

COASTAL PLANNING IN BELIZE: SYSTEMS THINKING AND STAKEHOLDER ENGAGEMENT ON A NATIONAL SCALE

In the summer of 2017, Chantalle Clarke-Samuels and her colleague Samir Rosado were making the four-hour drive from Belize City to the small seaport and fishing town of Punta Gorda, where they were scheduled to have lunch with their trusted local partner and friend, Mario Chavarria. Over the last several years, Clarke-Samuels and Rosado had been instrumental in crafting the country's first National Integrated Coastal Zone Management Plan, with lots of input from Chavarria and hundreds of other stakeholders around the country who participated in the national planning process. Community-driven and based on scientific inquiry and analysis, the National Plan was designed to guide Belize in achieving its national goals for conservation and economic development while honoring the unique qualities and priorities of the country's diverse regions. In 2016, Belize's Prime Minister and Cabinet had formally adopted the groundbreaking plan, a major step forward in the country's path toward sustainable development. Now, Clarke-Samuels, Rosado and their colleagues at Belize's Coastal Zone Management Authority and Institute (CZMAI) were responsible for overseeing its implementation. However, implementing the plan presented a new set of challenges, and Clarke-Samuels and Rosado had decided to turn to their strongest local partners for help. The long-term well-being of the country's residents and the health of its natural ecosystems depended on their continued success.

Clarke-Samuels, the Chief Executive Officer of CZMAI, and Rosado, the agency's Coastal Planner, had made this same 270-kilometer drive to Punta Gorda along the Hummingbird and Southern Highways countless times. During the plan's development phase, the two of them frequently traveled up and down the coast, attending meetings with each of the nine Coastal Advisory Committees (CACs) responsible for spearheading the planning effort at the regional level. Each CAC consisted of local business interests, landowners, NGO and government representatives, academics, and other community members whose livelihoods or cultural beliefs gave them a vested interest in the sustainable use of the region's coastal resources. These stakeholders provided extensive input to CZMAI about the natural resources and human activities in the coastal zone and their desires for the future. In addition, a team of scientists and engineers from the Natural Capital Project at Stanford University helped to advance the planning process

Shelley Ratay and Professor Julia Novy-Hildesley prepared this Change.X case for the Change Leadership for Sustainability program at Stanford University's School of Earth, Energy and Environmental Sciences. The case is intended to promote class discussion rather than to illustrate either effective or ineffective handling of an administrative situation.

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through their expertise in science-policy engagement, sustainable development and ecosystem services modeling.

Located in the Toledo District on Belize's southern coast, Punta Gorda was quickly gaining popularity as a destination for international travelers. The region's sandy beaches, aquamarine Caribbean waters, offshore cayes, Mayan ruins, and striking views of rainforest-covered mountains had plenty to offer those seeking outdoor adventures or new cultural experiences. Yet compared to Ambergris Caye and other tourist hotspots that were already heavily built-out with resorts, ports and other infrastructure, Punta Gorda and the Toledo District remained largely undeveloped, and the planning process had given concerned residents a unique opportunity to help shape the region's development trajectory.^{1,2}

Mr. Chavarria, a long-time and well-connected resident of Punta Gorda, had earned Clarke-Samuels' and Rosado's trust and respect over the years through his collaborative leadership of the Southern Region CAC. Thanks to Chavarria's efforts and the active participation of the community as a whole, the Southern Region had been the first of nine regions to complete its portion of the national plan. Now, Clarke-Samuels and Rosado were looking to Chavarria to re-activate the CAC and help with local monitoring and enforcement of the Plan. They hoped he would be on board.³

Belize's Coastal Zone – A National Treasure at Risk

Located on the Caribbean coast of Central America, the country of Belize is rich in coastal and marine natural resources, including the second longest unbroken barrier reef system in the world. The country's coastal zone also includes three atolls, numerous coastal lagoons, extensive mangrove forests and more than 300 cayes, which together provide diverse habitat for marine life.^{4,5,6} The area provides habitat for 65 species of stony coral, 350 species of mollusks, over 500 species of fish, and a number of species of conservation concern including the West Indian manatee, green turtle, hawksbill turtle, loggerhead turtle, and the American crocodile.⁷ Endemic and migratory birds, including the red-footed booby, brown booby, and the common noddy, use the littoral forests along the coastal areas, cayes, and atolls to reproduce. In 1996, Belize's reef system earned distinction as a UNESCO World Heritage site. Thirteen years later, in 2009, the site

¹ "Belize's Toledo District – Including Punta Gorda and Other Areas," <www.belize.com/toledo-belize>, accessed January 23, 2018.

² The region's remoteness and relatively high poverty levels contribute to its lack of development vis-à-vis other coastal areas of the country.

³ Interview with Samir Rosado of the Belize Coastal Zone Management Authority and Institute, January 11, 2018. Except where otherwise noted, subsequent quotations from Samir Rosado are from the January 2018 interview and other communications with Mr. Rosado in 2018.

⁴ *Cayes*, pronounced as "keys" and sometimes spelled without the 'e', are sandy, low-elevation islands that form on top of coral reefs.

⁵ *Belize Integrated Coastal Zone Management Plan*, Coastal Zone Management Authority and Institute (CZMAI), Belize City, 2016.

⁶ The term coastal zone refers to the area bounded by the shoreline up to the mean high-water mark on its landward side and by the outer limit of the territorial sea on its seaward side, including all coastal waters.

⁷ *Belize Barrier Reef Reserve System*, UNESCO, <<http://whc.unesco.org/en/list/764>>, accessed May 2, 2018.

was listed as a “UNESCO World Heritage site in Danger” due to mangrove cutting and excessive development in the region.⁸

Of the 380,000 people who live in Belize, more than 40 percent live and work in the coastal zone, and many of these residents depend on the country’s marine and coastal resources for their livelihoods.^{9,10} The country’s robust tourism and fishing industries, in particular, rely on the natural beauty, rich biodiversity and healthy ecological functions of the coast and ocean, including protection from hurricanes provided by mangroves.

Well over a million tourists visit Belize annually, seeking out its picturesque beaches, diverse cultural experiences, world-class snorkeling, diving and more. Visitors from the United States are the largest drivers of tourism in Belize, accounting for nearly two-thirds of overall arrivals, followed by Europeans and Canadians at 12 and 7 percent respectively.¹¹ In 2016, tourist-serving businesses such as hotels, restaurants, airlines and other transport providers, travel agencies and tour operators provided approximately 13 percent of the country’s jobs and directly generated 14 percent of the national gross domestic product (GDP).¹² When activities indirectly related to tourism are factored in – such as capital investments in airplanes and new hotels and government spending on security and sanitation services in resort areas, tourism’s contributions to employment and GDP jump to 34 and 38 percent.¹³ Through 2027, the country’s tourism sector is expected to continue growing at an annual rate of more than five percent. The country’s fishing industry, while not as large as tourism, accounts for three percent of national GDP and plays a large, visible role in Belizean society, as commercial, subsistence and recreational fishers all vie for access to prime coastal waters where tarpon, spiny lobster, conch and other species thrive.^{14, 15}

In addition to directly supporting key sectors of the national economy, the natural systems of the coastal zone provide numerous ecological functions, or *ecosystem services*, that underpin the country’s long-term environmental health and human well-being. The reef system, seagrass beds and mangroves, for example, provide critical habitat for marine life that are the economic backbone of the fishing industry, while also protecting the coastline from storm surges, an increasingly important function as climate change threatens to bring weather events of increased frequency and

⁸ Ibid.

⁹ *World Population Prospects*, United Nations Population Division, <<https://esa.un.org/unpd/wpp/>>, accessed January 24, 2018.

¹⁰ *Belize Integrated Coastal Zone Management Plan*, Coastal Zone Management Authority and Institute (CZMAI), Belize City, 2016.

¹¹ Belize Tourism Board, <<http://www.belizetourismboard.org/belize-tourism/statistics/>>, accessed January 23, 2018.

¹² *Travel and Tourism Economic Impact 2017 – Belize*, World Travel and Tourism Council, <<https://www.wttc.org/>>, accessed January 24, 2018.

¹³ Indirect activities include private capital investments such as purchases of new airplanes and construction of new hotels; government spending on tourism marketing and promotion, aviation, security and sanitation services in resort areas, etc.; and purchases of goods and services by tourist-serving businesses, including purchases of food and cleaning services by hotels, of fuel and catering services by airlines, and IT services by travel agents.

¹⁴ *Fisheries and Aquaculture Country Profiles – Belize, Country Brief*, Food and Agriculture Organization of the United Nations, updated December 2016, <<http://www.fao.org/fishery/facp/BLZ/en#CountrySector-Overview>>, accessed January 24, 2018.

¹⁵ Rosenthal A., G.Verutes, K.Arkema, C. Clarke, M. Canto, S. Rosado, and S.Wood. *INVEST Scenarios Case Study: Coastal Belize*, <http://www.naturalcapitalproject.org/pubs/Belize_INVEST_scenarios_case_study.pdf>, accessed January 24, 2018.

severity to the region. Coastal vegetation stores and sequesters carbon from the atmosphere in its sediments, leaves, roots and shoots, helping to regulate Earth's climate. Given that much of Belize's landmass lies below sea level and much of its population resides along the coast and cays, the threat of rising seas from climate change is particular cause for concern. At the same time, warming seas pose a risk to the coral reef, as corals die in warm waters.^{16, 17}

Whether knowingly or unwittingly, the very industries that depend on Belize's natural resources and the ecosystem services they provide oftentimes contribute to their degradation and depletion.¹⁸ The owner of an oceanfront hotel, for example, might decide to remove mangroves along the shoreline in order to improve views and provide guests direct access to the water for swimming and boating. Those mangroves, however, provide essential nursery habitat for fish and spiny lobster, and their removal, combined with the persistent problem of overfishing, accelerates the decline of fish stocks in coastal waters. Local fishermen must now work even harder to make a living and meet the growing tourist demand for fish at restaurants, resorts and cruise ship dining rooms. Meanwhile, the quality of popular tourist activities such as snorkeling and diving is diminished, creating challenges for tour guides and other segments of the tourism sector that rely on Belize's reputation for world-class recreation. Activities outside the coastal zone can also harm the country's coastal and marine resources. Agricultural runoff from inland areas, for example, introduces pesticides, herbicides and other pollutants into coastal waters, further impacting fisheries and tourism. Over time, the cumulative impacts of human activities and land use changes in and around the coastal zone diminish the services provided by natural systems, leaving them and the industries they support less resilient.

Coastal Planning in Belize

Steadily increasing demands on Belize's coastal and marine resources and conflicts over their use have raised growing concern about how to protect the country's natural assets for the future. Government oversight of the country's coastal zone and its resources has traditionally been siloed, with industries such as tourism, transportation, fisheries, forestry and agriculture falling under the jurisdiction of separate government ministries. Under this arrangement, a ministry working toward one set of focused outcomes might be undermined by another ministry optimizing for a different set of goals. Moreover, since industry-specific government interventions typically fail to account for the highly dynamic nature of the coastal zone and its complex physical, chemical and biological interactions and interdependencies, this conventional approach to coastal planning and management often allows unsustainable practices to persist.^{19,20}

¹⁶ Arkema K., G. Verutes, S. Wood, C. Clarke, M. Canto, S. Rosado, A. Rosenthal, M. Ruckelshaus, G. Guannel, J. Toft, J. Faries, J. M. Silver, R. Griffin, A. D. Guerry. 2015. *Improved returns on nature's benefits to people from using ecosystem service models in marine and coastal planning in Belize*. Proceedings of the National Academy of Sciences. 112 (24):7390–7395, doi: 10.1073/pnas.1406483112.

¹⁷ *Belize Integrated Coastal Zone Management Plan*, 2016.

¹⁸ Arkema K., G. Verutes, J. Bernhardt, C. Clarke, M. Canto, S. Rosado, S. Wood, M. Ruckelshaus, A. Rosenthal, M. McField. 2014 Assessing habitat risk from human activities to inform coastal and marine spatial planning in Belize. *Environmental Research Letters* 9 114016.

¹⁹ *Belize Integrated Coastal Zone Management Plan*, 2016.

²⁰ The importance of integrated management, especially in ocean and coastal systems, has been recognized around the world and written about extensively. See, for example, McLeod, Karen and Heather Leslie, Editors, *Ecosystem-Based Management for the Oceans*, Island Press, 2009.

In 1998, the Belizean government passed the Coastal Zone Management Act (“the Act”) in response to increasing pressure on coastal land and marine resources and the challenges arising from rapid tourism-based development, over-fishing and population growth. This visionary legislation formally established the Coastal Zone Management Authority and Institute (CZMAI) as the central agency responsible for designing a comprehensive plan to address some of these unsustainable practices and charting out a set of actions that would ensure sustainable use of the country’s coastal resources.^{21, 22} Early financial support from the United Nations Development Programme (UNDP) enabled CZMAI to carry out its activities.

Behind the scenes, local and international NGOs were instrumental in laying the groundwork for the passage of the Act. The World Wildlife Fund (“WWF”), for example, a long-time leader in resource conservation efforts throughout the Caribbean, spent years gradually building support for a comprehensive, science-based planning process.²³ According to CZMAI’s Rosado, local communities also came forward to advocate for better coastal zone management, as they increasingly recognized that tourism hotspots such as Ambergris Caye were on a path of rapid and unsustainable growth, and that other regions might find themselves on a similar trajectory if care were not taken. Local communities experienced first-hand the increasing demand for coastal lands to support tourism activities (e.g., hotels, resorts, transportation infrastructure, utilities), conflicts between traditional fishing activities and marine based tourist activities (snorkeling, diving and sport fishing), increased dredging activity and mangrove removal associated with development of tourism infrastructure, and increased demand for fisheries products to support both local and tourist demands. The national planning process was identified as a solution to address these escalating problems.

CZMAI’s fundamental goal was an ambitious one: “to facilitate the improved management of coastal and marine ecosystems so as to maintain their integrity while ensuring the delivery of ecosystem service benefits for present and future generations of Belizeans and the global community.”²⁴ As mandated by the Act, CZMAI would need to follow a fairly specific process with respect to plan preparation, approval, implementation and monitoring. In addition to requiring extensive engagement from diverse stakeholders (i.e., government ministries, non-governmental organizations, private sector interests, community groups, and indigenous communities), the Act specified that the planning process should be continuous and adaptive. Once CZMAI had developed a *National Integrated Coastal Zone Management Plan* (hereinafter “the Plan”) and the Belizean government had approved it, the CZMAI team would need to evaluate the effectiveness of the proposed measures every four years and adjust the plan as necessary to reflect new information and lessons learned. This Plan would be the first of its kind in Central America and the wider Caribbean region.²⁵

²¹ *Belize Integrated Coastal Zone Management Plan*, 2016.

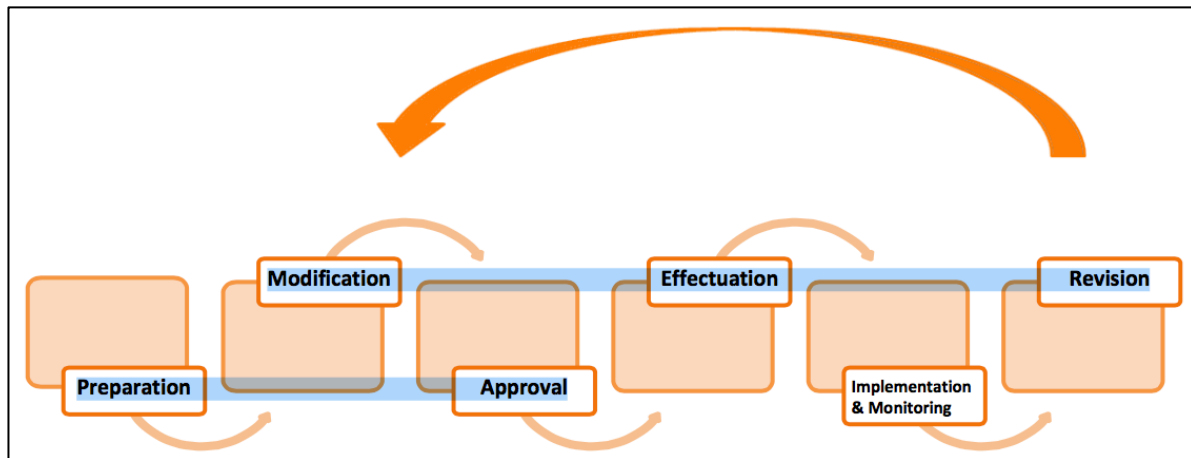
²² Prior to this, coastal zone management activities had fallen to a small sub-unit of the Fisheries Department.

²³ Conversation with Mary Ruckelshaus, Managing Director of the Natural Capital Project, November 6, 2018.

²⁴ *Belize Integrated Coastal Zone Management Plan*, 2016.

²⁵ A similar planning effort has since been undertaken in The Bahamas.

Figure 1: Plan Development, Implementation, Monitoring and Revision Process

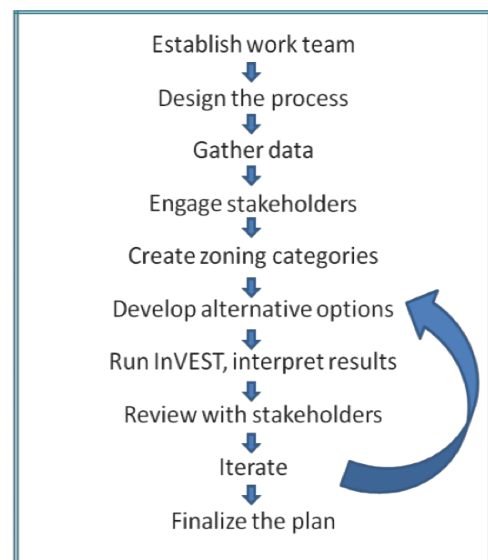


Source: Management Plan

In 2005, when CZMAI expended the last of its UNDP funding, the Belizean government lacked adequate replacement funds to sustain CZMAI’s work. Financial constraints forced CZMAI to scale back its operations dramatically, leaving the agency no choice but to effectively abandon the planning activities of the previous seven years. In the years that followed, although several other ministries possessed permitting powers that could be used to control coastal activities, coastal development projects moved forward in an ad hoc manner, with limited government coordination. During this time, CZMAI was given management oversight of an island called Goff’s Caye and the ability to charge fees related to the island’s use. Revenue from fees was used for upkeep of the island and to fund limited CZMAI activities. CZMAI also began to manage and generate fee revenue from the country’s sport fishing licensing system as a way to fund its planning activities.

Eventually, in 2008, the central government allotted a small government subvention dedicated to supporting CZMAI’s work, and in 2010, a small but committed staff team re-launched the planning process in earnest. Vincent Gillett served in the role of CEO at the time and held chief oversight responsibilities for the ambitious planning project, while Chantalle Clarke-Samuels, the team’s Coastal Planner (who would later become CEO), and Samir Rosado, Coastal Science Research Officer (who would later be promoted to the Coastal Planner position), did much of the day-to-day legwork, traveling all over the country to mobilize Coastal Advisory Committees in nine different coastal planning regions, gather data, and participate in hundreds of hours of community stakeholder meetings and interviews. Clarke-Samuels and Rosado also took the lead on writing the contents of the plan, while CZMAI’s Data and GIS Manager at the time, Maritza Canto, led the process of creating spatial data layers for

Figure 2: Iterative Planning Process



Source: Management Plan

the team's mapping and modeling efforts, assisted by GIS consultant Ian Gillett. The team embraced a flexible workplan centered around knowledge-building, ecosystem services and stakeholder engagement.²⁶

Creating the Foundation for Change: Building Capacity²⁷

CZMAI's leaders felt strongly that the national plan should be developed by and for Belizeans, rather than outsourced to international consultants, as was common practice in developing countries. However, they were also realistic about the fact that their small team would be hard pressed to complete the monumental task without outside support. When a contact at WWF suggested that CZMAI engage an interdisciplinary team of specialists from the U.S.-based Natural Capital Project to help, the CZMAI team gave the idea careful consideration. The Natural Capital Project (or "NatCap") – a collaboration of scientists and analysts from Stanford University, the University of Minnesota, WWF and the Nature Conservancy – was developing a powerful approach for incorporating science into policy and a set of software tools designed specifically to model complex social-ecological interactions within natural systems. Part of the appeal of working with NatCap was their extensive network of more than 300 scientific and implementing institutions, which gave CZMAI confidence in the quality and breadth of their approach and tools. Their *InVEST* software – short for "integrated valuation of ecosystem services and tradeoffs" – could be ideal for modeling the different values derived from Belize's coastal and marine natural resources and enabling comparisons of alternative planning scenarios.

The CZMAI team knew that one of their biggest challenges would be coordinating and building support among the various government ministries that must ultimately sign off on the Plan. Numerous ministries held jurisdiction over the management of the coastal zone and its resources, and managers in each ministry were accustomed to making decisions independently, without necessarily consulting other ministries or considering how their decisions might impact industries, communities or natural systems outside their jurisdiction. Developing an integrated coastal management plan across ministries and industries – taking into account the impact of mangrove loss on fisheries, for example, or the positive and negative impacts of coastal development on tourism – would be a complicated and politically sensitive task.²⁸ In order to gain the confidence and approval of government stakeholders, building the plan on a foundation of sound scientific analysis would be essential. The Natural Capital Project's strengths in this area convinced CZMAI to bring the Stanford-led collaboration on board.

For its part, the Natural Capital Project (NatCap) team was eager to apply and advance its sustainable development expertise and scientific models in the context of a complex, real-world

²⁶ *Belize Integrated Coastal Zone Management Plan*, 2016.

²⁷ This section heading and those that follow reflect a social change framework articulated in Stroh, David Peter, *Systems Thinking for Social Change: A Practical Guide to Solving Complex Problems, Avoiding Unintended Consequences, and Achieving Lasting Results*, Chelsea Green Publishing, White River Junction Vermont, 2015.

²⁸ Solie, Stacey, *Belize Coastal Plan a Model for the World*, The Natural Capital Project, April 2016, <<https://www.naturalcapitalproject.org/belize-coastal-plan-a-model-for-the-world/>>, accessed January 24, 2018.

decision-making process.²⁹ Katie Arkema, a Stanford University scientist with a PhD in ecology, evolution and marine biology, served as NatCap’s lead scientist for the Belize planning effort. “Through early conversations, we saw that a lot of key elements were already in place to give this national planning effort a real chance at success,” Arkema said. “Belize has a long history of coastal management, dating back to the 1990s. It’s a small country, but a lot of bright and committed people had been coming together for a long time and talking about what we now know are some of the central tenets of good, integrated resource management, like involving multiple sectors, engaging the public, and creating geographically-specific recommendations. And the government at the time had the foresight to put all of that into their Coastal Act. The elements that were called for in the legislation were strongly aligned with the kinds of models and tools that we hoped to bring to the table. This was the perfect chance to see if what we thought would work in theory would work in real life.”

Arkema recalled her early interactions with the CZMAI team. “They were very cautious about how much they wanted to bring us in at first. They didn’t want the Belizean people to view this as an outsider-driven process, with outsiders coming in to tell the country what to do,” Arkema explained. “A lot of this type of work that’s done in the Caribbean – like developing a plan – it’s done by hired consultants, by people who leave and disappear. Chantalle had this determination that she and her team, though they were a very small group, were really going to see this through. They were committed to writing the plan themselves. I’ve honestly not seen that sense of dedication anywhere else in our work,” she said.

After several months of fairly regular communications with the full CZMAI team, Arkema finally found a chance to speak with Clarke-Samuels one on one. During that phone call, Clarke-Samuels took the time to walk Arkema one name at a time through a long list of representatives from each government ministry, each of whom held a seat on either the CZMAI Board or Advisory Council and would have a say in the national plan’s approval as it made its way up the political chain. Though Arkema had yet to meet Clarke-Samuels in person, something between the two of them clicked that day. “It was just the two of us on the phone,” Arkema recalled, “and that’s when a real connection emerged. I felt like there was this breakthrough in understanding, of being able to clearly see the challenges they faced. It was the first time I really began to understand Chantalle’s vision for the plan—and her pragmatism,” Arkema said.

When CZMAI’s Rosado joined the team several months into the process, he was quick to embrace the collaboration with NatCap. “We realized that the tools, the science and everything that they were offering could really assist us in this huge undertaking. That was enough to get me on board,” he said. As the partnership with the NatCap scientists progressed, Rosado and his CZMAI colleagues learned new technical skills that helped advance the planning process and would also bolster the agency’s capacity to carry out its work after Stanford was no longer involved. “I had no idea about GIS before this started - none,” Rosado said. “I had to learn it out of necessity, because there was just so much work to be done. Having the NatCap guys there to help us with our work, and to teach us as we went along, it was actually a very, very big help to us.”

²⁹ Interview with Katie Arkema of Stanford University and the Natural Capital Project, conducted on November 30, 2017. Except where otherwise noted, all direct quotations in this case from Katie Arkema are from a set of interviews conducted on November 30, 2017, December 7, 2017, and January 11, 2018.

“Capacity building was a big part of this process on a lot of different levels and scales,” Stanford’s Arkema explained. “Part of the reason that our NatCap team and the CZMAI planning team were able to successfully work together was that we were both really open to learning from each other. During our time together, we were teaching Samir and Chantalle various things and they were teaching us various things. We taught them about the variety of ways to measure the value of ecosystem services – such as acres of land protected from erosion, or avoided cost of damages to coastal properties, for example, while they taught us about the types of information that would be useful to different stakeholders, and so much more. There was this constant evolution of people’s roles and understanding, and then we could innovate more in our work.”

At one point, the two teams – the CZMAI planning team led by Clarke-Samuels and the NatCap science team led by Arkema – started to hold weekly one-hour phone calls. “I don’t remember how that exactly came to pass,” Arkema said, “but we put those calls on the calendar and we stuck by them. We had a relatively small group, and that allowed for very close co-development of the science and the planning process. We worked hand in hand like that for three years.”

The act of holding weekly calls, as simple as it seemed, turned out to be tremendously important to the project’s success. Not only did these regular touch points nurture trust among the core team members, they also allowed for an iterative process that resulted in a stronger plan. “So often, at least in academics,” Arkema explained, “you conduct a bunch of research but you don’t put it out into the world until you’ve written a whole paper on it. In Belize, we took this entirely different approach where each week we could present some ideas and ask, ‘Hey, is this in-line with what you are thinking? Or is this gonna help you tease apart these different issues? Or is this going to resonate with stakeholders?’ So you’re constantly putting things out there that may not be right, but then that gives you an opportunity to tweak it and change it as you go,” she said.

CZMAI’s Rosado found the frequent calls to be valuable too. “Every time we spoke we got an opportunity to sort of pump the breaks,” he said. “We would give a progress report on what we had accomplished at the latest community meeting, or take a look at the information we’d collected. We would all share. And then Katie or Greg or Spencer [from NatCap] would say, ‘Okay well, we could take this information and we could do this, and this, and this with it. But we would need this or that from you in order to make that happen.’ And then we would decide how to proceed. We would get off the calls with a renewed sense of direction and focus. It was a constant aligning of direction by our two teams.”

Mary Ruckelshaus, managing director of the Natural Capital Project at Stanford, observed that the relationships that emerged between team members at CZMAI and NatCap made the collaboration more resilient.³⁰ “Having that strong foundation in place enabled the group to keep going year after year and work through any challenges that arose,” she said.

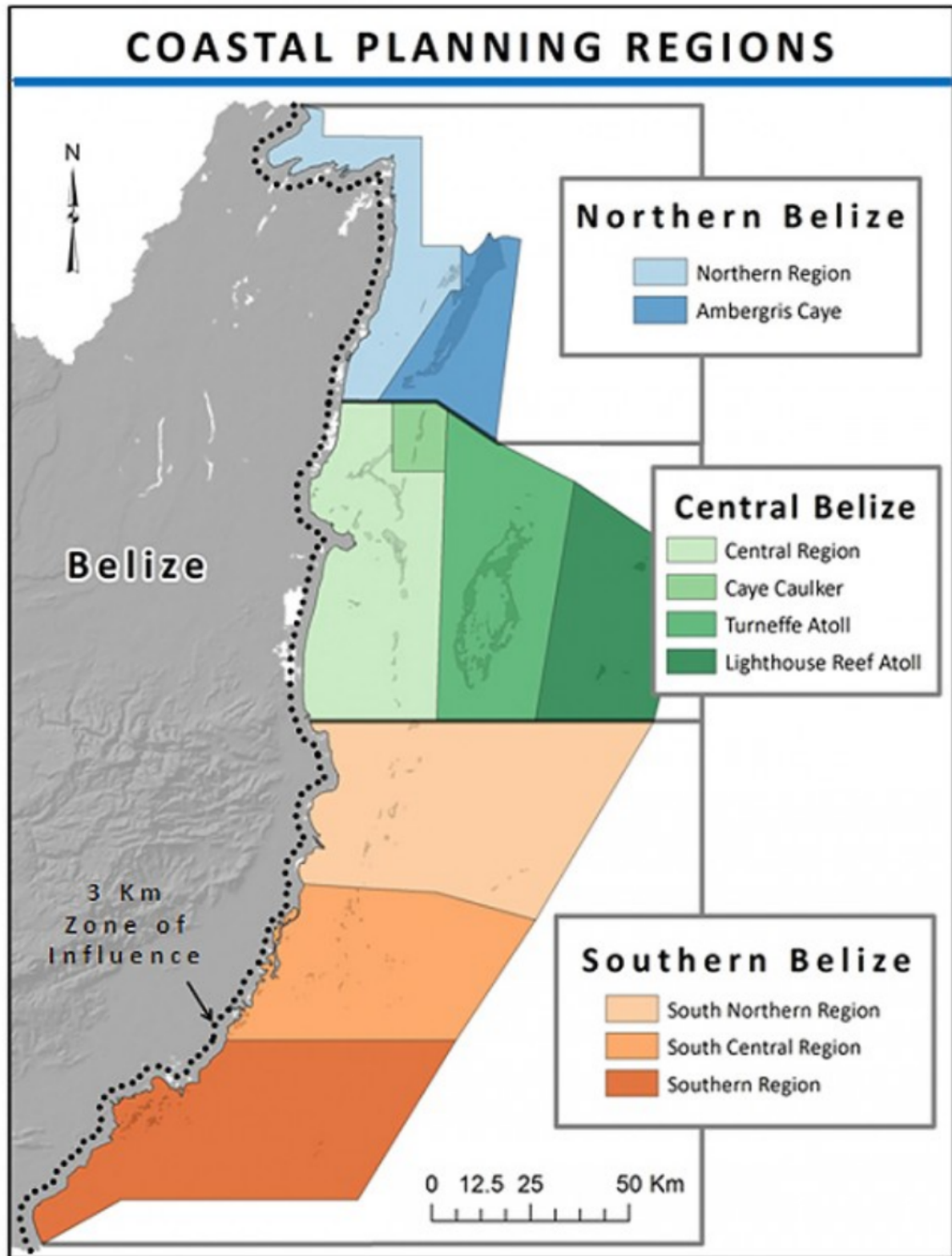
Creating the Foundation for Change: Engaging Stakeholders

Under the Coastal Zone Management Act, Belize’s coastal zone was divided into nine separate coastal planning regions to encourage local participation in the planning process and allow for

³⁰ Ruckelshaus, 2018.

regional differences. (See Figure 3 for a map of the regions.) Each coastal planning region would develop its own regional planning recommendations, and then CZMAI would integrate the nine regional plans into a single national plan. As one of their first major undertakings, Clarke-Samuels and Rosado went to work helping each region set up its own Coastal Advisory Committee (CAC). Comprised of local stakeholders from a variety of sectors and industries, these committees were responsible for creating planning guidelines specific to their own regions. Clarke-Samuels and Rosado

Figure 3: Coastal Planning Regions as Defined by the Coastal Zone Management Act



Source: Management Plan

“In a planning region like Ambergris Caye that is largely tourism-driven, you would have more of your tour operators, your fishing guides, and your local fishing associations represented,” Rosado explained. “In the southern regions, where farming is more prevalent, you would have your agricultural association or a grower's group. It was all dependent on what the main economic activities were. However, we did have some constants across all the regions. We always tried to have a representative from an educational institution in the community, as well as the government ministries that were responsible for regulating the main activities in the area. For example, if agriculture was a big interest in the planning region, we would ask a representative from our country’s Agricultural Department to participate, and so on in the other areas. (For an example of CAC composition, see the list of members of the Southern Region CAC in Figure 4.)

Figure 4: Southern Region Coastal Advisory Committee Membership List³¹

- Mario Chavarria, Toledo Development Corporation (Chair)
- Jorge Ramirez, Rio Grande Fishermen Cooperative Society (Vice Chair)
- Karyn Stein, Sarstoon Temash Institute for Indigenous Management (Treasurer)
- Rachel Graham, Belize Tourism Industry Association – Toledo Branch
- James Foley, Toledo Institute for Development and Environment
- Paula Jacobs, Punta Negra Village Council
- Lyndon Rodney, Belize Fisheries Department
- Chris Harris, South Coast Citizens for Sustainable Development
- Dennis Garbutt, Toledo Tour Guide Association
- Victor Jacobs, University of Belize – Toledo Campus
- Christian Bech, Monkey River Management Company
- Jack Nightingale, Toledo Association of Businesses
- Wil Maheia, People’s National Party/Interested Citizen
- Mayor, Punta Gorda Town Council
- Representative, Southern Environmental Association
- Chantalle Clarke-Samuels/Samir Rosado, CZMAI (Secretary)

The CZMAI team was intentional about empowering local stakeholders to lead the CACs, insisting that local community members serve in the roles of Committee Chair and Vice Chair and work together to conduct all of the meetings. Clarke-Samuels and Rosado took on the role of CAC Secretary in each region to ensure they would have comprehensive minutes from all gatherings. “We aimed for minimal interference,” Rosado said. “We would provide background information, we would set the stage, and then we would allow them to run the meetings. At the end of the day, any conflicts that arose or compromises that needed to be made, the committees handled all that and we only steered a bit when it was really necessary.”

“What we wanted to do was, of course, deliver a national plan, but we didn't want it to be something that we made ourselves and then forced onto the communities, forced onto the stakeholders,” Rosado said. “Instead, we wanted to build from the bottom up. The division of the coastal zone

³¹ Membership list as at 2014. Members have since changed.

into separate planning regions really facilitated that bottom-up approach. And by empowering local stakeholders we were helping to build buy-in for the plan. If the plan was generated from within communities, by people who really understood local issues and challenges and could represent their community's interests, then the recommendations they came up with for addressing those issues were likely to earn people's confidence. That was something that we aimed to do from the onset."

While some regions were enthusiastic about launching a CAC and engaging in the planning process, others were not. In regions where people's livelihoods were integrally linked to coastal resources, Clarke-Samuels and Rosado found community members to be very proactive. "They recognized very early on, especially the business interests – your tour guide associations, your hoteliers, your restaurants, your dive shops – that this plan would actually steer the way the government would regulate the coastal resources that were very important for their livelihood. And so they tried their absolute best to give guidance that would maximize their access to resources but at the same time decrease the negative effects on the sensitive habitats that they relied on." Rosado said. "If you have a snorkeling or a dive shop, the coastal waters are really their business. They recognize that if the reefs die out, they lose business. But at the same time, they would like to maximize their use of the reef while minimizing the impact of those divers."

In places where the linkage between jobs and coastal resources wasn't as strong, where agriculture played a more central role in the economy than tourism, for example, CZMAI faced some push back, and convening a CAC was more challenging. "One of the difficulties in us being a quasi government agency," Rosado explained, "is that in some areas, there was suspicion that this was just another plan to limit what they can do with their land or in the coastal waters. They thought that we were going to introduce more red tape. We had people that were hell-bent on the idea that this plan would make their lives harder. They were skeptical of the entire process. That was something that we had to work through in our meetings. It was hard, but we listened and explained the process, to help take the uncertainty out of it, and eventually they got on board."

Even in regions where the planning process was favorably received, community members sometimes raised doubts about the effort. Was the plan just going to sit on the shelf? Would anything actually happen? Were they wasting their time? Mario Chavarria, CAC Chair for Belize's southernmost planning region, was generally effective at winning over skeptics. Mild-mannered and optimistic by nature, Chavarria reminded his fellow community members that the plan was important because everyone in the community was in some way or another a beneficiary of the region's unique natural resources and the ecosystem services they provided. Everyone stood to benefit from a thoughtful plan that would protect local resources for the long-term and prevent resource abuse. For some stakeholders – the fisher folk and tourist businesses especially – their economic survival and livelihoods depended on it. "This is part of a national process mandated by the government. It will ultimately be approved, and we should be a part of it," Chavarria maintained.³²

³² Chavarria, Mario, *The Southern Region CAC Planning Process*, a presentation to Caribbean Regional Conference: Integrating Climate Adaptation Planning into Coastal Zone Management using Ecosystem Services. Princess Hotel and Casino, Belize City, Belize, October 9 – 11, 2012.

Looking back, Rosado singled out CZMAI's hands-off approach at local meetings as one of the leading drivers of strong stakeholder engagement. "By taking a backseat and *not* leading, we showed that the onus was on them to get this done. They essentially convinced each other of the importance of this plan," Rosado said. He recalled sitting in many CAC meetings and watching the chair or another committee member get up to explain or reiterate why it was so important to participate. "Whenever somebody raised a concern about resource conflicts, for example, somebody else would say, 'Well, you know, this is why we need to plan, because these are the kinds of things that a plan would address.' Letting the community members create that buy-in was a very big part of the process," he explained.

Understanding the Current Reality

During her early visits to Belize, NatCap's Arkema observed that Belizeans demonstrate care for their natural environment and possess a high level of environmental awareness. "Our team of scientists didn't have to come into this situation and work on changing attitudes around the importance of nature. We were able to come into this place where people said, 'Yes, we know that nature matters. We know that people's well-being depends on nature. That's something that we're bought into. What we actually want to know is how the decisions that we make, these management planning decisions, could affect the things that we care about that come from nature, now and in the future.' This was an intuitive understanding that Belizeans clearly had," Arkema said.

Building on this foundation of environmental awareness, CZMAI and NatCap went to work helping each of the nine CACs reach a more detailed and integrated understanding of the key natural systems and human activities in their region and the dynamics among them. The team spent several months reaching out to government ministries, universities, industry associations and NGOs to collect existing data on biodiversity, habitats, and human uses of the marine and coastal environment. As they compiled all this information into a central database, along with satellite imagery of the coast, the team started to gain a clearer picture of the types and distribution of activities occurring in the coastal zone. To ensure that their dataset captured valuable local knowledge, Clarke-Samuels, Rosado and their planning colleagues spent time on the ground in each region of the country, using physical maps, surveys and interviews to solicit input from community members about the current locations and intensity of human activities, and to ask them about their values and goals for the future of the country's coastal resources.^{33, 34}

"We printed out huge versions of the planning region maps, gave everybody markers and said, 'Listen, identify where you guys fish. Identify areas where there's been dredging activity, or development activity,'" Rosado explained. The team then digitized the hand-drawn maps and gave community members a chance to review and further refine them for accuracy. Though stakeholders had the option to provide input via online mapping tools, most chose to submit their feedback in person at community meetings hosted by the CACs.

³³*Belize Integrated Coastal Zone Management Plan*, 2016.

³⁴ Arkema K. and M. Ruckelshaus. 2017. "Transdisciplinary research for conservation and sustainable development planning in the Caribbean." In *Conservation in the Anthropocene Ocean: Interdisciplinary Science in Support of Nature and People*. Levin, P & M. Poe, Eds.: pp. San Diego, CA: Elsevier.

Through this iterative process of information gathering and map revisions, CZMAI and NatCap created a refined set of regional maps that depicted the locations where specific human activities were occurring throughout the coastal zone. These “baseline” or “*current scenario*” maps helped ensure that everyone involved in the planning process shared a common understanding of the current reality.³⁵

Finding Common Ground

With the initial phase of information gathering and mapping complete, CZMAI and NatCap turned their attention to grouping the numerous human activities occurring in the coastal zone into a small set of zoning categories. These zoning categories would ultimately be used in the plan to specify the permissible locations for each type of activity. Following best practice from other planning efforts around the world, NatCap guided CZMAI in limiting the zoning categories to a small number of broad groupings. “We asked them, ‘What are the major categories of human activities that you’re going to manage? What do you need to focus on?’” Arkema said. “There can be a tendency to get very detailed very quickly,” she explained. “For example, you could break up a marine transportation zone into the areas where the water taxis go, and where the cruise ships are. You could break down your fishing areas by all different types of fish caught and type of gear used. But you have to remember that people are going to be out there in the real world following the guidelines that you’re creating, and it can be very challenging to implement overly detailed plans. If you start coarse, you can always go finer in future iterations if that becomes necessary.”

The eight zoning categories that the partners ultimately selected included fishing, coastal development, dredging, marine recreation, aquaculture, agriculture, marine transportation, and oil exploration and drilling. In addition, the plan would include protective designations such as coastal and marine protected areas and cultural and historic preservation sites. These categories were informed by NatCap’s expertise in sustainable development analysis and planning, CZMAI’s vast knowledge of the country’s specific coastal management needs, and the extensive input of local stakeholders.

Next the team set to work determining which ecosystem services to model, again relying on extensive stakeholder input. Reaching agreement on shared objectives early on in the process was essential so that the NatCap scientists could focus their time-intensive modeling efforts on the most important analyses. “We needed to understand which ecosystem benefits communities cared about the most so that we could examine how changes to the coastal ecosystems would affect the core things that they valued or worried about,” Arkema explained. After much consultation with the CACs, government ministries and other stakeholders, three top priorities emerged: 1) lobster fisheries, which would be evaluated in terms of pounds of harvested lobster and the market value of the harvest; 2) tourism, to be measured by the number of tourists as well as the market value of tourist activities; and 3) coastal protection, evaluated in terms of the area of land protected and the dollar value of avoided damages.³⁶

³⁵ Arkema et al., Proceedings of the National Academy of Sciences, 2015.

³⁶ Ibid.

Though Arkema and her NatCap colleagues had developed a variety of ecosystem services modeling tools prior to their engagement in Belize, they were prepared to develop new scientific approaches and tools as necessary to support the country's unique planning needs. Once they were confident, based on extensive stakeholder input, that lobster fisheries, tourism and coastal protection were the ecosystem benefits of greatest importance, Arkema and a small but devoted team of Stanford scientists and colleagues at World Wildlife Fund spent the next several months building out new software models designed to map and quantify the biophysical and economic values of these ecosystem benefits. By using their new InVEST tools to analyze the current scenario, the team was able not only to measure the tremendous value currently provided by ecosystem services, but also, importantly, to see the spatial, or geographical, distribution of the ecosystem services and the locations where people were benefitting from them. "Understanding the relationships between nature and people across space and time is critical for determining management priorities," Arkema emphasized. This initial application of the modeling tools also gave the NatCap team an opportunity to test and refine them in preparation for their next major phase of work: future scenario planning.

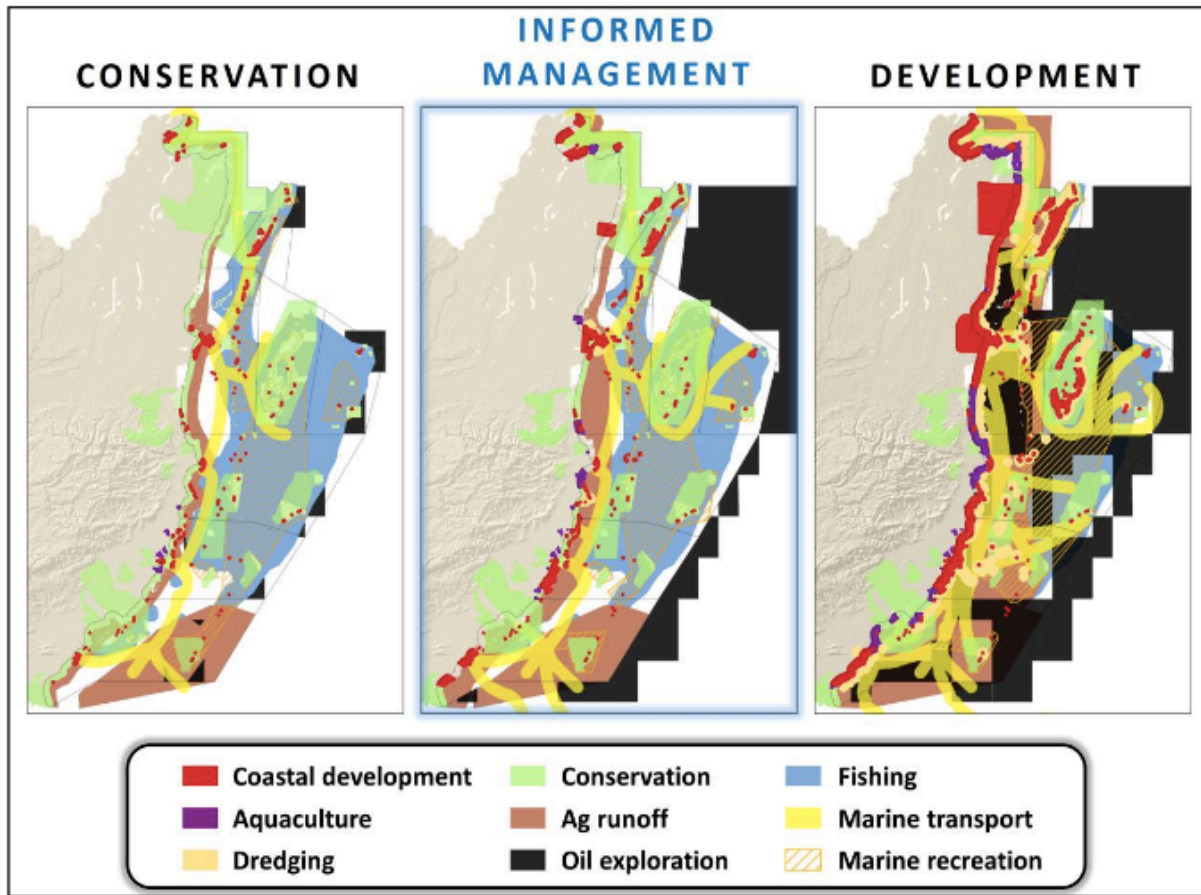
Scenario Planning: Creating a Shared Vision for the Future

With the zoning categories established, the current scenario complete, and the modeling software ready, it was time for CZMAI to conduct another round of stakeholder meetings throughout the country. This time, the team would meet with the CACs to develop and refine three alternative future zoning scenarios for each region: 1) a "development" scenario, which prioritized development activities above all else; 2) a "conservation" scenario, which prioritized long-term ecosystem health; and 3) an "informed management" scenario, which attempted to strike a balance between the two, integrating strong conservation goals with current and future needs for development and marine uses. Over many months, NatCap engaged with CZMAI in an extensive process of soliciting stakeholder ideas, developing the scenarios, running the ecosystem services models, and further revising the scenario maps. The process was highly iterative, involving three major rounds of back and forth before the team arrived at the final scenario maps shown in Figure 5.³⁷

"The ideas embodied in the alternative scenarios came from the stakeholders – from the maps they drew with CZMAI in all of the CAC meetings," Arkema explained. "We took all their ideas about how the future might look different [with regard to human uses of the coastal zone] and incorporated those into the three alternative future scenarios – one oriented toward conservation, one toward development, and a third for informed management. For each of the three scenarios, we mapped out the zoning categories using different spatial configurations, marking areas for coastal development, dredging, marine transportation, aquaculture, etcetera." The stakeholders then reviewed the scenarios to see if CZMAI and NatCap had incorporated their alternative ideas for the future accurately, and gave feedback as needed. The NatCap team then ran the scenarios through their ecosystem services models to determine the magnitude and distribution of ecosystem benefits – in terms of lobster fisheries, tourism, and coastal protection – derived under each scenario. Outputs from the model are shown in Figure 6.

³⁷ *Belize Integrated Coastal Zone Management Plan*, 2016.

Figure 5: Alternative Future Scenarios Designed by Stakeholders



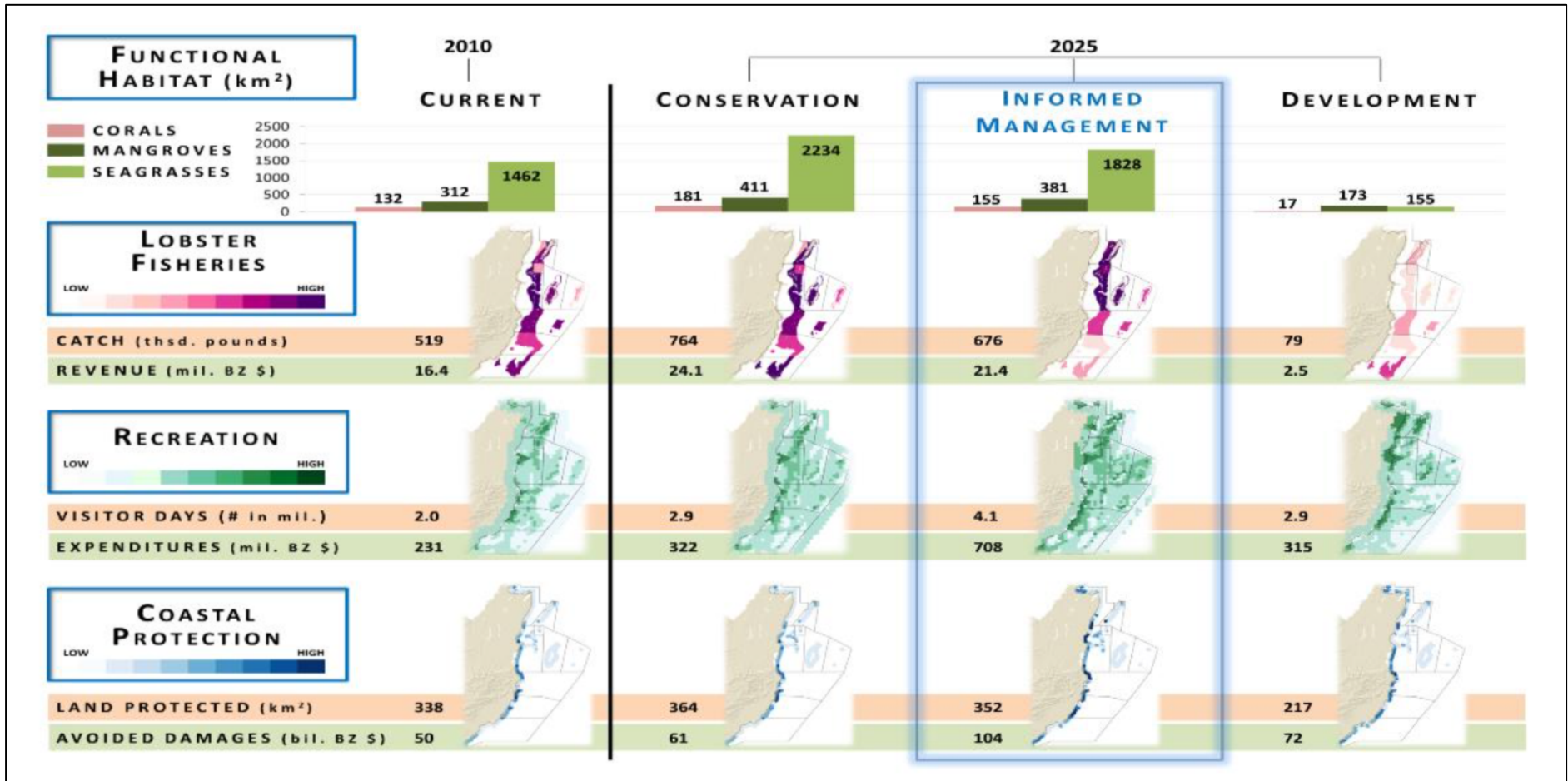
Source: Rosenthal et al., *InVEST Scenarios Case Study: Coastal Belize*.

While only the informed management zoning scheme would ultimately make it into the national plan, it was important for the stakeholders to clearly understand all three of the scenarios and see the tradeoffs involved so that they could make informed decisions about their country’s future. As the team refined and optimized the informed management scenario, they were able to show that it was in fact possible to achieve conservation and development goals at the same time, as long as the activities were evaluated carefully and sited in appropriate places.³⁸

At times, the NatCap team worked around the clock, fine tuning models and preparing maps so that the CZMAI team had everything they needed for upcoming meetings with CACs, government representatives or other stakeholders. Arkema didn’t mind the long hours. “The scientist in me finds it fascinating to try and solve questions of how people depend on nature. I truly get excited when there’s a real world puzzle to solve, and not just a hypothetical question I’ve come up with in my office,” she said. “In Belize, we believed that the science would support the country’s ability to do planning from the bottom up and from the top down, helping them see and understand the regional variations that were important locally while at the same time pursuing sustainable development objectives on a national scale.”

³⁸ Arkema and Ruckelshaus, 2017, in *Conservation in the Anthropocene Ocean*.

Figure 6: Functional Habitats and the Delivery of Ecosystem Services by Scenario



Sources: Management Plan; Arkema et al., 2015; Arkema and Ruckelshaus, 2017.

Clarke-Samuels shared Arkema's commitment to good science, and she helped ensure that no corners were cut for the sake of expediency. "She's able to appreciate the science in a way that you don't always find in somebody who's also a visionary leader," Arkema said. "She didn't want us to rush through the science just to get to some answer. She really wanted to understand how things work and what the implications were."

While Clarke-Samuels relied heavily on Arkema and her NatCap colleagues to develop the science behind the plan, and to design and outline the key steps for integrating science into the policy development process, she and Rosado took the lead when it came to stakeholder engagement. NatCap's scientists often worked with CZMAI in advance of community meetings to determine what type of local stakeholder input was essential to the analysis and the plan. However, they didn't typically attend CAC or other local meetings. Arkema, despite her deep commitment to the planning process and to her CZMAI partners, was conscious of the fact that she and her colleagues were 'outsiders' who would eventually leave Belize and return to the United States – a fact that might make it harder to build rapport and trust among locals. Though they occasionally met with key stakeholders such as government officials in order to present their research findings, more often than not the NatCap scientists refrained from attending local community meetings. Aside from the logistical challenge of attending meetings around the country while a newborn baby waited for her at home, Arkema sensed that keeping a low-profile would benefit the project by ensuring local ownership of the planning process and outcomes. Even CZMAI's Clarke-Samuels and Rosado, who were themselves Belizean, took a backseat role at the local meetings, much for the same reason.

As Clarke-Samuels and Rosado traveled around to the nine planning regions to share and discuss the future scenarios with stakeholders, NatCap's scientific models and maps proved to be invaluable decision-support tools. "Modeling the different scenarios got everyone thinking about what potentially could happen, how the future could look really different depending on the choices made now. The InVEST tool helped them to understand the consequences of human activities in a much more tangible way," Rosado explained. "Once everyone saw how people and natural resources would be impacted, then they were more willing to compromise, more willing to reduce conflicts between different activities because they could see how it would benefit everybody as a whole."

Opening up dialogue and understanding the viewpoints of diverse stakeholders was essential to fostering compromise among various users of the coastal zone, particularly when it came to activities that were commonly in conflict with one another. "For example, if it were solely up to the fishermen," Rosado said, "coastal areas would be free from development, because developments often threaten the mangroves that are important nursery grounds for their fish stocks. But then the development interests would explain that where the land is high enough, a resort could be a compatible use. The addition of a resort didn't necessarily mean that all of the mangroves would be lost. There was a lot of educating and balancing like that during the process."

The planning process also helped broaden the perspectives of government ministry employees, providing them with new science to inform their work and facilitate integrated planning. For example, with the NatCap models, the Forestry Department – the ministry with oversight responsibility for all of the country's forest resources, including coastal mangroves – could see a

very clear link between the clearing of coastal mangroves for resort development in certain locations and the potential decline of spiny lobster populations due to the loss of critical nursery habitat. The Fisheries Department, which held no official jurisdiction over the coastal mangrove forests yet was charged with ensuring sustainable fisheries for spiny lobster, one of Belize's major exports, was empowered by this new science to engage more collaboratively with Forestry and ensure that nursery habitat protection would be factored into future decisions.

Ultimately, once the informed management scenario was developed and refined to the satisfaction of the planning regions, CZMAI set to work integrating all of the regional findings and recommendations into a single national coastal management plan. The plan laid out a comprehensive zoning scheme that recommended specific locations for permissible activities and human uses throughout the country's coastal zone and clarified prohibited uses.

CZMAI's next major hurdle was to garner political support for the plan. Each of the country's government ministers would need to endorse the document before it ultimately went to the Cabinet, the House of Representatives and the Prime Minister for approval. Clarke-Samuels, Rosado and their colleagues had made significant efforts to meet with decision-makers at various government ministries throughout the planning process, keeping them informed of their progress and giving them opportunities to review and validate their findings along the way. Having these relationships in place went a long way toward securing support for the plan when the time came. "Samir and Chantalle were very diligent about that," Stanford's Arkema observed. "It takes so much time to go around to each individual agency to develop those relationships, to bring them information and elicit their feedback. Other groups I've worked with don't always do that. And I do think you lose the buy-in of those different sectors and agencies – the same ones that you'll eventually turn to for help implementing the plan."

Rosado viewed the InVEST modeling results as instrumental to securing government buy-in. "In the end, when we had to convince the government that this plan was worth getting behind, showing the value of the ecosystem services and having the science to back it up really made the difference. That helped us push this plan forward," he said. CZMAI's ability to point back to the enabling legislation and mandates of the Coastal Act, and the irrefutable fact that the plan had been created by Belizeans for Belizeans, were also major factors.

Putting the Plan into Practice

Although Belize's Coastal Zone Management Act specifically called for the preparation of an integrated coastal zone management plan, it never outlined how the plan would be implemented or how the provisions of the plan would be legally enforced. Shortly after the plan was signed into law by the Belizean government, Clarke-Samuels and Rosado found themselves in the difficult position of needing to figure out how to effectively implement the plan they had spent years crafting. "Creating the plan and having it approved was one thing, but the critical next step of implementation hadn't been accounted for. It's something that should have been contemplated from the beginning of the process. We didn't recognize that early enough," Rosado said.

At the recommendation of the staff, CZMAI's Board of Directors – comprised of ministry CEOs and one representative each from the private sector, NGO community and the University of Belize – agreed that an institutional assessment and legislative review should be conducted to explore limitations on Plan implementation and potential solutions. Clarke-Samuels and Rosado hoped the government could be convinced to amend the Act and grant CZMAI some sort of power to influence management of the coastal zone, such as the right to issue stop-orders on certain activities. They also sought to broaden the responsibilities of the CACs, empowering them through an amendment of the Act to participate in plan implementation. With the help of consultants, the staff set to work developing proposed amendments for the Board's consideration.

At the same time that they pursued legislative solutions, the CZMAI team put feedback mechanisms in place to alert them promptly of issues on the ground so that concerns could be addressed before they ballooned into major problems. Clarke-Samuels and Rosado made efforts to reconnect with community partners and reactivate the CACs informally, enlisting local help for compliance monitoring. Their vision was to create a community wardens program in partnership with the Coastal Advisory Committees, whereby volunteer wardens would look out for plan violations related to coastal resource use and report them to a CAC representative or to CZMAI.

“For example, if the wardens alert us to clearing of mangroves that's unauthorized, we would provide a report to the relevant ministry, in this case the Forestry Department,” Rosado explained. Hopefully our relationship with Forestry is good enough that they would actually respond to our request for help.” For additional assurance, the CZMAI staff would compile all reports and share them, along with the responses of their ministry partners, at the next meeting of their Coastal Zone Advisory Council. The Advisory Council, a technical body established by the legislation to guide CZMAI's work, was comprised of chief technical officers from all the pertinent government departments, including Fisheries, Forestry and Environment. The Council's quarterly meetings would provide opportunities for CZMAI and the technical officers to jointly review the types of issues that were arising and how well they were being addressed.

The CZMAI staff would also keep its Board of Directors apprised of the issues. If ministries weren't following or enforcing the government-approved plan, it was important for the Board to understand that so that they could advocate for solutions at higher levels of government if needed. “If the Board understood, for example, that what was preventing ministries from going out and addressing violations was a lack of resources, then the Board could make the case that the government really needs to stop restricting funding for enforcement. By creating this feedback loop, we can keep everybody informed and create some pressure for the responsible entities to deal with these issues as they arise, instead of waiting until we bring the whole plan back around for review in a few years,” he said.

Toward a New Era

On that hot summer day in 2017, as Clarke-Samuels and Rosado arrived in Punta Gorda to discuss their community wardens idea with Mr. Chavarria, they felt cautiously optimistic. Clarke-Samuels and Rosado had strong local partners and a vast network of industry, NGO and government leaders who respected them and believed in the Plan, but would that be enough to keep their efforts from

stalling out? The country's recent adoption of the Plan represented a massive step forward, but the next step of plan implementation was equally important. Clarke-Samuels and Rosado hoped that the worst days of resource use conflicts, overexploitation and degradation were behind them, and looked forward to a new era, hopefully not too far off, when integrated coastal zone planning and management would be the norm, implementation and enforcement capacity would be adequate, and the country would be steadily progressing toward its vision of a sustainable future, integrating human needs with conservation priorities for the long term.

Glossary of Key Terms

“Coastal Zone” refers to the area bounded by the shoreline up to the mean high-water mark on its landward side and by the outer limit of the territorial sea on its seaward side, including all coastal waters.

“Conservation Scenario” refers to a vision of long-term ecosystem health through sustainable use and investment in conservation.

“Development Scenario” refers to a vision that prioritizes immediate development needs over long-term sustainable use and future benefits from nature.

“Ecosystem Services” are benefits nature provides to people that support human well-being.

“Informed Management Scenario” refers to a vision that blends strong conservation goals with current and future needs for coastal development and marine uses.

“Integrated Coastal Zone Management” refers to an approach that brings together all decision-making agencies to resolve issues so as to ensure integration among their existing policies and plans to ultimately maintain, restore, and improve the quality of coastal ecosystems and communities they support.

“Marine Spatial Planning” refers to a public process of analyzing and allocating the spatial and temporal distribution of human activities in marine areas to achieve ecological, economic and social objectives that are usually specified through a political process.

“Protected Area” is an area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means.

“Scenario” refers to a vision or “snapshot” of what the future may look like and allows competing goals to be weighed and compared through narrative, quantitative and/or visual interface.

“Stakeholders” refers to individuals or groups within a region that have a vested interest in coastal and marine resources.

Source: *Belize Integrated Coastal Zone Management Plan*, Coastal Zone Management Authority and Institute (CZMAI), Belize City, 2016

Further Reading

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