

BOCAS DEL TORO AT A CROSSROADS: INTRODUCTION TO THE THEMES OF THE PUBLICATION

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The Bocas del Toro region of northwestern Panama borders Costa Rica to the West and the Caribbean Sea to the North. Mainland coastal plains are very narrow and quickly disappear into mountains of the Continental Divide that often exceed 3,000 meters elevation. Some 200 islands (9 larger than 1 km²) form the Bocas del Toro Archipelago that has two relatively shallow coastal lagoons (Almirante Bay and Chiriquí Lagoon) (Figure 1). The Bocas del Toro region includes three districts of Bocas del Toro Province and two of the Ngöbe-Buglé Comarca¹ (Figure 2). These five districts have a population of 134,000 people or 4% of the population of Panama. A great diversity of habitats and peoples characterizes the region. The ethnic groups Ngäbe (Ngöbe²) and Naso/Teribe comprise a large percentage of the population. They coexist with a large Afro-Antillian cultural group, as well as other Panamanian *mestizos*. Today, Bocas del Toro also hosts a large population of foreign expatriates from all over the world who are attracted to the region's environmental amenities, economic opportunities offered by tourism, and a standard of living less expensive than that of North America and Europe. High levels of social inequality exist in Bocas del Toro and many of the traditional coastal communities have extremely low social indicators. Banana cultivation controlled by modern subsidiaries of the United Fruit Company is the major economic activity of the region's mainland areas and has been for more than a century. However, subsistence agriculture, cacao cultivation, and small-scale fisheries are also important. During the past 25 years, tourism has become the major economic activity of insular Bocas del Toro – today one of Panama's prime tourism attractions. All these activities have significant impacts on Bocas del Toro's marine and coastal resources, as well as its social and economic structure.

¹ A "comarca" is a self-governing autonomous indigenous area. The Ngöbe-Buglé Comarca was officially recognized by Ley (Law) No. 10 of 1997.

² In recent years the Ngöbe people have changed the spelling of their group to "Ngäbe" to more truly represent the sound in their language Ngäbere (Ngöbere). When we refer to the comarca, we use "Ngöbe"; however, when we refer to the people, we use "Ngäbe".

Bocas del Toro also boasts a rich biological diversity. The region’s mangrove forests and coastal wetlands, seagrass beds, and coral reefs form a mosaic of habitats ecologically and physically connected through the exchange of water, nutrients, and organisms. Many organisms use these three habitats during their different life stages. For example, four species of sea turtles use the water and beaches of the region during different stages in their life cycles. These ecosystems, as well as the scenic beauty of the beaches and islands in the Bocas del Toro Archipelago attract an ever larger number of tourists, as well as expatriate residents. The lack of attention to land use and coastal planning in the region, the increase of tourists and tourism infrastructure, and the construction of residences throughout the Archipelago by new – often foreign – residents (also referred to as “lifestyle migrants”) are of great concern. Degradation of coastal and marine resources in Bocas del Toro as a result of these activities is evident. Land conflicts and lack of land security are rampant, particularly so for Ngäbe indigenous peoples who occupy insular lands in the Archipelago but often lack formal title or any other land use documentation.

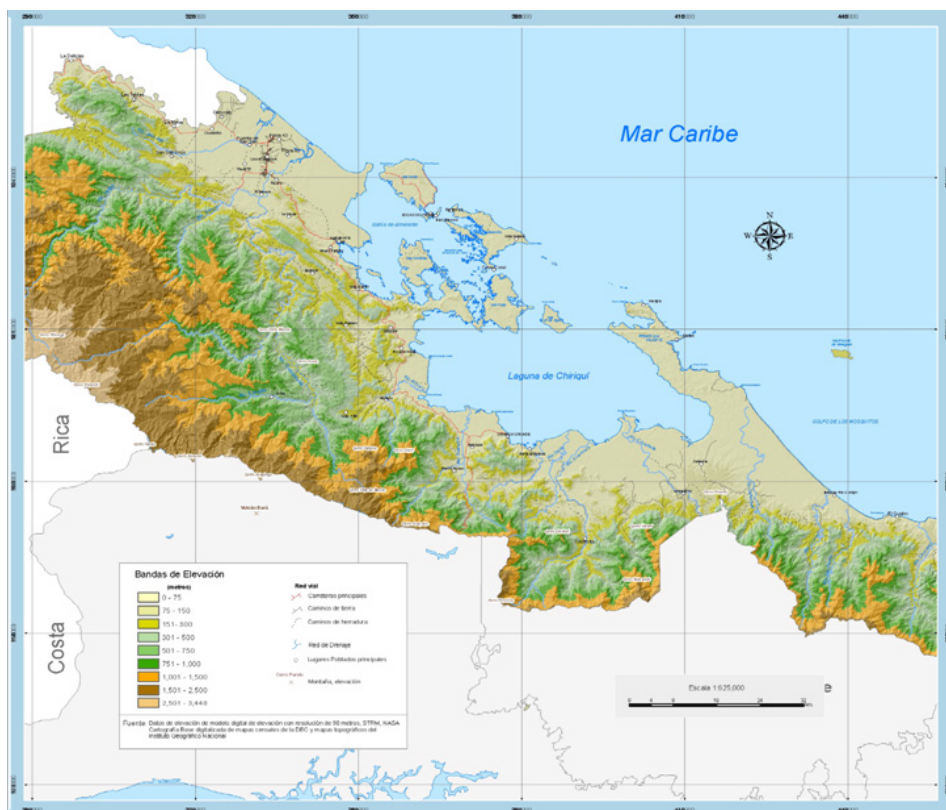


Figure 1. Topography of the Bocas del Toro region (Arden & Price Consulting/University of Miami, 2008. *Atlas de los Recursos Marino-Costeros de Bocas del Toro.*)

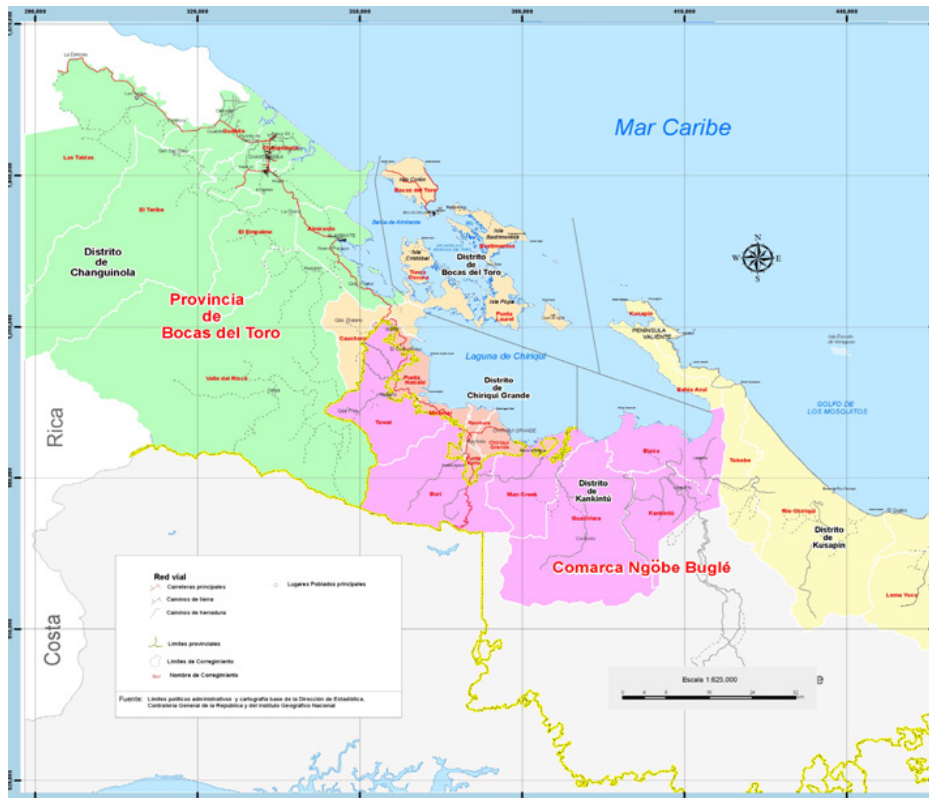


Figure 2. Political-administrative map of the Bocas del Toro region (from Arden & Price Consulting/University of Miami. 2008. *Atlas de los Recursos Marino-Costeros de Bocas del Toro*).

This publication includes interdisciplinary research findings from the development of the Integrated Marine-Coastal Management Plan (ICM plan) that was prepared by a team of faculty from the University of Miami’s Rosenstiel School of Marine & Atmospheric Science and Arden & Price Consultants in Panama between 2007 and 2009. This ICM plan was funded by a loan from the Inter-American Development Bank (IDB) to the Government of Panama and overseen by the Aquatic Resources Authority of Panama (ARAP) (Contract N1439-OC-PM). Additionally, during and after the development of the Bocas del Toro Marine-Coastal Management Plan, Suman connected with several researchers and students whose work in the Archipelago is relevant to this publication. These included two researchers who were conducting studies in Bocas del Toro as part of their doctoral theses (Ana K. Spalding and Gayatri S. Thampy), both of whom have contributed to this publication; and Cinda P. Scott and Leon Mach, director and instructor, respectively, at The School for Field Studies (SFS). The SFS offers a semester-long program in Bocas del Toro on Tropical Island

Biodiversity Studies. Scott and Mach provide a thoughtful chapter on the role of research and training institutions (such as SFS) on sustainable tourism governance in Bocas del Toro. Additionally, since 2007, Daniel Suman has organized a course at the University of Miami (“Tourism, Conservation, and Development/Fieldwork in Coastal Management”) with a week-long field component in Bocas del Toro. Janine Lux, one of the first participants in this course, wrote her Masters thesis on a controversial hydroelectric project in Bocas del Toro (Chan-75), and she has written a chapter about the role international non-governmental organizations (NGOs) have played in support of the struggle of Ngäbe peoples against this project. Notably, some of the chapters in this publication report data and observations from 2007-2009, providing a previously unavailable baseline for future studies. Where possible, we have attempted to update information. However, we strongly believe that field observations from previous years, although dated, provide a valuable snapshot of those years.

The underlying question of all the chapters is whether the current tourism developments in the Bocas del Toro region will lead to greater sustainability and social justice. The authors explore whether the Panamanian Government will succeed in its attempts to properly regulate development and tourism activities in Bocas del Toro; whether the private sector will take the lead role in promoting eco-tourism and sustainable practices; or if research and training institutions will play a more significant role in Bocas del Toro’s quest for sustainability. Hopefully, the themes that this publication presents, summarized in the next section, will lead to active debate, a greater appreciation for the uniqueness of the Bocas del Toro region and the challenges it faces, and more effective and responsible management and oversight of developments by the national and local authorities. Will all people in Bocas del Toro benefit from developments or will some social/cultural groups continue to be marginalized?

LIFESTYLE MIGRATION TO BOCAS DEL TORO

Due to its relative geographic isolation from centers of power in Panama, the strong presence of foreign-owned banana companies, and cycles of immigration of many ethnic groups and nationalities, Bocas del Toro’s history and its socio-environmental implications are truly unique in Panama. In her chapter, Ana K. Spalding offers a brief history of Bocas del Toro from the Spanish Conquest in the 16th Century, exploring the Spaniards’ interactions with native inhabitants, the West Indian diaspora during and after the construction of the Panama railroad and the Panama Canal in the 19th and 20th Centuries, and the emergence of the banana boom and the hegemony of the United Fruit Company at the end of the 19th Century.

Spalding also tells us how, during the past three decades, Bocas del Toro has entered a new phase. Roads now connect Bocas del Toro to the Pacific

provinces of Panama and, since the 1990s, Bocas del Toro has become an important tourist destination in Panama due to its natural beauty and easy access to tourist destinations in neighboring Costa Rica. An important component of the tourism boom is the arrival of “lifestyle migrants”, also referred to by some as “residential tourists” or “expatriates”. Today the percentage of foreign-born persons in the Bocas del Toro District accounts for about 10% of the resident population.

Spalding’s contribution examines the arrival of “lifestyle migrants” in Bocas del Toro and the push and pull factors that may explain this phenomenon. Through the lens of a political ecologist, Spalding touches some of the social, economic, and environmental changes that may have resulted from foreign migration to Bocas del Toro. The impacts are both positive and negative, and there are winners and losers. On the one hand, employment opportunities increase; cultural diversity and new ways of living create new opportunities for growth, learning, and exchange of ideas; migrants may promote reforestation and other sustainable practices. However, clearly some of the adverse consequences raise concerns. These include the increased cost of living, serious land tenure conflicts, the lack of participation of the local community in economic and business initiatives, as well as impacts of construction activities and unregulated visitation on the coastal resources of Bocas del Toro.

Spalding points to the cyclic nature of Bocas del Toro socio-economic history and its boom-and-bust cycles and warns of the possible “bust” of the current tourism boom and lifestyle migration unless the community and authorities are better able to address environmental and infrastructure challenges.

LAND TENURE CONFLICTS

As Bocas del Toro has mushroomed into a tourist destination during the past 25 years, as well as a retirement haven for expatriates, land conflicts have flared. In large part, the tourism boom is the product of many factors: the natural beauty of the region, its proximity to developed tourist areas in neighboring Costa Rica, as well as national Panamanian policies to create neoliberal incentives for tourism businesses in the Bocas del Toro region, encourage foreign investment, and incentivize expatriate migration to the country. In a sense, Bocas del Toro was a backwater area of Panama 30 years ago. The land registry was highly informal and unorganized. Most residents outside of Bocas Town – largely Ngäbe indigenous peoples living outside the Ngöbe-Buglé Comarca- simply occupied their lands, engaging in subsistence agriculture without formal title or documents attesting to their “Right of Possession” of the land. With the arrival of tourists, real estate developers, and expatriate immigrants, as well as Panamanian

legislation creating incentives to attract these new arrivals, the once local land market collided with global market forces. Gayatri S. Thampy examines these colliding property regimes and the impacts that this reality has had on *bocatoreños*, particularly Ngäbe indigenous peoples who have, more often than not, been the losers. Thampy suggests that neo-liberal policies, such as land privatization, that are in vogue among international financial organizations, create many adverse impacts for poor indigenous peoples in Bocas del Toro.

As part of her research, Thampy conducted over 80 surveys and semi-structured interviews of *bocatoreños* residing on Isla Colón. These interviews asked opinions about tourism development in the Archipelago, and specifically about land-related concerns. In addition, she obtained case histories of Ngäbe residents' experiences with land conflicts on other islands in Archipelago (Bastimentos, Carenero, Cayo de Agua). Her work documents the rather crude adverse impacts that tourism and real estate development have had on native *bocatoreños*. Despite the passage of several years since this research was conducted, the situation has not changed significantly at the time of publication.

Thampy also takes us through the evolution of confusing Panamanian land use legislation and explains the different types of property ownership – titled land, right-of-possession, and indigenous collective land. National legislation adopted over the past 15 years has facilitated the granting of concessions on the islands of the Bocas del Toro Archipelago, as well as the ability of individuals and corporations to obtain titled property for a high price. Perhaps the most recent legislation has created more order in the land registry, but it is questionable whether it has created opportunities for the poorest peoples of the Archipelago.

Thampy's chapter describes some typical land use conflicts that create losers who are, more often than not, Ngäbe indigenous peoples. Her case studies and interviews provide evidence of land grabbing/land banking by elites (be they Panamanian or foreign), land tenure insecurity, dispossession of Ngäbe from lands they have occupied and/or farmed, and land speculation.

One of the results of dispossession of their lands, as well as the pull factor of wage employment in tourist hotels and businesses in Bocas Town (what Thampy calls "proletarianization"), has been the growth of marginal communities with hundreds of homes adjacent to Bocas Town in mangrove areas next to the town's sewage collection ponds. This is the other face of the tourism boom in Bocas del Toro.

HYDROELECTRIC PROJECTS – CHAN-75

Land conflicts in Bocas del Toro not only involve dispossession of poor Ngäbe residents in the Archipelago who lack formal land title or “right of possession” legal status; confusion due to a history of poor land registry; new land owners who block traditional access routes; or even uncertainty of land title for new purchasers (often expatriates). An additional socio-environmental conflict on mainland Bocas del Toro involves the construction of hydroelectric projects and the displacement of residents, mostly Ngäbe or Naso native peoples.

Bocas del Toro Province possesses significant water resources. Annual precipitation in the mountainous mainland areas may exceed 6-7 meters, and in few areas is it less than 3 meters. The continental divide with elevations higher than 2,000 meters is rarely more than 50 km from the Caribbean Sea. Thus, these watersheds are targets for several significant hydroelectric projects. The forested watersheds have been designated via a variety of classifications of protected areas: national parks (Parque Internacional La Amistad) and protected forests (Bosque Protector Palo Seco). Ngäbe and Naso peoples live in small settlements and villages in these protected areas – also sites for hydroelectric projects.

One of the earliest and most controversial hydroelectric projects in Bocas del Toro was Chan-75 on the Changuinola River, inland from the coastal town of Almirante. Chan-75 has an electrical generation capacity of 223 MW and has created a reservoir that extends from the dam site some 30 km upstream on the Changuinola River. Now operational, Chan-75 was inaugurated by the Panamanian President in July 2012. Nevertheless, controversy continues today regarding resettlement and compensation for some 1,000 Ngäbe residents of the four villages whose lands were flooded or were granted in concession to AES-Changuinola, a subsidiary of Applied Energy Services Corporation, a Virginia-based (USA) firm.

Janine Lux details the conflicts between the Ngäbe residents; the National Environment Authority (ANAM), responsible for the administration of the BPPS Protected Forest, and the AES-Changuinola that began with the concession of 6,215 ha of land in the BPPS to AES-Changuinola in 2007. She describes the uncertain legal status of the Ngäbe residents whose lands were located outside the Ngöbe-Buglé Comarca, created by Law No. 10 of 1997. This legislation recognized that many Ngäbe peoples resided in areas outside the designated comarca on lands defined as “annex areas”. However, the Panamanian Government has failed to develop additional legislation that would regulate the “annex areas” and define the rights of Ngäbe living there – particularly with respect to their land tenure.

After describing the legal regime, the hydroelectric project, and the Ngäbe villages, Lux documents the actions of AES-Changuinola and the National Police to remove residents, create internal divisions within the communities, and quell opposition. The key ally of the Ngäbe in opposition to Chan-75 was a Panamanian NGO – Alianza para la Conservación y el Desarrollo (ACD – Alliance for Conservation and Development) – that offered legal advice, publicity, moral support, as well as technical studies to support the Ngäbe struggle.

What makes this case unique (and the focus of Lux' analysis) is the international support and attention that ACD was able to generate surrounding the Chan-75 issue. The NGO Cultural Survival, advocate for native peoples' rights throughout the world, was central in disseminating the story of Chan-75 to a global audience. The Center for Biological Diversity and International Rivers also offered support. The ACD-Cultural Survival-Ngäbe alliance also elevated the case to the Inter-American Commission on Human Rights (IACHR) in an attempt to pressure the Panamanian Government to cease dam construction. The petition claimed that the concession to AES-Changuinola occurred without "prior informed consent" and resulted in environmental, social, and cultural damages. Ngäbe and ACD representatives participated in several hearings of the IACHR in Washington, D.C., testifying about the situation in Bocas del Toro. In addition to the petition before the IACHR, several other international organizations sent inspection teams to Bocas del Toro to investigate the Ngäbe claims; these included visits by the United Nations Special Rapporteur on the Situation of Human Rights and Fundamental Freedoms of Indigenous People and another visit by a World Bank Inspection Panel that examined the government's World Bank-funded Land Administration Program (PRONAT).

Lux concludes by discussing the strengths and weaknesses of transnational support for the struggles of native peoples. Bringing the Chan-75 case to the attention of the Inter-American Commission on Human Rights, the World Bank, and the United Nations clearly created media coverage, gave moral support to the Ngäbe, and produced international pressure on the Panamanian Government to act more responsibly. The linkages between the Ngäbe and the Panamanian NGO ACD and Cultural Survival were crucial to these contacts. Nevertheless, State sovereignty reigns and AES-Changuinola continued with the project with government support. Indigenous peoples remain dependent on the good will of the State, and perhaps "good will" will increase as a result of the pressure exerted by the transnational linkages that Lux documents.

TOURISM DESTINATION GOVERNANCE & THE ROLE OF RESEARCH AND TRAINING INSTITUTIONS IN BOCAS DEL TORO

In less than 30 years, Bocas del Toro has exploded into one of Panama's most popular tourist destinations. For example, in 1990 only two hotels operated in Bocas del Toro, Isla Colón, while today we count over 100. Mass tourism on a small island can lead to numerous social and environmental problems: habitat degradation and loss; poor management of trash and solid waste; overburdening the island's ability to supply potable water and electricity and effectively treat sewage; overexploitation of marine resources; and social inequities.

Successfully addressing these challenges can be a daunting proposition that requires the cooperation of local and national government officials, the private sector, organized civil society, and, as Cinda P. Scott and Leon Mach point out in their chapter, research and training institutions. Together these parties make decisions about island resources and tourism management in what the authors call "tourism destination governance" (TDG).

Isla Colón is home to at least six permanent research and training institutions. Many conduct scientific research, organize short-term and semester-long courses in tropical ecology and local culture, and carry out community development and outreach programs. Scott and Mach of the School for Field Studies' (SFS) Center for Tropical Island Biodiversity Studies analyze the roles and impacts that research and training institutions, such as the SFS, have in Bocas del Toro TDG. Scott and Mach's contribution raises many important questions that could be the topic of future studies and should be discussed among the existing research and training institutions in Bocas del Toro. They illustrate their discussion points with examples from SFS operations in Bocas del Toro.

Most of the research and training institutions service non-Panamanian researchers and students. Scott and Mach ask about the economic benefits that these programs contribute to the Bocas del Toro community and whether these local economic benefits could be enhanced by operational and organizational changes.

All the research and training institutions generate information: peer-reviewed scientific research, student-developed research papers that focus on the natural or social systems of the Bocas del Toro Archipelago, as well as data on the health and well-being of residents in dispersed settlements in the Archipelago. Most of the publications are written in English. The authors ask how the generated information could be better disseminated in the local Bocas del Toro community and, more importantly, how it could assist

decisionmakers improve TDG. They discuss current outreach efforts of the various programs and call for a more concerted effort in this area.

The research and training institutions in Bocas del Toro have different goals, funding sources, and target clientele. However, they all use Bocas del Toro as a living laboratory for research, education, and community outreach. Scott and Mach emphasize the need for increased coordination between the different centers. Enhanced coordination could better synthesize information that could assist decisionmakers. Many areas exist for enhanced coordinated research and training activities between the various institutions. The unified efforts of the educational NGO sector has the potential to improve TDG in Bocas del Toro and help protect the Archipelago's natural, social, and cultural resources so that they will continue to attract tourists in the future.

LOBSTER

Fishing has historically been one of the principal economic activities in the Bocas del Toro region – although today banana cultivation and tourism have become the region's economic drivers. Currently sport and subsistence fishing join commercial fishing to exert considerable pressure on the region's marine resources that include a broad diversity of species of Caribbean reef fish. The principal fishing effort contributing to the local economy targets Caribbean spiny lobster (*Panulirus argus*) from relatively shallow waters of Almirante Bay, Chiriquí Lagoon, and waters surrounding Valiente Peninsula and the island Escudo de Veraguas, administratively part of the Ngöbe-Buglé Comarca. The exact number of lobster fishers is unknown, but we estimate that over 500 individuals, mostly Ngäbes, free dive for lobster using small wooden dugout canoes powered by sail, small outboard motors, and wooden oars. Free divers use hooks as their exclusive fishing art. Landings in Bocas del Toro appear to exceed 27,000 kg of tails annually. The spiny lobsters are sold to intermediaries in Chiriquí Grande, Almirante, and Bocas Town and, subsequently, most are transferred to Panama City for sale or export. A portion remains in Bocas del Toro to supply tourist restaurants.

The trends for spiny lobster landings are not bright. Although actual catch data are scarce, lobster divers mention that 30 years ago it was possible to catch spiny lobster at depths of several *brazas* (2 fathoms or less than 4 meters), while today it is often necessary to dive to over 15 *brazas* (15 fathoms or about 27 meters) to land commercial size lobster. In their chapter, Nelson Ehrhardt and Darío López estimate landings for spiny lobster in the Bocas del Toro region. They collected 2007 tail length data from intermediaries who purchased lobster from Bocas del Toro divers and

then compared these data with similar information from the 1990s. They note a remarkable shift to smaller tail length during these years.

The authors also demonstrated a high correlation between the larger lobster spawning population abundance from the broad Honduras-Nicaraguan continental shelf with small landings from Bocas del Toro, Panama from 1994 to 2007. They suggest that due to the limited habitat area (narrow continental shelf) in Bocas del Toro, recruitment of the Panama stock originates on the Honduras-Nicaraguan Shelf. Larvae from that region are carried to Panama and Costa Rica by cyclonic ocean circulation in the southwestern Caribbean Sea.

Their findings suggest that serious lobster recruitment and growth overfishing occurs in Bocas del Toro. Panamanian lobster regulations (last revised in 1981) establish a minimum tail weight for harvested spiny lobster of 2 ounces or 60 mm carapace length (CL). Such a small legal allowable size means that the vast majority of harvested lobsters are immature. Ehrhardt and López recommend that authorities increase the minimum size to 5 ounces tail weight or 80 mm CL, the size at which 50% of females are mature and perhaps also adopt measures to limit access to what is today an open access, and essentially, unregulated fishery. Removal of immature lobsters results in substantial economic loss; if individuals were left in the sea for one more year, they would be worth much more, perhaps 50% more (Growth Overfishing). Additionally, removal of immature lobsters means that the Bocas del Toro lobster stock is not able to sustain itself and its fecundity approaches zero (Recruitment Overfishing). The current lobster fishery in Bocas del Toro is unsustainable. The fishery is open access, information and monitoring are lacking, regulations are inappropriate, enforcement is insufficient, social needs of the lobster divers are great, and the demand for lobster is high. This is a cocktail destined for a crash.

CORAL REEFS AND SEAGRASS MEADOWS

Coral reefs and seagrass meadows have experienced serious declines in extent and health throughout the world in recent decades due to numerous factors, such as diseases, warming of sea temperatures, ocean acidification, pollutants, as well as physical damage from boats and divers. The Bocas del Toro region has almost 88 km² of coral reefs, representing the second largest reef area on Panama's Caribbean coast. Together with seagrass meadows, these two ecosystems comprise most of the shallow benthic habitats in the Bocas del Toro Archipelago. In their chapter, Diego Lirman and Juan L. Maté report on surveys of some 26 sites representing different reef habitats and oceanographic conditions using the methodologies of the Atlantic and Gulf Rapid Reef Assessment. Their data provided information on coral abundance, species richness, reef health, and spatial distribution.

The researchers also evaluated abundance of fish at the survey sites. During the same 2007 sampling period, they also evaluated seagrass community abundance, richness, and spatial distribution at some 20 sites representing different environmental conditions in the Bocas del Toro Archipelago. Their results permit comparison with similar habitats through the Wider Caribbean Region.

Lirman and Maté's research indicates that three distinct coral reef areas exist: Chiriquí Lagoon, Almirante Bay, and open ocean areas. Areas exposed to open ocean conditions display higher coral species diversity and larger colonies than reefs inside the lagoon. In these more exposed sites, *Orbicella*, *Colpohyllia*, and *Pseudodiploria* (brain coral) were common. Species that predominate in the lagoonal areas, particularly Almirante Bay, were *Porites* spp. (finger coral), *Agaricia tenuifolia* (lettuce coral), and the hydrocoral *Millepora alcicornis* (fire coral). *Siderastrea siderea* (massive starlet coral) dominated at depth in lagoonal reef sites. The mean coral cover for the sampling sites was 32.0%, and cover of fleshy and filamentous macroalgae was 34.3%. There did not seem to be a significant difference in these data between sites with greater oceanic influence and those inside the protected lagoonal waters. The average recent coral mortality was about 1.0%. Lirman and Maté's data indicate that the coral cover of fringing reefs inside Bastimentos Island National Marine Park (BINMP) was actually lower than that of fringing reefs sampled outside the National Park, evidence that the National Park marine boundaries should be expanded. Data for coral cover, mortality, and disease from the coral reef sampling in Bocas del Toro compare favorably with data from more than 600 sites in the Caribbean and Tropical Atlantic. However, Lirman and Maté point out that Bocas del Toro coral species are predominately *Porites* and *Agaricia* that are not effective reef builders and do not have large three-dimensional structures. Moreover, macroalgal cover was often greater than coral cover. Nevertheless, at least a decade ago at the time of sampling, coral reefs in Bocas del Toro appeared to be relatively healthy. They emphasize that urgent action is needed to ensure coral reef protection in Bocas del Toro, particularly with the rapid growth in tourism infrastructure and visitors to the region.

Survey data indicated that abundance of reef fish in Bocas del Toro was also significantly greater than the average for other Caribbean and Tropical Atlantic sites. Grunts, snappers, and parrotfish were the primary taxa. Lirman and Maté demonstrate, however, that despite the high fish abundance, the majority of fish were small (<10 cm).

Lirman and Maté observed two seagrass species, *Thalassia testudinum* and *Syringodium filiforme*, at the 20 sites they sampled. The mean coverage of *Thalassia* was 32.3% and that of *Syringodium* was 7.0%. The dominant *Thalassia* species was observed at all sites, but its abundance was greater along the mainland coast than at insular sites. *Syringodium* had higher abundance at insular sites.

MANGROVES

Bocas del Toro contains about half of the mangroves on Panama's Caribbean coast, as well as large extensions of other types of coastal wetlands. Most of the mangroves are located on the relatively sheltered waters of the Bocas del Toro Archipelago (Almirante Bay and Chiriquí Lagoon) in association with seagrass beds and coral reefs. In his chapter, Rafael J. Araújo reports results of extensive surveys of mangroves in the Bocas del Toro region. He conducted ten 250-meter transects in different sites using the Point-Centered Quarter Method to examine mangrove forest structure and species composition.

Araújo classifies mangrove ecosystems in Bocas del Toro into three distinct types. Mangroves of the islands in the Archipelago are a combination of fringe/dwarf types dominated almost exclusively by *Rhizophora mangle* (red mangroves). Perhaps high soil salinities and limited soil nutrients explain the presence of these forest types. The mangrove belt is very narrow and may extend 50 meters inland. Seaward tree height may range from 3 to 7 meters, but moving away from the open water, trees rarely are taller than 2 meters. Araújo classifies mangroves as riverine on the mainland coasts where freshwater input is greater. These forests are less homogeneous than those on the islands in the Archipelago. *R. mangle* again dominates the fringe with trees that may be between 5 and 10 meters in height. However, moving inland, mangrove species diversity increases, as do forest parameters. The average crown varies between 8 and 22 meters, and species include *Laguncularia racemosa* (white mangroves), *Avicennia germinans* (black mangroves), and *Pelliciera rhizophorae* (pineapple mangroves). Araújo identifies a distinct mangrove ecosystem type on the Valiente Peninsula in the Ngöbe-Buglé Comarca. These fringe mangroves are intermediate in structural characteristics between the archipelagic and mainland mangrove forests which might be explained by evidence of cutting by local residents.

The majority of Panama's mangrove forests are located on the Pacific Coast where tidal range may exceed 6 meters and large estuaries are common. Forest structure data (crown height and tree height) for mainland Bocas del Toro mangroves are relatively similar to those

from Pacific sites in the Gulf of Chiriquí (Chiriquí Province), Chame Bay (Panama Province), and the Azuero Peninsula (Los Santos Province).

However, mangrove forests around the Gulf of San Miguel (Darién Province) are much more structurally developed than those of all other sites. Araújo also compares mangrove data from Bocas del Toro with those from other Neotropical sites. For example, leaf area comparisons indicate that mangroves in Bocas del Toro show a high degree of “goodness” relative to many other sites in the Western Hemisphere.

In a separate chapter, Rafael J. Araújo and Daniel O. Suman examine management challenges for mangrove ecosystems in Panama and Bocas del Toro. They trace the evolution of mangrove regulation in Panama and offer recommendations for improving management through advances in the legal framework, zoning of mangrove forests based on ecological characteristics and human uses, a research and monitoring regime, and public outreach programs that emphasize the importance of mangrove preservation and restoration for the important ecosystem services that mangroves provide.

COASTAL MANAGEMENT

An interdisciplinary team of over 20 specialists from the University of Miami and Arden & Price Consulting developed the Bocas del Toro Marine-Coastal Management Plan from 2007-2010 for the Aquatic Resources Authority of Panama (ARAP) with funding from the Inter-American Development Bank (IDB). The team spent the first year monitoring the natural resources of the Bocas del Toro Archipelago, as well as the interactions of the various stakeholders with the coastal and marine resources. Rapid ecological and social evaluations led the planning team, in collaboration with the local communities and government institutions, to identify several key themes that must be addressed to wisely manage the region’s coastal resources: sustainable fisheries, conservation of coastal resources and habitats, protection of the natural shoreline, management of eco-tourism activities, and institutional coordination. The team then developed an Action Plan for each of the five key themes. Action Plans proposed numerous interventions/activities that could potentially overcome some of the identified problems. Each proposed activity had a number of components, including a project description, budgetary and personnel requirements, timelines, lead agency and allies, positive and negative impacts, potential obstacles, and indicators to gauge success and advancement.

ARAP formally approved the Bocas del Toro Marine-Coastal Management Plan in 2010. However, the agency failed to implement most of its recommendations. In his chapter Daniel O. Suman discusses the challenges

to coastal planning and implementation of the management plan. The principal obstacles centered on the institutional weaknesses of ARAP and the absence of coastal management on the national political agenda.

Without major changes in management of Bocas del Toro's marine and coastal resources, the region's increasingly popular tourism economy may be in serious jeopardy. Suman suggests that due to institutional weaknesses, perhaps coastal initiatives in Bocas del Toro (and Panama, as well) would be better led by the private sector, NGOs, and research and training institutions.

FINAL THOUGHTS

Bocas del Toro has entered a crossroads – a time when important decisions and actions will determine whether the region's coastal and marine resources continue to remain in healthy condition or whether irreversible degradation will occur. In turn, the outcome will determine whether the region continues to attract tourists or whether it repeats its historical "boom and bust" cycle – this time with respect to tourism. In the final chapter Suman, Spalding, and Scott summarize some of the threats and potential harms (and benefits, as well) that tourism developments in Bocas del Toro cause; the vulnerabilities of the region's environments and political systems; and the factors that will hopefully lead to resilience of Bocas del Toro environments and societies. We invite readers to consider these issues as they examine the following chapters and hope that they will contribute to efforts to promote the environmental, social, and economic sustainability of the Bocas del Toro region.