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Conservation in Practice: The Implementation of Marine Protected Areas near Resource-Dependent Fishing Communities in Cuba

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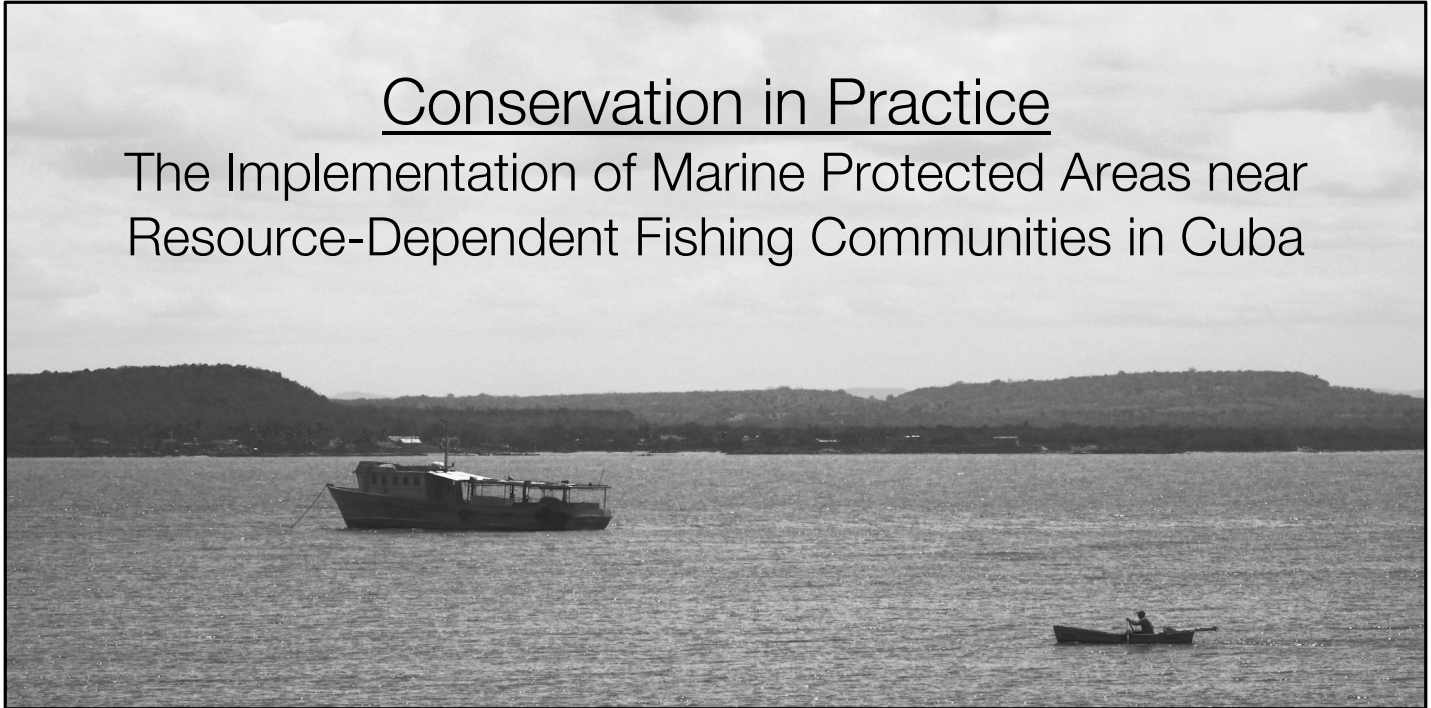
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# Conservation in Practice

The Implementation of Marine Protected Areas near  
Resource-Dependent Fishing Communities in Cuba



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Scripps Institution of Oceanography  
Center for Marine Biodiversity and Conservation



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## I. Introduction

In 2001 an international team of experts issued a Scientific Consensus Statement on Marine Reserves and Protected Areas. It was the culmination of a two-and-a-half-year review of all available research to assess their utility for conservation and fisheries management<sup>1</sup>. With signatures from 161 leading marine scientists the statement concluded that marine protected areas (MPAs) were necessary and effective tools for the conservation of biodiversity, fisheries productivity and ecosystem services (1), and the experts encouraged their use throughout the world's oceans. This statement was designed to meet a growing demand from non-scientific stakeholders like fishermen, policymakers, concerned citizens and conservation activists who sought evidence on whether MPAs merited their support or not. Interestingly, during the drafting stages of this statement and in the throes of a severe economic crisis, the Republic of Cuba was already taking giant strides to protect their environmental wealth with a National System of Protected Areas (SNAP), including terrestrial and marine environments, and ranging from no-take marine reserves and wildlife refuges, to limited use MPAs. Preempting this consensus from the global scientific community, Cuba's SNAP was notably ambitious by any standard, declaring a goal of protecting 20% of national waters—and 25% of its insular platform. The insular platform, or shelf, is the underwater landmass extending from shore into the sea, that stays relatively shallow and encompasses some of the most productive and diverse coral reefs and mangrove ecosystems. Today Cuba's protected areas face their largest test yet as the island experiences unprecedented increases in tourism, economic development, and resource demand (2).

Cuba has experienced steady increases since 1995 in foreign visitors and tourism revenue (2), with no signs of subsiding—the island still has a low volume of tourists relative to other Latin American countries, but the government's ambitions to continue this expansion are reflected in the 2030 Vision Plan, recognizing the, “centrality of tourism to the nation's future” (2). With a projected 10 million visitors in 2030, this would nearly eclipse the entire population of Cuba. Conservation managers were quick to point out that *managing* these protected areas, particularly coastal marine ecosystems vulnerable to tourism activities and land-based development would be vital to deliver long-term fishery and conservation benefits (3).

Of particular interest to policymakers and conservation managers today is the identification of key characteristics that make MPAs successful. If this is well understood many believe it can be used to create a framework for new MPA development that can be replicated across different sites effectively. Edgar et al. (2014) demonstrates that many MPAs fail to meet their full potential, and that conservation benefits have been shown to increase with the accumulation of five key features; no-take, sufficient enforcement, adequate age of the protected area, adequate size, and geographic isolation (4). While four of these requirements are addressed at the time of an area's designation, the issue of enforcement is unique in that as a matter of practice, it requires sustained efforts throughout the life of the protected area. It can be difficult to determine whether a protected area is achieving its full potential without a guarantee of enforcement and compliance by local stakeholders (1,5). A comparative study of the Sumilon and Apo MPAs in the Philippines over a 16-year period showed that significantly more positive results came from Apo because it was able to maintain adequate enforcement and user compliance over the entire period of the MPAs establishment (6). Adequate enforcement often demands significant funding, human resources, and infrastructure, and can still fail to prevent illegal activity due to the difficulties of policing large bodies of water. In fact, it is estimated that only 35% of MPAs in the Caribbean are meeting their stated objectives, due to lack of compliance by resource users and lack of monitoring or enforcement by management (7). For this reason, fostering compliance and involving local communities in the

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<sup>1</sup> Marine Reserves (MRVs) are a type of marine protected area (MPA) in which no fishing or extractive activities are allowed. MPAs are areas designated for protection that can have varying levels of restriction or use.

management of MPAs can be critical to their success or failure, especially in regions with high economic dependence on marine resources (4,5).

The success or failure of MPAs in Cuba has important ramifications on the entire Caribbean region. Cuba's waters comprise part of a biodiversity hotspot in the west Caribbean (8,9), an area notable for some of the highest levels of endemism and species diversity on the planet. Due to a unique political relationship with the United States and a history of isolation, stifled economic growth has prevented explosive development that has been seen across much of the Caribbean. Having avoided this rapid development and related habitat degradation over the last 50 years, Cuba's well-preserved mangrove and coral reef ecosystems provide critical habitat and nursery grounds for many commercially valuable fish populations that disperse across the Caribbean. With an estimated annual value of \$375 billion worldwide (10), the goods and services provided by marine ecosystems are particularly important for regions filled with island nations like the Caribbean. Not only will Cuba's MPAs provide value by enhancing the marine resources of neighboring countries, but by studying characteristics of its MPAs and their varying degrees of success we can gain a better understanding of how to foster compliance by local resource-users, reconciling conservation goals with the livelihoods of local communities.

Now is a critical time to assess conservation measures like MPAs in Cuba, as they face imminent impacts from a boom in tourism and economic growth (2). In an optimal scenario, MPAs can contribute to the island's sustainable identity, bolstering profitable industries of tourism and fishing while also safeguarding ecosystem services and fisheries resources over a longer term. Conversely, neglected management or administration could result in protected areas with little to no enforcement, disaffected local communities, and unsustainable business that deplete the value of ecosystems and overall fail to provide the benefits of successful MPAs.

While Cuba created its first national park in the 1930s, it was Law No. 81, a comprehensive set of environmental policies enacted in the mid 90s, that contained specific decrees for the administration and regulation of human activity in protected areas (3). These protected areas, many of them MPAs, were created with management objectives like the protection and maintenance of biodiversity, fisheries, and ecosystem services. However, to achieve these objectives in practice requires more than just sound policy.

This pilot study examines the quality of MPA management and level of compliance by local resource-users that are highly dependent on the marine environment in Cuba. By reviewing existing management practices and community engagement in several different areas, my goal was to identify the most decisive characteristics that influenced local communities' support of an MPA, and how these characteristics contributed to the effective management of a marine environment. In other words, what is necessary for MPAs to appeal to the resource-users that are impacted by the regulations, like fishermen and local residents that depend on the sea for food and livelihoods? And how can that community support increase the effectiveness of an MPA?

## **II. Methods**

For this pilot study I examined the realities of MPA management in Cuba by reviewing relevant literature and scientific publications, attending a panel on Cuba's most successful MPA, conducting over 20 informal interviews, and visiting several coastal communities in Cuba. My objective was to identify key themes from Cuba's MPA management practices that could be applicable to management of any MPA that relies on an element of community support or compliance to achieve its conservation objectives.

In February 2017 I attended the annual meeting of the American Association for the Advancement of Science (AAAS) for a panel presented by three marine biologists from Havana's Center for Marine Research (CIM), hosted by the Environmental Defense Fund's (EDF) Cuba Program. The panel, entitled *Protecting the Crown Jewel of the Caribbean: Cuba's Marine Ecosystems*, discussed the

benefits provided by Cuba's most well recognized MPA, the Gardens of the Queen National Park (JRMP). I conducted six one-on-one interviews with EDF managers and the visiting scientists to gather perspectives and insight from their professional experiences studying or working in Cuba's MPAs. The primary objective of each conversation was to obtain their perceptions based on personal experience as to the utility of MPAs in Cuba, their effectiveness, and key characteristics that did or did not make them effective<sup>2</sup>.

From March to April 2017 I performed site visits to coastal fishing towns in four different provinces of Cuba, conducting interviews with fishermen and local residents and observing the manner in which they interacted with nearby MPAs. I drew on themes from the responses in each town to characterize the community's perception of their local marine environment with which they interacted for fishing, extraction of resources like mangrove roots, and other aspects of their lifestyle. I also asked about the importance of marine conservation, specifically the use of MPAs, to see whether they were viewed as beneficial measures or detrimental to the community. I visited towns on all corners of the island, from right outside Havana, to the far east, as well as on the Isle of Youth off the southern coast<sup>3</sup>.

### III. Interviews at AAAS Annual Meeting, February 2017

In their panel presentations and following press briefing the Cuban marine biologists cited successful management strategies resulting from the high level of community support they received from nearby communities in Cuba, who were able to see direct benefits from the MPA like sustained fisheries yields as well as lucrative dive tourism. In 2015 the EDF completed a 3-year project called *SOS Pesca*, leading collaborative workshops between government officials, scientists, and community members along with other efforts to actively involve two coastal fishing towns in south central Cuba with the management, monitoring and support of adjacent MPAs. The goal was to make community members, recognized as key stakeholders, aware of the direct benefits related to MPAs and give them opportunities to play a larger role in the management process while also developing sustainable livelihoods that did not conflict with the MPA. The projects were regarded as resounding successes by EDF managers, who reported a significant shift in community members' mindsets from an initial distrust of the visiting park officials, to a noticeably amicable relationship between these different stakeholder groups at the project's conclusion. It was also noted that community members came to reflect a new and impassioned sense of ownership over their marine resources, leading them to suggest ways they could be more involved with the management of MPAs by adhering to catch limits on their own volition as a way to sustain iconic species like the lane snapper (*Lutjanus cyanopterus*), that residents wished to see preserved for future generations. EDF managers also remarked on the development of several new business ventures and roles in the two communities, like oyster aquaculture, a sewing cooperative, and collaboration between fishermen and fisheries scientists to use catch data and the historical knowledge of species ranges and relative sizes to inform stock assessments on different species.

Comparing responses, I concluded that all six interviewees independently reached a consensus that MPAs in Cuba have varying levels of success and highly varied levels of compliance. All interviewees affirmed that Cuba's environmental legislation was strong, with comprehensive policy and regulation to provide the groundwork for effective marine conservation. JRMP, which is a very large (900+ km<sup>2</sup>) national park that encompasses hundreds of cays off the southern coast, was often referenced as Cuba's "iconic marine park," or the best example of a successful MPA in Cuba. When prompted to explain why JRMP was so successful, responses were not identical but all contained an element that emphasized the reserve's successful management and protection being directly related to the high level of user compliance/community support. The ability for local communities to realize benefits through direct

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<sup>2</sup> See Table 1

<sup>3</sup> See Figure 1, Site Visits Map

involvement in the tourism operations in JRMP, as well as witness first-hand the increases in fish populations inside and outside the park (spillover effects (11)), were the primary drivers of compliance by these key stakeholders, the residents of coastal fishing towns that have a strong dependence on marine environments for subsistence and livelihoods. According to both biologists and EDF managers, if resource-users like fishermen were able to improve their current livelihoods, then compliance with MPA regulations and willingness to collaborate with authorities was far more likely. When asked to define success for their recent project *SOS Pesca*, EDF members stressed that rather than defining success by the presence of sustainable fisheries indicators that would require a longer period of study and data collection, they emphasized that changing mindsets and achieving more positive attitudes in communities was their primary or at least initial focus. The Cuban biologists were more interested in a definition of success that incorporated actual reductions in poaching within reserves, and socio-economic benefits realized by local communities like sustained fish catches, or sustainable livelihoods supported by the MPA. All these responses indicated that social engagement was critical to achieving MPA goals, and made the key difference between success in JRMP and less impactful MPAs elsewhere on the island. Across all interviews Cuba's SNAP was said to have notable instances of success and failure, with the positive example of JRMP, but also many examples of "paper parks", where enforcement and compliance were severely lacking and the areas were not achieving their stated objectives. Lack of compliance was indicated as the critical factor that would diminish conservation success. Dr. Jorge Angulo-Valdés, one of the marine biologists from Havana who has extensively researched the value of community support on MPA effectiveness spoke at length about compliance as a nuanced issue, citing specific towns and areas where MPA compliance was hindered by failures to address differences in the cultures and needs of nearby communities. Dr. Angulo emphasized that towns were not uniform, which I regarded as an important distinction because it illuminated one of the possible reasons why even scientifically-informed MPA designations do not necessarily yield positive conservation outcomes without sufficient interaction and collaboration with the communities impacted by such designations.

This first round of interviews provided compelling evidence for the critical role of community involvement for MPA success in Cuba. I received first-hand accounts of how different towns had complicated histories of conflict with nearby MPAs. While the theme of collaboration and continuous communication between stakeholders was prominent in all these discussions, this was not necessarily a solution in and of itself to MPA compliance. Instead it was a first step, necessary to understand the particular needs of all those with a stake in an MPA's existence—local resource-users, researchers, conservation practitioners, and fisheries officials—and ideally address them in unison through site-specific management plans and in person deliberations amongst stakeholders. Only after these parties with different needs reached an understanding of the others' perspective, could MPA management plans proceed with all representative groups aware of the joint-objectives for conservation, community benefit, and scientific understanding.

#### **IV. Site Visits and Cuban Perspectives, March-April 2017**

In order to expand on the perspectives from members of the scientific/conservation community, I conducted site visits to coastal fishing towns in four different provinces of Cuba. In chronological order I visited the town of Cojímar, Gibara, Playa Florida, and Cocodrilo<sup>4</sup>. Cojímar and Gibara were more developed towns, due in large part to easier access to larger cities, Havana and Camagüey respectively. Playa Florida and Cocodrilo were noticeably more remote, rural communities that had less infrastructure, and Playa Florida was one of the two towns engaged in the EDF's *SOS Pesca* project.

A key observation from these site visits was the confirmation of Dr. Angulo's remarks about how different communities could be—the diversity of culture and circumstance in each town I visited influenced each community's attitudes and engagement with MPAs in a different way. Across all sites I

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<sup>4</sup> See Figure 1

visited, community members voiced concern and awareness of changes taking place in the oceans, some referencing climatic changes, others speaking to visible reductions in fish abundance and size, and also loss of mangrove cover. It was evident that environmental awareness and degradation associated with human impacts were not lost on those who spent their lifetime interacting with the ocean. Despite this notable awareness and concern, the desire to support nearby MPAs that restricted their use of resources varied based on the perceived capacity of individuals to sustain their livelihoods at the same time. In Playa Florida and Cocodrilo, there was less incentive for community members to change their lifestyles to support MPAs as their remoteness, economic dependence, and lack of infrastructure made sustainable alternative livelihoods like tourism extremely difficult to pursue without an existing market or adequate demand for these types of services. One fisherman in Playa Florida repeatedly expressed his willingness to work as a tour guide and indeed exhibited an extensive knowledge of all flora and fauna in the coastal environment. He believed that he could significantly improve his income through providing tourism services, or aiding scientists in need of locating certain organisms if he had the opportunity to do so. However he was also observed and admitted to engaging in illegal fishing activity within the nearby wildlife refuge, for the purpose of feeding his family and making a living. Examples like this were common among fishermen I spoke with, as many community members voiced frustration with an inability to change their livelihoods or fishing habits yet also noted the restrictive quality of MPA regulations that left them little choice but to disobey the rules.

In contrast to these more remote fishing towns, Gibara held the distinction of being the most developed of towns I visited. Gibara appeared to be profiting most from a strong, unique brand of diversified tourism business such as locally-crafted artisanal goods, eco-tourism outings to nearby caves, boat tours, local museums, and annual film and art festivals that have achieved island-wide recognition. Several hotels accommodated large tour buses arriving from across the island, and the entire town exhibited a commitment to aesthetic improvements, with well-painted boats and restoration efforts in progress on historic buildings. Residents of Gibara possessed the same sense of appreciation and concern for the marine environment as the other towns I visited, but appeared more capable of actively protecting their waters due to a sense of ownership and adequate financial opportunity to do so. I observed signs encouraging mangrove protection and nature conservation, and through conversations with fishers learned that they are very committed to monitoring the abundance of fish populations to prevent stock depletion and cooperating well with state observers to report catches daily. Others not involved in the fishing industry expressed the sentiment that Gibara was a town that took pride in a longstanding sense of tradition and individuality, and sought to protect this by actively managing development and business in the town.

The contrast between Gibara and other towns revealed that community support of MPAs could be more specifically tied to local perceptions on how empowered they were to manage their own lifestyles, and whether or not the opportunity to do so presented itself. The presence of environmental awareness without means to take action actually seemed to create a heightened frustration within communities, attitudes detrimental to MPA support because these frustrations became associated with the restrictive qualities of MPAs rather than any of the potential benefits.

## **V. Conclusions**

Throughout this pilot study my understanding of MPAs, their utility as instruments of marine conservation, and the realities of achieving their objectives in practice has deepened, informed by conversations and observations around Cuba's MPA administration and management<sup>5</sup>. The interviews I conducted at the AAAS conference conveyed the critical importance of community support and compliance for MPA success from the perspective of scientists and conservation practitioners. Traveling throughout Cuba provided concrete examples of how diverse the communities affected by MPA

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<sup>5</sup> See Table 2, Key Takeaways

regulations could be, and that addressing the needs of local residents most dependent on marine resources is paramount to achieving their support or compliance. While the needs were not uniform across communities, certain characteristics of the conflict between residents and MPA managers were. Each area had been designated under some degree of protection due to the quality of the marine ecosystem, exhibiting a remarkable level of biodiversity, ecological productivity, or endemism. Similarly, it followed that the adjacent communities of each area contained culturally unique societies that consequently required individualized solutions tailored to fit their circumstances. I suspect that this trend of diversity, from natural environments to the nearby communities to the individualized strategies for reconciling the needs of both, can be found in many areas with conflict between conservation and the exploitation of marine resources. The potential to realize ecological and social benefits from marine conservation in Cuba is high; the island already has many of the necessary ingredients for MPAs to be effective; healthy, beautiful and unique environments that can attract lucrative and sustainable use strategies like tourism, as well as strong existing legislation to inform management. Nevertheless, to capture this potential, the implementation of conservation measures like MPAs in practice must be carried out in a highly inclusive, collaborative manner that responds to the needs of all stakeholders, empowering more dependent resource users with the ability to pursue sustainable lifestyles while still supporting their way of life.

## **VI. Discussion and Future Action**

In addition to this written report, some of the key highlights from interviews and site visits are compiled in a 10-12 minute documentary film in order to create a more distributive summary of this pilot study on community-supported MPA management. This documentary emphasizes the importance of collaborative MPA management by illustrating some of the differing perspectives or priorities that different stakeholders have, from conservation managers and scientists to community members and fishermen. Echoing the conclusions of this pilot study, the video encourages MPA management strategies to consider an inclusive behavior that addresses benefits to local communities and ecosystems alike. In creating this audiovisual summary to supplement my final report, my objective is to advocate for a wider variety of communication strategies to support marine conservation measures that accommodate these social considerations in conservation planning.

More effective communication is needed to encourage the adoption of sound MPA management strategies, and to implement a code of conduct for marine conservation that does not marginalize local communities (12). The collective goals of marine conservation and the benefits that strategies like MPAs are intended to provide can be improved with greater public support. Policymakers that may not be afforded enough time spent in areas for which they design legislation need to be reminded of the critical role that local communities can play as environmental stewards, including their traditional knowledge and expertise as an asset to MPA management and compliance. Local communities and fishermen should interact with scientists as allies to devise informed management plans for sustaining fisheries resources into the future, not as authority figures imposing restrictive limits on their way of life. The myriad value of marine ecosystems should be conveyed to a larger audience to unite all public, private, and governmental interests behind conservation measures that can mutually benefit everyone. In conclusion, this pilot study demonstrated that MPA managers should create more opportunities to interact with those most directly affected by an MPA's restrictions in order to enhance management strategies and ultimately the conservation objective they strive to fulfill.



## VII. Tables and Figures

Table 1. Interviews: Sample Question List

<b>Questions for Conservation Managers and Scientists, AAAS</b>	
1	What efforts have been made in the past or are currently used to involve communities with marine protected areas?
2	Have you observed MPA management or the capacity for areas to achieve conservation goals benefit from community involvement in Cuba?
3	How would you evaluate environmental policy related to marine environments in Cuba?
4	How will tourism, and increases in tourism affect Cuba's marine environments and the objectives of MPAs?
	What do you think are the key factors for MPAs to be successful in achieving their stated objectives?
5	Do you think increasing environmental awareness could significantly increase MPA compliance in Cuba?
7	How valuable do you consider traditional knowledge, and the human resources within coastal communities to nearby protected areas?
<b>Questions for Community Members, Cuba</b>	
1	How long have you lived by the coast?
2	Have you noticed changes to the marine environment over the course of your lifetime? If so, what kind?
3	What do you think causes these changes (if any)?
4	Do you think it is important to protect the marine environment?
5	Do you think marine protected areas are a good thing?
6	Are you concerned about changes to the environment affecting your way of life?

Figure 1: Map of Site Visits and Description of Coastal Fishing Towns



City	Gibara	Playa Florida	Cocodrilo	Cojímar
Province	Holguín	Camagüey	Isle of Youth	Havana
Closest major city	Holguín (37 km)	Camagüey (87 km)	Nueva Gerona (90 km)	Havana (12 km)
Nearby MPA	Balsas de Gibara (Gibara Marsh) Wildlife Refuge	Cayos de Ana Maria Wildlife Refuge	Punta Frances Marine Protected Area	Cojímar Flora Reserve (proposed)
Primary Habitat of MPA	Mangrove Forest	Mangrove Forest	Coral Reef	Estuarine habitat
Access	taxi, public bus on road in good condition	public bus on dirt road in poor condition	public bus for residents only, on dirt road in poor condition	Taxi, public bus on paved roads in good condition
Infrastructure	Indoor plumbing, electricity, internet, restaurants and stores	Basic plumbing, limited electricity	Basic plumbing, limited electricity	Indoor plumbing, electricity, internet, restaurants and stores
Approx. Population (town)	38,000 (municipality)	apx. 300	apx.100	unknown (note close proximity to Havana, pop. ~ 2 million)
Fishing Operations	State Owned Enterprises (6 person boats with engines, sail-powered skiffs)	State Owned Enterprises (6 person boats) Independent fisherman (hand	Independent fishermen (hand, hook and line, net)	State owned enterprises (hook and line, longline) independent fishermen (hand, hook and line, net)

	Independent fisherman (hand net, line)	net, line, sail powered skiffs)		
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Table 2: Key Takeaways for Cuba’s Successful MPA Management

JRMP, a model for successful MPA mgmt.	Gardens of the Queen National Marine Park (JRMP), the largest MPA in the Caribbean, exhibits successful management practices in part due to sound scientific planning, but also of critical importance is the ability for local communities to realize direct benefits from its existence
SOS Pesca	This project by the Environmental Defense Fund with international partners consisted of collaborative workshops to involve local communities, park managers, and scientists in joint-management strategies of marine resources and adjacent MPAs. It’s notable success was the distinct shift in the mindsets of local residents, from attitudes of mistrust and frustration to empowerment, ownership, and a sense of responsibility to conserve their marine resources and environments through better management.
Defining success	From the perspective of the marine biologists interviewed, a critical element of success regarding MPAs was evidence that it provided direct benefits to people in the form of sustained fisheries resources, job creation, or other positive socio-economic results.
Diversity in Cuba	Different towns in Cuba exhibited different circumstances, resource-demand, and cultures, that affected the community’s receptiveness to an MPA, and conservation effectiveness.
Site-specific management plans are better	MPA management strategies in Cuba were significantly more effective in achieving public support or compliance by resource-users when their design addressed the specific needs of nearby communities. These needs showed substantial variation between sites.
The role of communities	Beyond mere compliance with MPA regulations, resource-users like fishermen can play a critical role by contributing their historical knowledge and intimate understanding of their local environment to conservation objectives like data collection, monitoring and enforcement
It is critical to sustain livelihoods	Among the sites visited, poor MPA compliance by resource-users was most prominently linked to the sentiment that they had no way of surviving or providing a livelihood without engaging in activities deemed illegal by an MPA. In order to address this sentiment it is critical to provide another substantive means for residents to make a living (i.e. transitioning fishermen to careers in tourism) in order to increase MPA compliance
Basic Needs as most powerful driver	Hunger and basic needs are priorities in remote marine resource-dependent communities of Cuba, and if these needs are left unfulfilled it prevents even environmentally conscious resource-users from adhering to MPA regulations

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