

# RESILIENCE SOURCEBOOK

INSPIRED BY THE 2013 MILSTEIN SCIENCE SYMPOSIUM  
*UNDERSTANDING SOCIAL AND ECOLOGICAL RESILIENCE IN ISLAND SYSTEMS*  
*INFORMING POLICY AND SHARING LESSONS FOR MANAGEMENT*



CASE STUDIES OF SOCIAL-ECOLOGICAL  
RESILIENCE IN ISLAND SYSTEMS



AMERICAN MUSEUM OF NATURAL HISTORY

**CENTER FOR BIODIVERSITY  
AND CONSERVATION**

THE ESTABLISHMENT OF MAN OF SHOALS MARINE PARK BEGINS TO REVERSE LONG-TERM DEGRADATION OF THE MARINE ENVIRONMENT

SINT MAARTEN, CARIBBEAN

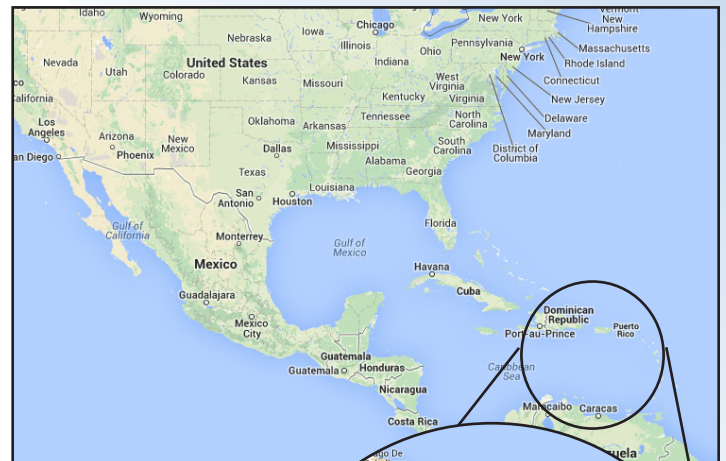
Tadzio Bervoets<sup>1</sup>

THE SETTING

The island of Sint Maarten/Saint Martin, in the West Indies, located at 18°03'N, 63°06'W, is divided between the French Saint Martin in the North (53 square kilometers) and the Dutch Sint Maarten in the South (34 square kilometers). Sint Maarten is part of the Kingdom of the Netherlands. The island is surrounded by about 20 square kilometers of threatened coral reefs.

Starting in the 1960s, when Cuba was closed to tourism, and continuing until today, Sint Maarten's tourism economy has grown. Sint Maarten is now one of the largest tourism hubs in the West Indies. In 2008, 1.3 million cruise ship passengers and 475,000 stay-over tourists visited the island. Sint Maarten's airport is the second busiest in the Caribbean. In 2009 Sint Maarten's permanent population was estimated at about 40,000 people. During the high season, however, the population swells temporarily to as many as 250,000, due to seasonal employment by the restaurant and hotel industry. With steady immigration from the Dominican Republic, Haiti, Jamaica, and other nearby islands, Sint Maarten's permanent population is growing. Most of Sint Maarten's residents are immigrants or have immigrant roots; only about 30% of Sint Maarten's year-round population can trace their ancestry back to the colonial era.

About 85% of Sint Maarten's workforce is employed in tourism or tourism-related industries. Unlike other islands in the Caribbean, Sint Maarten does not have a large-scale commercial fishery. The few fishers that do exist in Sint Maarten have only a minimal effect on the reefs. For example, Sint Maarten's 10-15 artisanal fishers mostly do not fish in near-shore waters because their target fish are



Map Data: ©2014 Google

not found there. Most of these fishermen only fish part-time as part of their tradition. Sport fishers also do not fish along the reef because they are more interested in deep-water species like marlin (*Makaira* spp.) or mahi-mahi (*Coryphaena* spp.).

Until recently, there was little government management of the marine environment in Sint Maarten. In 1997, the Nature Foundation Sint Maarten was established in order to set up and manage a marine park in Sint Maarten, under contract from the Sint Maarten government. Sint Maarten was the only country in the Dutch Caribbean that did not have a marine park, therefore the proposal aimed to achieve parity between Sint Maarten and the other states of the Dutch Caribbean. The proposed park's design was based on the design of marine protected area on Bonaire, another state in the Dutch Caribbean. Unfortunately, however, this design was too extensive (it would have included all of Sint Maarten's territorial waters) and too complicated

<sup>1</sup> Nature Foundation St. Maarten

to gain political support. This was a bitter pill to swallow for politicians in Sint Maarten, given the interests of the cruise ship industry, fishers, and dive shop operators. Furthermore, while Bonaire's protected area had a staff of 54, the Nature Foundation St. Maarten had only three people on staff. The park remained an entity only on paper until 2010.

### THE DISTURBANCE

Sint Maarten's reefs incurred long-term degradation due to the explosion of the tourism sector. The country underwent unconstrained and poorly managed coastal development to accommodate large-scale tourism. High-rise hotels and an increasing population put pressure on the island's natural resources. Poor urban planning and infrastructure and lack of watershed management led to sedimentation and runoff that severely impacted near-shore reefs. In addition, dive tourism and fishing caused further damage to the reef. Dive operators and fishers would sometimes anchor on the reef and in seagrass beds, damaging these fragile ecosystems.

Catastrophic disturbances over the last three decades further imperiled Sint Maarten's coral reefs. In 1995, Hurricane Luis caused a significant reduction in coral cover because already-impaired reef systems had diminished resilience. Sint Maarten's reefs suffered another setback in 2005, when there was a mass coral bleaching event across the whole Caribbean. These two catastrophic disturbances led to an 80% reduction in coral cover in the near-shore environment.

Photo credit:  
St. Maarten  
Nature  
Foundation



### THE RESPONSE

In 2010, the Nature Foundation St. Maarten was officially reactivated and again took up the

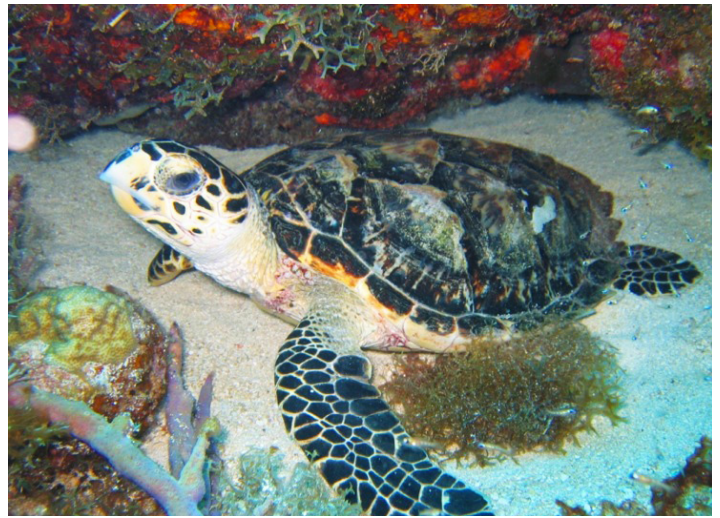


Photo credit: St. Maarten Nature Foundation

challenge to create a well-managed, functioning marine park, with a strict no-take area, to address increasing anthropogenic threats. The Foundation took a three-pronged approach to convince decision makers to support the establishment of the park: first, conservation rationale; second, economic reasoning; and finally, outreach to generate support for the park in the local community. For the first prong, the Foundation did an ecological assessment of Sint Maarten's reefs. This baseline study pinpointed specific areas – the country's remaining healthy reefs – as a high priority for conservation. They redesigned the proposed park so that it would protect just those areas – representing 25% of the country's territorial waters, and covering 10,000 hectares.

Next, they did an economic valuation study of the marine ecosystem using a method from World Resources Institute. This quick-and-dirty method was designed to be easy-to-use by managers. By interviewing dive shop owners, fishers, tourists and other tourism industry stakeholders, the study was able to paint a compelling picture of the importance of a healthy marine ecosystem to Sint Maarten's economy.

Finally, the Nature Foundation St. Maarten took the results from both the ecological assessment and economic valuation study to the community to make their case for the marine park. The Foundation made presentations at community meetings and sat down and talked with fishermen



Photo credit: Mauricio Handler/ DCNA/ NPL

and dive operators to win their support. They also presented their study results to Parliament. At last, on December 30, 2010, the Man of Shoals Marine Park was established.

One of the first orders of business for the marine park was the design of a mooring system for dive boats to prevent damage from dive operators' anchoring directly on the reef. Prior to and during the establishment of the marine park, the foundation did wide-scale outreach to explain why anchors harm the reef and to communicate that this practice put dive operators' livelihoods at risk. Following the establishment of the park, small businesses in Sint Maarten paid for the construction of a mooring system drilled into the substrate.

Another beginning step for the marine park was to enforce the park's no-take zone. Given the Foundation's small staff, they maximized their effectiveness through collaborating with the Coast Guard. They made examples of a few rule breakers by imposing fines on them. This enforcement presence has led to a significant reduction in poaching within the park limits. To garner fisher support for the marine park, the Foundation worked to explain the spillover effect – how a well-managed marine park could increase fish populations and therefore augment nearby fisheries. In addition, the Foundation took on initiatives that reflected the fishers' interests. For example, the Foundation created zones in the near-shore environment for fishers only, not for divers. They sunk some wrecks in these zones to serve as artificial reefs and fish aggregating devices. These areas are now popular

fishing destinations.

In the near future, the Foundation hopes to expand the park to 35,000 hectares, which will make it continuous with a park on the French side of the island. Because the current boundaries of the park include the parts of the reef that were best for fishing and diving, those areas with the calmest waters and the healthiest reefs, the expansion is an easier case to make, since it will include choppy waters that are less appropriate for fishing and diving.

### THE RECOVERY

While coral growth is too slow to show an appreciable increase in coral cover since the establishment of the park, the Foundation was pleased to be able to document an increase in the populations in certain species of fish. The Foundation implements yearly surveys, and in 2013, they found that grouper (subfamily Epinephelinae) and snapper populations have rebounded, showing a 10-15% increase. Fishermen are reporting increased catch. The Foundation has begun staghorn (*Acropora cervicornis*) and elkhorn coral (*Acropora palmata*) nurseries and they hope to transplant these stocks to areas with high water quality to quicken the reef's recovery.

### LESSONS LEARNED AND RECOMMENDATIONS

- *Stakeholder involvement is key.* Scientists oftentimes are in a bit of a bubble, focusing on the ecosystem and its dynamics. Involving stakeholders and the local community is key to achieving conservation goals. The Foundation can attribute its success in reaching the community in this case to a willingness to listen and to break down conventional barriers to communication. The Foundation would go to community groups and community council meetings and give short and simple presentations. Instead of following these presentations with a traditional question-and-answer session, the Foundation personnel would sit down with everyone and share refreshments so that they could interact on equal terms. In this way they did not set themselves in the front

- of the room as though they knew everything and the audience knew nothing – because, in fact, it's the other way around. By making these sessions more informal, they were able to talk and listen to people, and therefore more effectively communicate the conservation message with community members in a manner that was more comfortable for them.
- *Economic valuation of ecosystems is a powerful persuasive tool.* While it can be controversial, putting conservation goals in terms of economic benefits is an effective way to reach and persuade decision makers.
  - *Effective communication should be a priority.* Scientists can also have a hard time communicating the importance of conservation. But in order to get political and popular support for conservation, scientists must do so through all the means available: Facebook, Twitter, Instagram, and, of course, traditional media as well.
  - *Tailor management to specific interests.* By implementing management actions that reflected the interests of multiple stakeholders (e.g., fishermen and dive tour operators), the Foundation was able to gain buy-in for the establishment of the MPA.
- Caribbean Environment Programme, UNEP <http://www.cep.unep.org>
  - World Wildlife Fund Netherlands [http://wwf.panda.org/who\\_we\\_are/wwf\\_offices/netherlands/](http://wwf.panda.org/who_we_are/wwf_offices/netherlands/)
  - USONA <http://www.usona.an>
  - MINA Fund Netherlands Antilles [http://www.mina.vomil.an/welcome/news\\_events/news.php](http://www.mina.vomil.an/welcome/news_events/news.php)
  - KNAP Fund Netherlands Antilles
  - The INNO Fund
  - Bunchies Garage & Trucking NV
  - Princess Juliana International Airport (PJIA) <http://www.sxmairport.com>
  - St. Maarten Harbour Holding Company (SHHC) <http://www.portofstmaarten.com/contact.htm>
  - St. Maarten Tourist Office <http://www.stmartiniland.org>
  - Dutch National Postcode Lottery <http://www.postcodeloterij.nl>
  - SOL Antilles <http://solpetroleum.com/st-maarten>

#### LEAD ORGANIZATION

- Nature Foundation St. Maarten <http://www.naturefoundationsxm.org>

#### PARTNER ORGANIZATION

- Dutch Caribbean Nature Alliance <http://www.dcnanature.org>

#### FUNDING SUMMARY

- Prince Bernhard Nature Fund <http://www.pbnf.nl>
- US National Fish and Wildlife Foundation <http://www.nfwf.org/>

#### RESOURCES

- The Government of Sint Maarten <http://www.sintmaartengov.org>
- Coastal Capital: Ecosystem Valuation for Decision Making in the Caribbean, World Resources Institute <http://www.wri.org/publication/coastal-capital-guidebook>

*As told to Georgina Cullman.*

## THE MILSTEIN SCIENCE SYMPOSIUM

The collection of this case study and others like it results from the April 2013 Milstein Science Symposium, Understanding Ecological and Social Resilience in Island Systems: Informing Policy and Sharing Lessons for Management. Held at the American Museum of Natural History, the Milstein Science Symposium convened local resource managers, researchers, educators, island leaders, policy makers, and other leading conservation practitioners to examine characteristics, qualities, and processes that may foster resilience for coastal and marine systems as well as explore interactions, linkages, and feedback loops in complex social-ecological systems and what this means for management. The Milstein Science Symposium was organized in collaboration with The Nature Conservancy, the Gordon and Betty Moore Foundation, the National Science Foundation, The Christensen Fund, the Coral Reef Alliance (CORAL), the Scripps Institution of Oceanography at the University of California San Diego, the University of California Santa Barbara, the United Nations Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries, and Small Island Developing States (UN-OHRLS), and the Wildlife Conservation Society.

**The 2013 Milstein Science Symposium was proudly sponsored by the Irma and Paul Milstein Family.**



## CENTER FOR BIODIVERSITY AND CONSERVATION

*In 1993, the American Museum of Natural History created the Center for Biodiversity and Conservation (CBC) to leverage its institutional expertise to mitigate threats to cultural and biological diversity. The CBC develops strategic partnerships to expand scientific knowledge about diverse species in critical ecosystems and to apply this knowledge to conservation; builds professional and institutional capacities for biodiversity conservation; and heightens public understanding and stewardship for biodiversity. Working both locally and around the world, the CBC develops model programs and tools that integrate research, education, and outreach so that people -- a key factor in the rapid loss of biodiversity -- will become participants in its conservation.*

**To learn more about the CBC, please visit our website:**

<http://cbc.amnh.org>



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