enforcement & coastal development for marine conservation


Kim Baldwin

Parks in Peril, Innovations in Conservation Series, 2007


Nancy Sefton

in this issue...


Marci Eggers

Marine conservation in the wider Caribbean basin faces a variety of ever-changing threats due to increasing coastal populations, high demand for marine resources from consumers and tourists, and environmental degradation impacts on coral reefs, such as damage from bleaching events. To address these threats, conservation practitioners and decision-makers must overcome an array of challenges including low levels of enforcement resources, increased ecosystem threats from unrestricted coastal development, and technical planning needs for protected areas. In an effort to address these concerns, conservation organizations and government agencies are working with partners in the Mesoamerican and Caribbean region (MACR) to increase knowledge and application of best practices for marine conservation. Informed by two workshops held in the MACR for the purpose of helping marine conservation practitioners learn from each other, this bulletin captures some current strategies for managing two critical marine conservation issues: enforcement and coastal development. The following case studies represent a range of problem-solving tactics applied in the region and are intended to raise awareness. While these examples represent some of the innovative strategies currently being adopted, there is much more to be learned from those who are practicing in the field.

1. Enforcement

Adequate and effective enforcement of marine protected areas ensures the operational effectiveness of both fisheries and conservation goals (Jones 2006). While marine reserves are designed with the goal of preserving ecosystem function and integrity, the benefits of protected marine areas extend beyond the zones of the reserve through various mechanisms such as "spillover" of larvae from fish nurseries and revenue from tourism activities. Coastal and marine communities benefit directly and indirectly from increased or sustainable fish and other marine organism populations when effective protective measures, such as education and enforcement, are in place. In short, the productivity of marine protected and managed areas increases with sound enforcement practices (Figure 1, Roberts 2000). This requires that fishers and others are compliant with rules and regulations that limit or restrict certain activities in important or fragile marine areas. In the Mesoamerican and Caribbean region, there are several threats to the health of the coral reef systems, including land- and sea-based pollution, vessel trawling and anchoring, destructive fishing practices, coral disease, climate change, coral bleaching, and illegal fishing. Small islands tend to be densely populated, which in turn increases pressure on local reefs and fish populations. One of the most important and successful practices in encouraging compliance and enforcement of proper fishing techniques is early and continued involvement of the community in the decisions that determine where reserves will be placed and how they will be monitored (Roberts 2000).

Compliance, which is the act of being in accord with accepted standards, is different than **enforcement**, where observation and obedience of standards are assured

through force. Wardens or rangers are usually taught to ensure that resource users are complying with agreements established by the government or community authority. In cases where people are willingly engaging in harmful fishing, anchoring, or polluting practices and thus neglecting rules and regulations, law enforcement rangers enforce and punish through various means. This can be a challenging and sometimes dangerous position. Glen Gator, Assistant Fisheries Superintendent in North Andros, Bahamas, who has been physically threatened numerous times while on patrol, sees this as a growing concern among rangers. One approach to effective enforcement of marine regulations is to provide a presence on the water, especially at odd hours when resource users may not be expecting to see rangers on duty. Also, well-marked and clear boundaries to the reserve offer visual messages regarding protected zones and areas where certain behaviors or activities are unacceptable. Equally important is generating public and political will to help enforce agreements so that rangers can spend their time with interpretation, education, and ensuring compliance rather than persecuting violators.

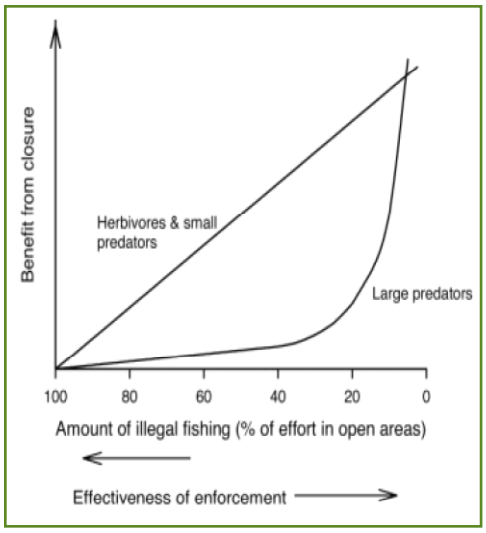


Figure 1: from Roberts, C. M. 2000. Selecting marine reserve locations: optimality vs opportunism. Bulletin of Marine Science. [Bull. Mar. Sci.]. Vol. 66, no. 3, pp. 581-592.

Stakeholder participation, especially by fishers, is an extremely important aspect of a successful marine enforcement program. When marine managed areas are developed and implemented, the results can have strong impacts on fishers who traditionally use locations that are now protected. In an effort to deter crime and to promote alternative livelihoods, strong communication and outreach programs need to be developed to inform fishers about the benefits of marine reserves. In some cases, community members who are law enforcers find themselves threatened by the nature of their jobs. Using interpretation and outreach can help minimize the negative social effects of new boundaries. Overall, the most effective marine enforcement programs are those that are transparent and engage members of the larger community, including fishers, through all stages of planning and negotiation. The investment in time to communicate with and develop a sense of ownership during the siting process results in a well-enforced and effective protected area. St. Lucia's Soufriere Marine Management Association is a good example of improving enforcement efforts through organized community involvement (see Case Study #1).

Several efforts have been made in the Caribbean region to provide training opportunities for marine enforcement rangers, which help address these challenges. One example is the pilot program entitled "Coral Reef CSI [Crime Scene Investigation]", a forensics investigation project offering training and low-cost options for collecting evidence in the marine environment, potentially leading to increased prosecution rates. Another strategy has been adopted by the Hol Chan Marine Reserve, situated near

Ambergris Caye off the main coast of Belize. Established in 1987, the Reserve strives to maintain natural coral reef ecosystems while providing tourism services, fisheries resources, and areas for research and education. Enforcement efforts here have been doubled recently, so two rangers are constantly present within the reserve during daylight hours, a system that provides support and back up among rangers. Sporadic patrols at odd hours, even at night, also encourage all users to abide by the park rules. For more information about this work, please visit the Reserve's website at www.holchanbelize.org.

Enforcement Lessons Learned

Building from the lessons learned in the region, the following is a series of recommendation and essential best practices:

- Ensuring effective protection of marine resources through reserves and protected areas provides biological benefits that can have positive economic and social impacts. In many Caribbean countries, income-generating activities such as tourism rely on highly productive marine areas, which require solid protection.
- Education and outreach, including interpretive enforcement efforts, help to build support and compliance within marine managed areas. However, this must complement other initiatives, rather than replace them, so that fishers and others do not feel patronized with overly simplistic measures (see Jones PJS, 2006). Many marine protected areas, such as Laughing Bird Caye in Belize, are supported by NGOs who produce brochures and hold community meetings to educate residents and visitors about reasons for appreciating and maintaining healthy marine areas.
- Community respect for reserves, which leads to greater success, can be increased by engaging a wide variety of stakeholders, including youth, at all stages of planning and

case 1

Soufriere Marine Management Association, St. Lucia

Beginning as a conflict resolution and threat reduction process in 1992, the Soufriere Marine Management Association (SMMA) in St. Lucia has contributed to national and local development, including fisheries and tourism, through management of the coastal zone since 1995. It focuses on sustainable use through collaboration and cooperation among institutions and stakeholders, where everyone shares benefits and responsibilities. The SMMA is organized around a Technical Advisory Committee (TAC) and Technical Working Group (TWG) who are responsible for management of the area. These two committees include members from community institutions such as fisheries, tourism, marine enforcement, hoteliers, divers, yacht-owners, and parks.

Challenges that the SMMA faces include low staff numbers, constraints on enforcement equipment, and lack of consensus on the role of wardens in enforcement, ranging from prevention of conflicts to enabling them with powers of arrest. Also, working with multiple users who are motivated to use the marine resources in different ways (including beach access, fishing, water taxis, and diving) can be difficult when trying to reach consensus on important decisions. The Department of Fisheries and Ministry of Agriculture tried to address conflicts but had no funding to support any programs. As a result, consultations with users were held to reach consensus about boundaries, settle disputes, and define issues. A review of the institutions was also conducted to identify options and solutions.

Funding for enforcement and the reserve comes from a variety of sources, including fees charged for various categories of use. USAID's ENCORE (Environmental and Coastal Resources) project has funded the demarcation of marine reserves within Soufriere Marine Managed Areas. In addition, the French government, through the French Mission for Co-operation, provided funds for moorings, a patrol boat, communications equipment for the SMMA office, and salaries for the manager and wardens for an initial three month period. The French also provided the services of a national volunteer for a period of sixteen months. The Caribbean Conservation Association, through a regional marine park development program, contributed to marine resource monitoring and public awareness literature. All three agencies and the local government contributed to an SMMA brochure, moorings flyer, and video. It was envisioned that this initial external funding would allow the SMMA to establish a firm foundation upon which user fees, purchase of souvenirs, and other donations would eventually contribute toward self-sustained financing.

Lessons learned by the SMMA include ensuring adequate time to identify critical elements for local conflict management. For example, it was important to have direct participation of resource users in making decisions as a way to manage conflict. In addition, decisions were made only after variations among individuals in each stakeholder group were accurately represented and incorporated, thus acknowledging the diversity of ideas throughout the community. Secondly, direct communication between user groups provides a forum for addressing conflicts openly. Self-regulating institutions, such as fisher cooperatives, dive and other associations, need to be given support. Finally, effective communication has been found to be critical in this collaborative process so the communications plan remains a high priority for the SMMA

case 2

Soufriere-Scott's Head Marine Reserve, Dominica

The Soufriere-Scott's Head Marine Reserve in Dominica engaged in ten years of consultation prior to establishing a marine protected area in 1997. An annual Youth Day encourages participation from the community in Reserve activities. In addition, active support for fishers' organizations and the Dominica Watersports Association is provided so they understand the benefit of the reserve to their activities

Challenges to the reserve include conflicts between the users, including fishers, divers, recreational users, and nurseries.

Funding for the reserve comes from recreational user fees, primarily for SCUBA diving.

Lessons learned include realizing and committing to the amount of time required to adequately consult with the community before making final decisions. Numerous community meetings were held in the ten years it took to bring the reserve to MPA status. The Fisheries Division played an integral role in information dissemination and organizing meetings. For those who did not want to attend community and or village council meetings, informal meetings were held very regularly, often while sitting under trees and on street corners. This method of seeking input and consultation apart from formal meetings or hearings is important to the process because it ensures buy-in from the widest representation of the community. The reserve is being managed through zoning and twice-daily enforcement patrols, conducted by four wardens who have full power of arrest. They are backed by the Coast Guard and hired from the local community, which can often lead to fewer user conflicts

implementation. The country of Colombia has a university training program in San Andres that prepares local students for managing the Seaflower MPA and Biosphere Reserve, generating jobs and strong community support.

- Protection is achieved through a combination of compliance and enforcement depending on the stage of protected area establishment. In early stages, reserves are likely to need strong enforcement; after some time, communities may start to police reserves independently and compliance will grow. After long periods of time, however, reserves may again need strong enforcement to keep poachers from depleting regenerated fish and other marine stocks (adapted from Roberts and Hawkins, 2000). The Port Honduras Reserve in Belize is so productive because of effective management practices that illegal fishers from neighboring Guatemala and Honduras are attracted to the area. This requires a stronger, concerted enforcement effort.
- Modern technology offers growing opportunities for remote surveillance and monitoring of reserves at reasonable cost, including use of satellite monitoring and hydrophones, which can be useful to detect inshore fisheries exploitation by smaller vessels (Jones 2006). While these have been used in the United State's Georges Bank and Philippine's Tubbataha Reef, they still await more extensive trial in the Caribbean.
- Enforcement patrols held during the night and other random hours can help maintain protection of marine environments. In addition, the physical presence of other individuals can help deter illegal activities. Rangers in Belize's Hol Chan Marine Reserve are currently managing a project to determine the outcomes of increased patrol presence.

Enforcement Case Studies

By looking at a variety of national marine reserves, we can see the importance of stakeholder involvement and communication, as well as the factors leading to an effective enforcement system.

case 3

Friends of Nature, Belize

Belize's growing tourism industry coupled with the traditional economy of fishing has been a difficult obstacle for the introduction and enforcement of marine reserves created to protect ecological habitats. Friends of Nature (FON), an NGO located in south central Belize, has engaged the local population in its enforcement efforts to support marine conservation. Working with five coastal communities, including two indigenous Garifuna communities, FON co-manages two fully demarcated protected areas with the Fisheries and Forestry Departments; these are the Laughing Bird Caye National Park and the Gladden Spit and Silk Cayes Marine Reserve. The enforcement team, consisting of nine employees, has a 24 hour presence at the two ranger stations in or near the reserves. Three boats are used for patrolling the area, which includes two no-take zones.

The first stage of enforcement that FON employs is education, where rangers provide maps and other materials to stakeholders through frequent informal interactions. When necessary, first offenders are given warnings and are required to accept responsibility for their actions. As last resort, a high level of zero-tolerance prosecution is used to enforce regulations. This tactic resulted in 52 arrests during one month in 2004, drastically reducing the incidence of violations over the following two years.

FON is currently developing projects that directly benefit stakeholders, including Dive master and fly fishing guide training, community exchanges, and direct support for stakeholder projects. Additionally, FON staff are working to increase involvement of stakeholders in enforcement by providing them with a means of communication such as radios, GPS Units, and maps. They are also exploring more systematic and clear ways to communicate and disseminate enforcement and research results to stakeholders. Finally, they are looking for increased collaboration with agencies and organizations outside of the current area of operation. For more information, you can visit the website at www.friendsofnaturebelize.org.

Challenges: Because these Belizean reserves have various types of zones, including no-take areas as well as those that allow some fishing or tourism, enforcement of these diverse zones has become difficult. To exacerbate the challenge, many fishers target undersize fish and use illegal products. In small communities where rangers and fishers know each other, personal relationships can frustrate enforcement efforts. Finally, increasing levels of tourism development and numbers of visitors proves difficult with a limited number of rangers.

Funding comes from government sources, non-governmental organization support through Friends of Nature, and user fee systems.

Lessons learned include the importance of maintaining a presence in the reserve, the value of an active and continuous education program, collaborating with the government, involving stakeholders such as tour guides, and consulting with the broader community. Through Friends of Nature's work to staff enforcement patrols in the parks, they've found three useful stages: 1) education, in which no arrests are made but rather consultations, interactions, and the distribution of materials takes place; 2) warnings, which patrols issue and violators must acknowledge by signing, often accompanied by confiscation of illegal gear; and 3) zero tolerance, where violators are arrested and prosecuted. The ability to arrest and prosecute has been integral to enforcing the system.

case 4

Coral Reef Forensics Investigations

A new pilot program is being developed to train communities and enforcers in "crime scene investigations" (CSI) so that illegal evidence can be collected in coral reef environments and used to prosecute violations. Traditionally, there have been challenges with the lack of will for compliance, as well as lack of evidence or timely collection to prosecute or deter violators. This program is working to translate terrestrial forensic practices, which are well developed, to coral reefs. To illustrate this tactic in the marine environment, a marine manager might collect paint scrapings to indicate boat bumps with reef corals or find soil samples to help prove that an oil spill, cyanide poisoning, or septic runoff has occurred. Successful prosecutions have taken place using this approach; for example, a developer in Hawaii recently paid a $200K fine for erosion that deposited silt on a coral reef.

The first training session in Coral Reef CSI took place during October 2006 in Cozumel, Mexico. More training is expected to occur within the Caribbean region.

Lessons learned: It is necessary to have evidence in order to take people to court and prosecute violations. Borrowing techniques from already established terrestrial practices can be successfully applied to the marine context.

case 5

Florida Keys National Marine Sanctuary, Florida

The Florida Keys National Marine Sanctuary, established in 1990, has been challenged with a shortage of staff for patrolling all 2900 nautical square miles of the MPA. Given that there is a high population turnover rate in the Florida Keys, about 50% every five years, interpretive enforcement is constantly important. Though there are professional enforcement staff working for the Sanctuary, the large number of visitors and great size of the Sanctuary make it difficult to effectively patrol everywhere. In response to these challenges, the Sanctuary developed Team OCEAN (Ocean Conservation Education Action Network), a volunteer group that spreads information and carries a presence throughout the marine area. In addition, permanent education and outreach specialists are staffed at several stations throughout the sanctuary to host radio programs, answer phone-in questions, and provide information to visitors.

Challenges that still remain include the need for increased presence, increased funding, public outreach, and stronger enforcement partnerships.

Funding is sponsored by the government, which gives money to the Sanctuary Enforcement Team (SET), under the Florida Fish and Wildlife Conservation Commission and in cooperation with the Coast Guard.

Lessons learned: Even though Team OCEAN does not have enforcement capacity, its presence in the area is a deterrent to those who might act against regulations. Team OCEAN makes presentations at businesses and organizations, answers questions, and has direct contact with vessels. Volunteers are stationed at highly visited reef sites. The presence of the volunteers has led to increased compliance and acceptance, allowing official enforcement staff to focus their patrols elsewhere.

2. Coastal Development

In addition to overfishing, sedimentation, pollution, and other marine-based threats that require enforcement to provide protection to the marine environment, the issue of coastal development is growing in importance as a region-wide threat. Direct and indirect threats from a variety of sources related to coastal development have had a significant impact on the reef systems in the greater Caribbean basin over the course of the past decade and more. While the benefit of development for communities is tangible in many cases, the list of threats to this region is lengthy. Tourism is a growing industry in the wider Caribbean region, bringing economic activity to many small island communities as well as increased numbers of cruise ships, restaurants, and hotels. The result of building infrastructure to accommodate these increases has a strong effect on the natural marine and coastal environments. Pollution is on the rise, demands on marine resources exacerbate conflicts among users, and the sheer number of potentially harmful activities has negative cumulative effects. In Placencia, Belize, for example, an entire suite of localized development activities is quickly impacting the marine environment. These include influences from aquaculture (shrimp farming), agriculture (orange grove production and banana plantation shipments), and coastal tourism including diving, tour boats and yachts, whale shark viewing, adventure tourism, resort construction, condominium sales, and access roads.

The Reefs at Risk program, sponsored by the World Resources Institute, has developed some models to identify the extent of threats to the Caribbean region's reef environment. Using a variety of indicators, including estimated pressure from sewage discharge, urban runoff, construction, and tourism development, the results indicated that 1/3 of the region's reefs are threatened (2004). Coastal development pressure is "significant" throughout the Greater Antilles, Eastern

case 6

El Rincon de las Ballenas, Dominican Republic

An ecotourism program was developed in 1999 in Carenero, Dominican Republic to orient and educate tourists prior to watching humpback whales (Megaptera novaeangliae) from small boats. A museum has been created to give an introduction to whale behavior, local regulations, and ecological issues. The primary goal of this program is to turn tourists into allies for the whales through training, building awareness, and supporting conservation. Another important component of this program is the training of youth from the community to participate in whale monitoring from the decks of the tourist boats. These students are offered courses that teach the basic aspects of biology, ecology, and conservation of humpback whales. The program also includes practical exercises, taught while on a boat, where the students learn the basis of the monitoring system in the Bay of Samaná, including use of the GPS and handling of data sheets.

Funding for this program comes from a small grant program and a partnership between Programa EcoMar and the town of Carenero. Local students and the Mother's Club of Carenero contribute to the overall functions of the program.

Lesson learned include the power of engaging youth in the success of conservation programs. Since the inception of student involvement in whale monitoring, there has been growing support from parents, teachers, and even tour-boat operators in Carenero. In fact, tour operators always find a space for monitoring students in the boat, despite the crowd of tourists. It is anticipated that the young students, because of their participation in the program and interactions with the local and foreign tourists, will become natural and spontaneous tourism guides, carrying important science and conservation messages. In addition, requiring that all tourists receive orientation prior to participation in whale watching activities ensures that they hear and understand regulations and natural behaviours, leading to a more enjoyable experience, healthier whales, and a sustainable industry.


James Byrne

case 7

Cruise Industry

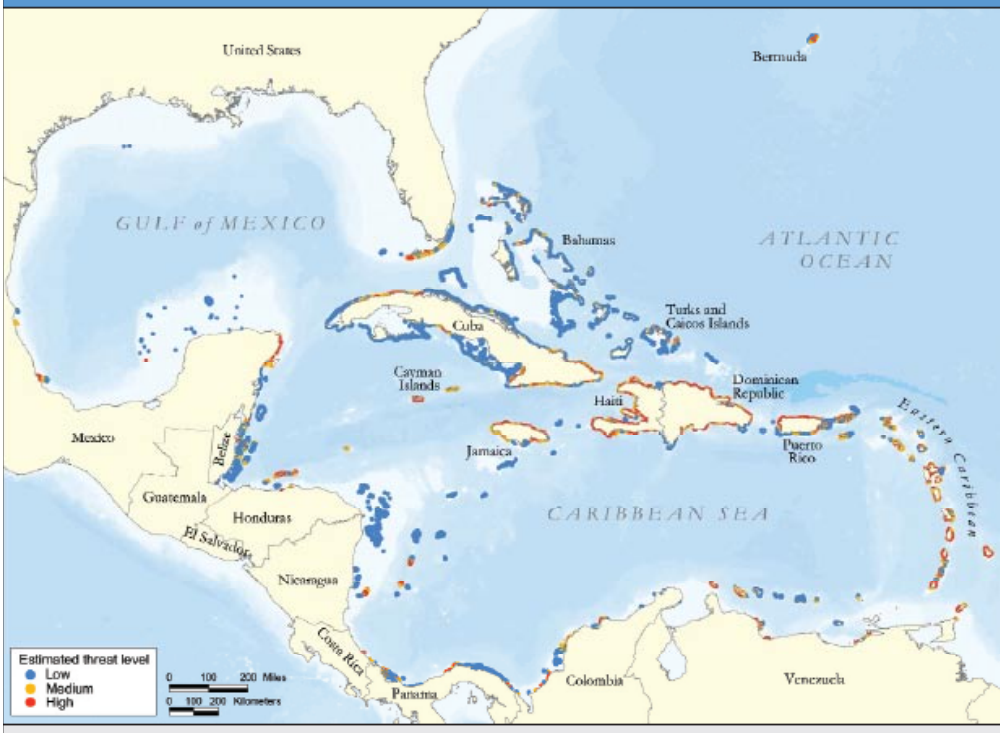
The cruise industry is one of the fastest growing tourism segments. The number of cruise ship passengers is expected to grow at 8.5 percent per year over the next decade (www.celb.org). Half of these passengers embark for ports in the Caribbean from the United States.

Challenge: The sheer number of cruise ships at any given time in the region has significant implications on the marine environment, particularly from water discharge, solid waste, and land-based infrastructure for passengers.

Funding: Many cruise lines have set up funds to support conservation projects in communities near port sites. These funding programs include: Disney Wildlife Conservation Fund, International Council of Cruise Lines' Cruise Industry Charitable Foundation, and the Royal Caribbean's Ocean Fund.

Lessons learned: In response to these challenges, Conservation International's Center for Environmental Leadership in Business has worked closely with cruise lines to promote sustainable practices. Many cruise lines have partnerships with inland ecotourism sites, parks, and environmental organizations. Examples of these partnerships include Reef Check and Carnival Cruises, which develops awareness materials for tourists on the cruise ship; Reef Ball Foundation, Holland America, Royal Caribbean, and Disney, which have created artificial reefs for cruise passengers as well as educational programs; and World Wildlife Fund and Costa Cruises, which created educational materials for dispersal in passenger cabins.

MAP 2. REEFS THREATENED BY COASTAL DEVELOPMENT



Threats to reefs from coastal development were estimated based on distance from cities, ports, airports, and dive tourism centers, as well as population density, population growth, and tourism growth in the area. For reefs inside marine protected areas (MPAs), management effectiveness was included as a factor mitigating threat. (*See Box 3 in Chapter 4 and Table A5 in Appendix A.*)

Source: WRI, *Reefs at Risk in the Caribbean*, 2004 (*see Appendix B*).

Figure 2. Coastal Development threat to the greater Caribbean basin. From Burke, L. 2004.


CORALINA

Caribbean, the Bay Islands in Honduras, and parts of the Florida Keys, the Yucatan, and the Southern Caribbean. The Bahamas, the Turks and Caicos Islands, and Cuba were identified with the lowest threat from coastal development *(see Figure 2)*. Not only does this degradation have an extensive environmental impact, but substantial economic loss can occur if the development continues unchecked.

Because only 6% of 285 marine protected areas in the region were effectively managed in 2004, there is a great need to develop some practices and strategies that can complement these efforts and increase protective capacities. Some countries are moving toward ecotourism and business partnerships to steer development in a more sustainable direction. Others, like Colombia, are using integrated coastal management as a way to combat direct threats. Because this is a critical area of concern, the United Nations General Assembly adopted a resolution in December 2006, which aims to strengthen sustainable development efforts in the Caribbean Sea ["Towards the Sustainable Development of the Caribbean Sea for present and future generations" (A/C.2/61/L.30)].

Coastal Development Lessons Learned

Building on lessons learned from the region, it is important to be proactive in addressing issues regarding coastal development in the Caribbean region. The following practices are suggested.

- Encourage the development of local organizations, such as fishing cooperatives and hotel operator associations, to strengthen the local community and keep in the local economy money generated by development. Development pressures in the Placencia peninsula of Belize are encouraging local associations to form, including hotel and fisher groups. For many participants, these structured associations present an opportunity to document local knowledge for perpetuity.

case 8

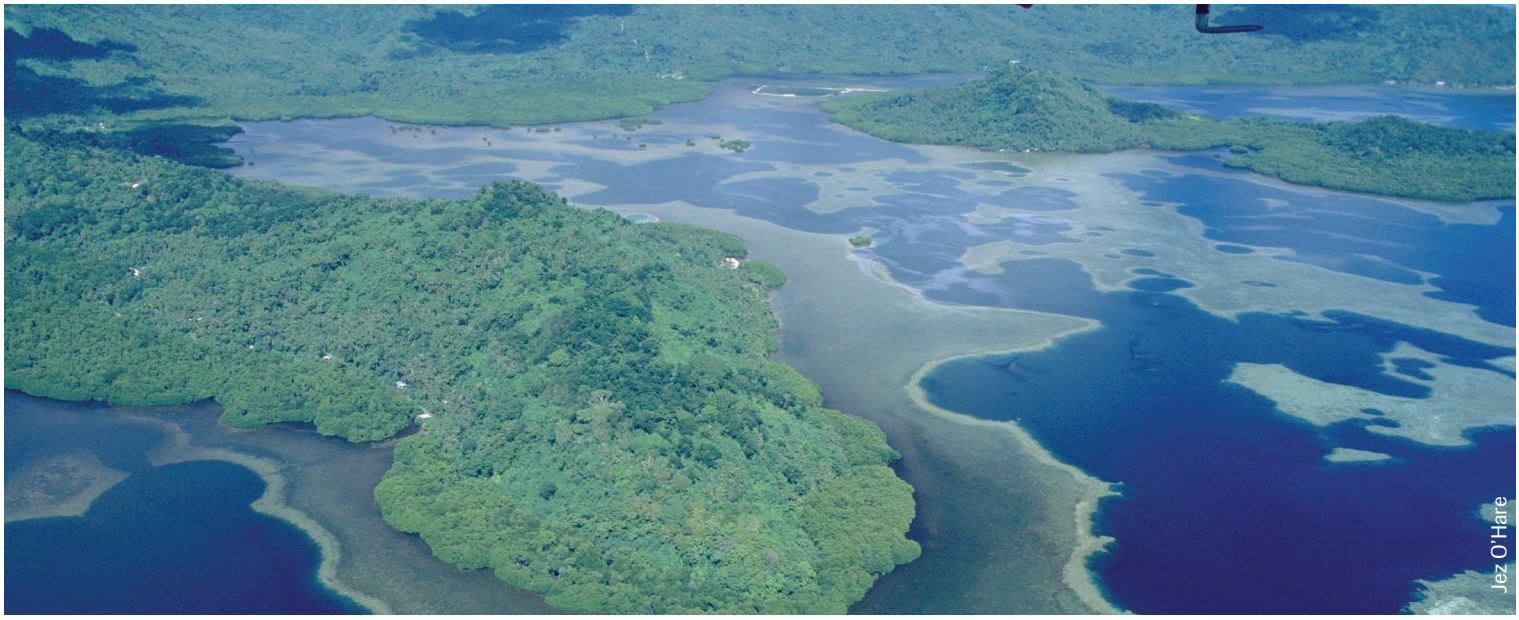
CORALINA Management Agency, Colombia

Colombia's San Andres Archipelago is located in the southwest Caribbean Sea. Migration from mainland Colombia has resulted in extreme population growth and intense pressure on the islands' fragile coastal and marine resources. San Andres, the largest island in the chain, is the most densely populated oceanic island in the Western Hemisphere (3000 people/ km2); unemployment rates are over 50%. Coastal development is a significant concern, especially as tourism is increasing and the small islands are already overburdened. In order to address the archipelago's environmental challenges -- many of which relate to overpopulation -- Colombia's environmental framework legislation declared the archipelago a biosphere reserve and created CORALINA (Corporation for the Sustainable Development of the Archipelago of San Andres, Old Providence, and Santa Catalina) as the environmental authority and reserve manager. Its regionally-autonomous broad mandate, to link conservation, economic development, and equity, requires that CORALINA's work be participatory so that community members are involved in all decisions that will affect them. CORALINA's work resulted in UNESCO's declaration of the Seaflower Biosphere Reserve in 2000, followed by the national declaration of the Seaflower Marine Protected Area (MPA) in 2005. The MPA, which is the Caribbean's largest, covers 65,000 km2 and includes all coastal waters and some open ocean.

Challenge: The main environmental issues, exacerbated by overpopulation, include poor solid and liquid waste management, severe freshwater shortages, soil erosion, ecosystem degradation, deforestation, loss of biodiversity, and the spread of urbanization, slums, and illegal housing. Given the integrated nature of environmental problems, especially on small islands where the entire land area is coastal zone, challenges also result from the lack of human capacity, weak institutions, poverty, and legacy of centralized government. In addition, marginalization of native islanders and uncontrolled migration have a significant effect on efforts to control coastal development. Establishing a system of community-based protected areas has improved resource management, promoted equitable access, and strengthened control over coastal development. However, using protected areas as the foundation for development is a new idea not only to the San Andres community but also for the country and region. A major challenge for CORALINA is that there are no real examples to follow, and management must be groundbreaking, adaptive, and flexible.

Funding: CORALINA receives only a fraction of its funding from public sources. UNESCO and the InterAmerican Development Bank (IDB) funded initial development of the Seaflower Biosphere Reserve while the Global Environment Facility (GEF) funded the project to establish the MPA. This project included setting up a technical degree at the Christian University of San Andres that builds local capacity by training young islanders for careers in tropical coastal and marine resource management, emphasizing the Seaflower Biosphere Reserve and MPA development model. CORALINA has also received funding from the EU, UNEP, NOAA, Darwin Foundation, The Ocean Conservancy, and many other grantors and institutions, including substantial national project funds. Ultimately the goal is for the Seaflower protected areas to become financially self-sustainable, but this requires additional capacity.

Lessons learned: CORALINA's regional autonomous status is rooted in the understanding at the national level that decentralizing governance and empowering local institutions and communities improves environmental management, leading to a self-reinforcing cycle of ecological and social sustainability. One of the most important lessons learned is that local management of multiple-use protected areas can improve conservation and sustainable use and also enhance equity by strengthening community ownership of resources. In addition to using protected areas to conserve resources, recover traditional livelihoods, and generate direct employment, focusing attention on demonstration projects within the protected area model can bring new job opportunities and economic development. Several projects integrate conservation and development including solid waste management, sustainable agriculture and green markets, natural and cultural tourism, and freshwater and energy alternatives. Special events, outreach, and island-wide education help reinforce the role of the biosphere reserve and MPA in mainstream development of the archipelago.


Jez O'Hare

- Keep historical records of decisions and agreements so that knowledge is not lost among the community.

- Invest in partnerships and relationships with other industries in the local community. This will reduce conflicts and provide incentives to share information.

- Since the tourist industry benefits from ecological integrity, develop alliances that could lead to a) donations toward the MPA from the private sector, and b) collaborative programs between MPA staff, tourist industry workers, and/or tourists directly. Conservation International's Center for Environmental Leadership in Business has been very successful in building relationships with cruise lines throughout the Caribbean basin, resulting in increased support of marine protection.

- Use presence of tourists to build a program for information or orientation about important ecological and environmental factors in the area. This can serve as an opportunity to demonstrate correct behavior around flora and fauna and build stewards for the environment In the Dominican Republic, tourists are required to attend an orientation program at a museum prior to participating in whale watching activities so they are familiar with marine mammal behaviors and potential interactions.

Case Studies:

Increased numbers of people living near the coastline, poor coastal development practices, sewage pollution, land-based run-off, and unsustainable tourism industries together are taking a toll on the health of the marine environment. As a result, marine conservation practitioners are developing and implementing some creative methods for facing these challenges. Case studies from the Dominican Republic, Colombia, and the cruise industry demonstrate some of these innovations.

Conclusion

It is evident that, despite the intensity of a range of threats to the marine environment in the wider Caribbean region, there are many organizations, communities, and governments who are developing innovative and creative strategies for addressing these challenges. As the marine conservation community continues to plan and implement science-based networks of marine protected and managed areas, it will be increasingly important to share successful ideas and build knowledge regarding best practices in the areas of enforcement and coastal development. This learning approach will increase awareness of innovations, accelerate movement toward regional conservation goals, and enhance effectiveness at every level.


Simon Williams

Bibliography

Burke, L. and J. Maidens. 2004. Reefs at Risk in the Caribbean. World Resources Institute, Washington DC. http://reefatrisk.wri.org

Davis, Braxton C. and G. Moretti. 2005. Enforcing U.S. Marine Protected Areas: A Synthesis Prepared by the National Marine Protected Areas Center, Silver Spring, Maryland, in cooperation with the National Oceanic and Atmospheric Administration Coastal Services Center. www.mpa.gov

Jones, P.J.S. (2006) Collective action problems posed by no take zones. Marine Policy 30(2), 143-156.

Roberts, C. M. 2000. Selecting marine reserve locations: optimality vs opportunism. Bulletin of Marine Science. [Bull. Mar. Sci.]. Vol. 66, no. 3, pp. 581-592.

Roberts, C.M. and J.P. Hawkins. 2000. Fully-protected marine reserves: a guide. WWF

Endangered Seas Campaign, 1250 24th Street, NW, Washington, DC 20037, USA and Environment Department, University of York, York, YO10 5DD, UK.

Sweeting, J. E. N., and S.L. Wayne. A shifting tide: environmental challenges and cruise industry responses. The Center for Environmental Leadership in Business. www.celb.org

Other Resources

Caribbean Marine Protected Areas Managers network listserv/ Yahoo Group: http://groups.yahoo.com/group/campam/members

Center for Environmental Leadership in Business, Conservation International: www.celb.org/xp/CELB/programs/travel-leisure/

Commercial Services Plan. Virgin Islands National Park: http://www.nps.gov/archive/viis/pphtml/documents.html

Community Knowledge Exchange, World Bank webpage. http://web.worldbank.org

Coral Reef CSI (Crime Scene Investigation): contact Dave Gulko at david.a.gulko@hawaii.gov

CORALINA (Corporation for the Sustainable Development of the Archipelago of San Andres, Old Providence, and Santa Catalina): www.coralina.gov.co

Florida Keys National Marine Sanctuary, Team OCEAN: http://floridakeys.noaa.gov/edu/programs_activities.html

Friends of Nature: www.friendsofnaturebelize.org

Gulf and Caribbean Fisheries Institute website: www.gcfi.org

Hol Chan Marine Reserve: www.holchanbelize.org

Marine Managed Areas: Best Practices for Boundary Making, June 2006, NOAA Coastal Services Center, Marine Boundary Working Group, Marine Managed Areas. Available in pdf: http://www.csc.noaa.gov/products/mb_handbook/MMA_Boundaries_Handbook.pdf

Programa EcoMar/Rincon de las Ballenas: www.freewebs.com/carenero, http://espanol.geocities.com/ongprogramaecomar/

Soufriere Scotts Head Marine Reserve: www.dominicamarinereserves.com

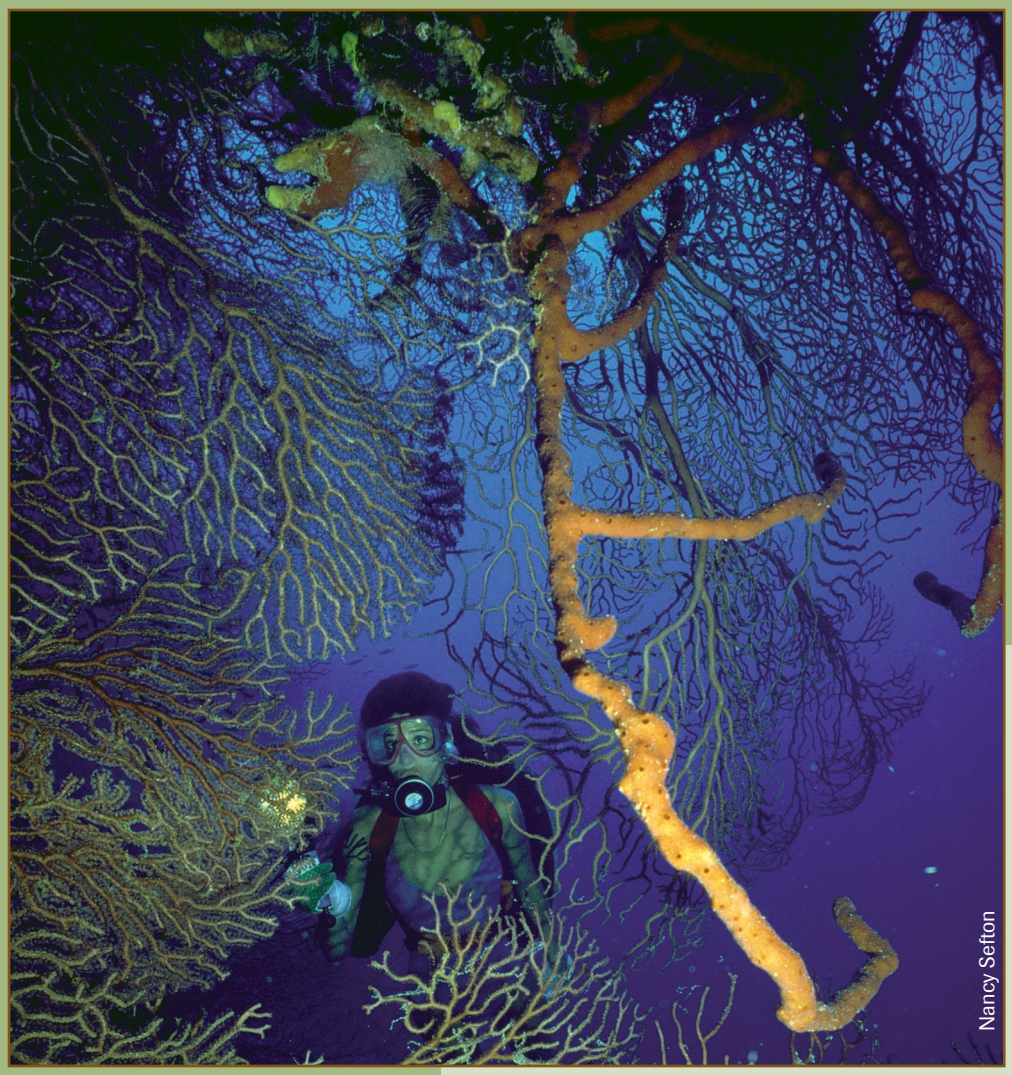
Soufriere Marine Management Associations: www.smma.org.lc

The Nature Conservancy (TNC). Parks in Peril. Webpage. www.parksinperil.org

TIDE (Toledo Institute for Development and Environment): www.tidebelize.org

UNESCO (United Nations Educational, Scientific and Cultural Organization): www.unesco.org


James Byrne



The Nature Conservancy

Protecting nature. Preserving life.™

The Nature Conservancy (TNC) is a leading Conservation organization working around the world to protect ecologically important lands and waters for nature and people. Since 1951, TNC has been working with communities, businesses and people like you to protect more than 117 million acres of land, 5,000 miles of river, and 100 marine sites around the world. TNC's mission is to preserve the plants, animals and natural communities that represent the diversity of life on Earth by protecting the lands and waters they need to survive.

www.nature.org

PARKS IN PERIL

Since 1990, The Nature Conservancy, the United States Agency for International Development, local government agencies and non-governmental organizations have been working together through the Parks in Peril Program (PiP) to protect and manage more than 18.2 million hectares of endangered habitats in 45 protected areas in 18 countries of Latin America and the Caribbean. PiP works with partner organizations to improve financing, supportive policies, and management of individual sites as well as entire systems of protected areas, including private, indigenous, and municipal reserves, as well as national parks.

www.parksinperil.org

USAID FROM THE AMERICAN PEOPLE

The United States Agency for International Development (USAID) is an independent U.S. government agency that receives foreign-policy guidance from the U.S. Secretary of State. Since 1961, USAID has been the principal U.S. agency extending assistance to countries worldwide recovering from disaster, trying to escape poverty, and engaging in democratic reforms.

www.usaid.gov

publication credits

Series Editor:
Angela S. Martin

Author:
Colleen Corrigan

Design:
Kristen Truitt

Editor:
Angela Martin

Parks in Peril Program Director:
James F. Rieger

This report is made possible by the generous support of the American people through the United States Agency for International Development (USAID) through the Award No EDG-A-00-01-00023-00 for the Parks in Peril Program. The contents are the responsibility of The Nature Conservancy and do not necessarily reflect the views of USAID or the United States Government.

please cite this publication as:

Corrigan, Colleen. 2007. Enforcement and Coastal Development for Marine Conservation. Innovations in Conservation Series. Parks in Peril Program. Arlington, VA, USA: The Nature Conservancy.

Parks in Peril Program
The Nature Conservancy
4245 N. Fairfax Drive, Suite 100
Arlington, VA 22203-1606 USA

Tel: +1-703-841-5300
Fax: +1-703-524-0296

www.parksinperil.org
www.parquesenpeligro.org