capacity building was identified as a sixth priority issue that needed to be developed.

In the evening, Arlenie Pérez of the University of Belize (UB) gave a presentation about their Natural Resource Management program and a discussion ensued about ways that international support for the UB program could be developed.

Tuesday, May 17, began with a presentation of the TASTE-SCMR monitoring plan by Jocelyn Finch. She discussed need for baseline monitoring, which has not occurred due to staff turnover and a lack of a formalized monitoring plan and centralized database accessible to multiple users. Based on the SCMR Management Plan, Ms. Finch has helped develop a baseline monitoring plan for sea turtles, caye birds, conch, lobster, fin fish, disease and natural phenomena, mangroves, coral reef, sea grass, caye vegetation, water quality, meteorological data, and

recreational activities. She also discussed the possibilities of collaborations among organizations, the need for training of local data collectors, and the need for an advisory body to connect research to management.

Tuesday morning also featured Reef Conservation International's (ReefCI) program and goals by Polly Wood; a presentation of the use of volunteers in research by Dr. James Crabbe of the University of Reading; research concerning marine management areas by Dr. Les Kaufman of Boston University; research concerning the effects of environmental and historical events on the evolution of fish by Dr. Phillip Lobel of Boston University; and the use of Earthwatch volunteers in research by Dr. Mark Chandler.

In the afternoon, the primary stakeholders together identified a series of key research questions that would address the priority issues listed on Monday (see Appendix B), including identification of possible local and international researchers and funders. There was also discussion about who would benefit most from capacity building opportunities that would be created by such a research program. A breakout session of two groups followed; one group discussed which projects and scientists should be the focus of Earthwatch support for the upcoming year; the other group discussed how best to ensure that research projects and their outcomes result in management plans and activities. Discussion focused on the possibility of creating a "solutions and mitigations" advisory body for TASTE-SCMR, and how best to get the SCMR management plan into law.

On Wednesday morning, May 18, the research questions were further developed, and engagement of local people and organizations was discussed. It was recognized that the outcomes of many of the research questions were long term. The need was recognized to develop a research project that could deliver meaningful information back to stakeholders in a shorter term so that they remained engaged in the process. Moreover, it was deemed important to outline what sort of capacity building should occur. Scientists then evaluated needs and resources available for research projects, and tentatively planned on submitting four preliminary proposals.

Outcomes

I. Research

The first outcome of the workshop was the refinement of the research and management goals as outlined by the SCMR Management Plan. This produced a long list of issues facing the Sapodilla Cayes (available upon request).

Stakeholders then produced a prioritized list of the issues from which a series of research questions was produced (see Appendix B & C). It was thought important to focus research on 4 key areas:

- Sustainable fisheries
- Tourism capacity and impact
- Key biodiversity and habitats
- Understanding (pollutant) impacts from outside the reserve

Within each of these areas, participants listed a series of potential key study areas and specific questions (Appendix C). Beyond the specific questions and needs, more integrated questions were also identified. Examples of such research programs included:

- Relationship between water quality and flux data for coastal rivers and runoff and the water quality in the Sapodilla Cayes Marine Reserve.

- Development of a comprehensive ecosystem-level modelling effort to understand the impact of more specific management programs which focused on single species or threats (lobster, species removal)

One research program was further expanded based on the needs identified by stakeholders. A research program was proposed that would look to link SCMR “health” through the viability of three species (conch, lobster, grouper), each with different recruitment life cycles, and the two key habitats they depend on (coral reefs and sea grass). It was felt that such a research program would encompass the majority of threats and dynamics occurring in the SCMR thereby providing a tool that would help manage the SCMR at the same time as targeting species that were identified by stakeholders to be of highest interest. The program would examine multiple facets of influences on each species, such as population dynamics, larval retention, water quality, anthropogenic factors, socio-economics, etc, to develop a comprehensive view of the impacts and management issues facing the SCMR.

Researchers then discussed a specific set of questions that they would lead that would fit into this three-species-two habitat research program. These projects included:

- Recruitment and survival of coral reefs in marine management areas Dr. James Crabbe;
- Coral reef growth and repair by Dr. Les Kaufman and Burton Shank;
- Queen Conch and Lobster population dynamics by Dr. John Cigliano, focusing on population densities and movement; and spawning, feeding and nursery sites;

Other research questions are also currently in development on the status and population dynamics of top fish and elasmobranch predators.

Generally, the participants were satisfied that the group had managed to distill down a long list of potential questions into a more coherent program of individuals projects that addressed a common set of questions.

Upon reflection, the group recognized that many of the research questions would provide many of their results in the longer term, but that it would be important to develop a project that provided results back to the stakeholders in the short term. The participants identified the queen conch research program as the project most likely to provide immediate results to stakeholders.

The scientists also discussed research and dive equipment needs for the proposed Living Reef Center to be built by Earthwatch Institute and University of Belize on Hunting Caye. They also expressed the need to share monitoring protocols with local partners, including those by CARICOM, WCS, and MBRS; and of monitoring data, such as a geo-reference photo mosaic of the area, currents, temperatures, turbidity, sedimentation, and tides.

Over the following months, Earthwatch will work with the scientists to develop these projects, with the goal of starting a conch survey project in the immediate future, and the medium to long term projects to start within a year.

II. Management

An important outcome of the workshop was the recognized need for a mechanism to ensure that research is linked to management priorities and action as identified by stakeholders. On Tuesday afternoon, options on how to carry this out were discussed. Ideas included the development of an ad hoc science committee dedicated to linking research and management of the SCMR. One possibility was to use the current SCMR advisory committee to serve this need, another possibility was to have TASTE-SCMR serve as the body to carry out actions.

Various roles were discussed for the advisory body including:

- a. Serve as a clearinghouse for all projects where information was available about what research had historically occurred or was currently underway
- b. Help strategize how the SCMR could benefit from research programs that were only of short term duration and/or based outside of Toledo
- c. Serve as the point of contact to TASTE-SCMR when researchers first apply to work at the SCMR through the permitting process with the Department of Fisheries, and again, at the mid-point or end of their program when they have results to share
- d. Work with researchers design their research to maximize outcomes relevant to the local community.
- e. Help researchers design and support the dissemination of research outcomes to maximize the impact of the research for the SCMR
- f. Assist with local capacity building by supporting a science officer or outreach coordinator
- g. Serve as a liaison with TRIGOH

There was a concern that TASTE lacked the resources, both in terms of capacitated personnel and time to create an effective advisory body. There was some reluctance to push the creation of an advisory body until the SCMR Management Plan is signed into law.

In order to make any solutions and mitigation in the SCMR effective, all present agreed that the most pressing need is to work on getting the SCMR Management Plan signed into law so that zoning in the reserve can be enforced.

III. Information Dissemination

Information dissemination was discussed as an outcome need, to be readily available to the local and international communities. Key audiences identified for dissemination were the following: Department of Fisheries, TRIGOH, TASTE, University of Belize, all regional conservation and science NGOs, communities, government, and world access, to be reached through personal communications and involvement, the web site, scientific meetings, scientific publications, radio programs, and local TV. The need for a local library to house all research for the area, located on the mainland, was also discussed.

IV. Capacity Building

A major outcome of the workshop was the identification of audiences to engage in capacity building. These included: UB students, local fishers, park staff, tour guides, TIDE, TASTE, SATIIM, Friends of Nature, government officials (both local and national), TRIGOH, school children, high school environmental clubs, educators, and corporations such as FYFFES, CHIQUITA, and DOLE.

There is also a tri-national engagement component of the SCMR that needs to be developed, involving Guatemala and Honduras through the Tri-national Alliance for the Conservation of the Gulf of Honduras (TRIGOH) and the universities that are involved with it, especially in realm of aquaculture.

The University of Belize will engage participants in educational aspects. Boston University, Cedar Crest College and the University of Reading are developing relationships with the University of Belize to promote education and capacity building through activities such as mini-courses, internships, fellowships, and workshops.

Earthwatch Institute will also engage audiences through their fellows program. Local and regional community members, such as fishers, farmers, educators, policy makers, industry

leaders, etc. will participate in Earthwatch projects to gain hands-on experience in research in their local area. National and international fellows such as educators, artists, and international industry leaders will also participate in the projects. There may also be opportunities for research assistants and interns presented through Earthwatch.

Community engagement will be a major outcome of the research supported in the Sapodilla Cayes. Participants in projects in the SCMR will bring the knowledge home with them, to share with friends and family, or more formally in school and community presentations. An engagement model of Friends of Nature was discussed as a possible activity, in which an education coordinator turns scientific research results into a community presentation, and then presents it to five local communities.

In addition, people will become engaged in projects in other ways, such as employment as dive masters, boat drivers, and assistants, through which they will be involved in research. Participants would also like to see the public engaged to learn more about fisheries laws. Beyond being involved as fellows, fishers will also have the opportunity to engage with research projects by sharing their local knowledge with researchers and reporting any catches with identification tags.

Conclusion

During this workshop, the community, stakeholders, and local organizations associated with the Sapodilla Cayes Marine Reserve expressed the priority need to study the sustainability of the fisheries of the SCMR. In response, local and international scientists have created a multi-species, comprehensive field research project to begin to determine the state of the fisheries and ecosystem, and the factors that influence it. The ultimate goal is for the research to enable local organizations to manage the Sapodilla Cayes Marine Reserve natural resource more effectively.

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Appendix A

Participant List

Research and Management Priorities Workshop for the Sapodilla Cayes
Sea Front Inn, Punta Gorda, Belize
May 16-18, 2005

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Appendix B

Priority Research and Management Topics

Based on Sapodilla Cayes Marine Reserve management plan goals

Workshop in Punta Gorda, Belize

May 16-18, 2005

Community Generated List of Priority Research Topics

1. Develop sustainable fisheries in the SCMR

- What is the status, ecology and sustainability of Queen Conch and lobster?
- What are the impacts of various marine management programs on multi-species fisheries and ecosystems?
- What is the socio-economic value of the ecology (and fisheries) of the SCMR?

2. Manage tourism within carrying capacity of the SCMR

- What is the tourism potential and carrying capacity of SCMR?
- What are key activities and marketing to develop sustainable tourism in SCMR?
- What is the financial impact of tourism for the SCMR?

3. Conserve and protect biodiversity and habitats

- What are critical factors to monitor for a baseline study of SCMR?
- What is the health and ecology of the coral reef?
- What is the status and role of top predators?
- How is water quality of the SCMR and what are the major factors influencing it?
- What are the water currents affecting the SCMR?

4. Address uses and activities outside the SCMR

- Where do the major environmental impacts to the SCMR come from?
- What are the mitigation measures needed to reduce impacts?

Community Generated List of Priority Management Topics

5. Ensure proper administration and implementation of SCMR management plan

- Need about \$BZ 500,000 /yr to manage protected area

6. Capacity building and training

- TASTE-SCMR staff
- Key stakeholders – (Fishing groups, tour guides, students, teachers, Different communities, town councils)
- Help identify information needed for management and scientific studies
- Teach mini-courses to stakeholders
- Information distribution and mitigation

Appendix C

Specific Priority Research Questions

Based on Sapodilla Cayes Marine Reserve management plan goals

Workshop in Punta Gorda, Belize

May 16-18, 2005

1. Develop sustainable fisheries in the SCMR

- What is the status, ecology and sustainability of Queen Conch and lobster?
 - What is larval movement?
 - What is actual population?
 - Where are nursery locations?
 - What is the rate of reproduction and survivorship?
 - Are these populations self-recruiting?
 - What is the relationship between reproduction and pollution?
 - Where do lobster populations enter into Cayes?
- What are the impacts of various marine management programs on multi-species fisheries and ecosystems?
 - What is ecological sustainable yield?
 - What is the best way to target stock to recover?
 - What are the ecosystem effects of removal of key species?
 - What are the effects on coral and seagrass?
 - Where are SPAG sites?
- What is the socio-economic value of the ecology (and fisheries) of the SCMR?
 - What is the value of marine products coming out of the SCMR?
 - What is the effect of sport-fishing on population and distribution in bait and bonefish?
 - How does the SCMR compare to other MPAs?
 - What are alternate income streams? (sport-fishing, mariculture)

2. Manage tourism within carrying capacity of the SCMR

- What is the tourism potential and carrying capacity of SCMR?
 - What are uses and damages by snorkelers, divers, and boats.
 - What habitats do tourists impact? With what intensity?
 - Is this data available? Does it need to be collected?
 - What is the need and distribution of mooring buoys?
- What are key activities and marketing to develop sustainable tourism in SCMR?
- What is the financial impact of tourism for the SCMR?

3. Conserve and protect biodiversity and habitats

- What are critical factors to monitor for a baseline study of SCMR?
 - Where are the different habitats?
 - What habitats are of priority for conservation?
 - What is the importance of each habitat in relation to species (conch, lobster, key fish)?
- What is the health and ecology of the coral reef?
 - What species are present?
 - What are the recruitment rates and vectors?
 - How can damage be restored?
 - What diseases are present?
 - What are species' resistance and resilience and effect on reef ecology?

- What is the status and role of top predators?
 - What contaminants are present in top predators?
 - What are their movement patterns and dynamics?
 - What are their population sizes?
 - What is their feeding ecology and effects of species removal?
- How is water quality of the SCMR and what are the major factors influencing it?
 - What are watershed based inputs (sediment, contaminants, and impacts)?
 - What is the bioaccumulation of pollutants and its effects on reproductive capabilities?
 - How much sediment loading is present?
 - What agricultural inputs are present?
 - Are there organochlorines?
 - What are their sources, transport, fate, bioaccumulation?
- What are the water currents affecting the SCMR?
 - How does current flow and temperature affect coral?
 - What is the influence of freshwater systems on circulation?
 - What is the residence time of water in the lagoon?

4. Address uses and activities outside the SCMR

- Where do the major impacts to the SCMR come from?
 - Where is waste coming from?
 - What is the influence of freshwater systems on pollution?
- What are the mitigation measures needed to reduce impacts?

Community Generated List of Priority Management Topics

Based on Sapodilla Cayes Marine Reserve management plan goals

5. Ensure proper administration and implementation of SCMR management plan

- Need about \$BZ 500,000 /yr to manage protected area

6. Capacity building and training

- TASTE-SCMR staff
- Key stakeholders – (Fishing groups, tour guides, students, teachers, Different communities, town councils)
- Help identify information needed for management and scientific studies
- Teach mini-courses to stakeholders
- Information distribution and mitigation