Evaluating Management Effectiveness of Marine Protected Areas in Cuba's Southern Archipelagos: A Comparative Analysis Between Punta Francés and Jardines de la Reina National Parks

Alexandra Puritz

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EVALUATING MANAGEMENT EFFECTIVENESS OF MARINE PROTECTED AREAS IN CUBA’S SOUTHERN ARCHIPELAGOS: A COMPARATIVE ANALYSIS BETWEEN PUNTA FRANCÉS AND JARDINES DE LA REINA NATIONAL PARKS

By
Alexandra J. Puritz

A THESIS

Submitted to the Faculty of the University of Miami in partial fulfillment of the requirements for the degree of Master of Science

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May 2017
EVALUATING MANAGEMENT EFFECTIVENESS OF MARINE PROTECTED AREAS IN CUBA’S SOUTHERN ARCHIPELAGOS: A COMPARATIVE ANALYSIS BETWEEN PUNTA FRANCÉS AND JARDINES DE LA REINA NATIONAL PARKS

Alexandra J. Puritz

Approved:

Maria Estevanez, M.A., M.B.A.
Senior Lecturer
Marine Ecosystems and Society

Manoj Shivlani, Ph.D.
Lecturer
Marine Ecosystems and Society

Kenneth Broad, Ph.D.
Professor
Marine Ecosystems and Society

Fernando Bretos, M.A.
Director
CubaMar
Miami, Florida

Jorge Angulo-Valdés, Ph.D.
Visiting Research Scholar
University of Florida

Guillermo Prado, Ph.D.
Dean of the Graduate School
PURITZ, ALEXANDRA J.                                           (M.S., Marine Affairs and Policy)  
(May 2017)

Evaluating Management Effectiveness of Marine Protected Areas in Cuba’s Southern Archipelagos: A Comparative Analysis Between Punta Francés and Jardines de la Reina National Parks

Abstract of a thesis at the University of Miami.

Thesis supervised by Professor Maria Estevanez
No. of pages in text. (61)

This study compared the management effectiveness of two marine protected areas located in Cuba’s southern archipelagos: Punta Francés National Park (PFNP) and Jardines de la Reina National Park (JRNP). The goal of this study was to determine what factors influence management effectiveness in Cuban marine protected areas (MPAs) with a focus on PFNP and JRNP. The objectives were to identify and assess the factors related to management success, and to determine how these factors can be utilized to strengthen MPA performance across the island’s MPA network in light of increasing pressures on Cuba’s marine environment. Key informant interviews and relevant secondary sources were used to evaluate MPA performance and management. Results showed that the National Parks shared similar trends in pressures, threats, legal security, infrastructural gaps, and output successes; key differences were present in socioeconomic context, vulnerability, and management planning. However, JRNP exhibited higher management effectiveness than PFNP primarily due to ecotourism’s contributions to park management. This study illustrated the significant role public-private partnerships can play in strengthening MPA management effectiveness, and the results suggest replicating similar models in other Cuban MPAs.
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<th>Acronym</th>
<th>Description</th>
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<tr>
<td>APRM</td>
<td>Protected Area for Managed Resources</td>
</tr>
<tr>
<td>CaMPAM</td>
<td>Caribbean Marine Protected Area Management Network</td>
</tr>
<tr>
<td>CECM</td>
<td>Executive Committee of the Council of Ministers</td>
</tr>
<tr>
<td>CIEC</td>
<td>Center for Coastal Ecosystem Research</td>
</tr>
<tr>
<td>CIM</td>
<td>Center for Marine Research</td>
</tr>
<tr>
<td>CITMA</td>
<td>Ministry of Science, Technology, and the Environment</td>
</tr>
<tr>
<td>CNAP</td>
<td>National Center for Protected Areas</td>
</tr>
<tr>
<td>ENPFF</td>
<td>National Enterprise for the Protection of Flora and Fauna</td>
</tr>
<tr>
<td>IUCN</td>
<td>International Union for the Conservation of Nature</td>
</tr>
<tr>
<td>JRNP</td>
<td>Jardines de la Reina National Park</td>
</tr>
<tr>
<td>MINAG</td>
<td>Ministry of Agriculture</td>
</tr>
<tr>
<td>MINAL</td>
<td>Ministry of Food Industry</td>
</tr>
<tr>
<td>MINTUR</td>
<td>Ministry of Tourism</td>
</tr>
<tr>
<td>MPA</td>
<td>Marine Protected Area</td>
</tr>
<tr>
<td>PA</td>
<td>Protected Area</td>
</tr>
<tr>
<td>PFNP</td>
<td>Punta Francés National Park</td>
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<tr>
<td>RAPPAM</td>
<td>Rapid Assessment and Prioritization of Protected Area Management</td>
</tr>
<tr>
<td>SNAP</td>
<td>National System of Protected Area</td>
</tr>
<tr>
<td>UH</td>
<td>University of Havana</td>
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<tr>
<td>ZUSRUP</td>
<td>Zone Under Special Regime of Use and Protection</td>
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Chapter 1: Introduction

1.1 Global MPA Theory and Practice

Marine protected areas (MPAs) are increasingly becoming a preferred management tool for protecting marine ecosystems (Agardy et al., 2003). The purpose of MPAs include, but are not limited to, fisheries management, coral reef management, biodiversity conservation, habitat restoration, coastal protection, and tourism development (Christie & White 2007; Kaplan et al., 2015). If properly designed and managed, possible MPA benefits can lead to marine biodiversity conservation, reduction of overfishing, protection of critical habitats for threatened species, refuges for exploited species, protection of genetic diversity, protection of habitats and species that encourage sustainable tourism, the provision of economic alternatives to local coastal communities, contributions to heightened knowledge of marine science through the creation of control sites for research and ecological benchmarks, and protection of cultural diversity such as underwater cultural heritage (CaMPAM, n.d.; Kelleher, 1999).

For coral reef management, MPAs can be potentially beneficial in maintaining coral cover over time (Selig & Bruno, 2010). By preventing overfishing and thus allowing for the replenishment of overharvested fish, MPAs can aid in the restoration of coral reef food webs, which play a role in preventing the outbreak of coral predators and can limit macro algal cover by keeping grazer populations in check (Selig & Bruno, 2010). More direct benefits include the limitation of destructive fishing practices and anchor damage, as well as the reduction of nutrient pollution and sedimentation if an MPA buffers the coastline (Selig & Bruno, 2010).
Despite the popularity of MPAs as a management tool, there remains a lack of clarity on MPA definitions and associated purposes, and these uncertainties are counterproductive to MPA effectiveness (Agardy et al., 2003). The most widely accepted protected area definitions are those set up by the International Union for the Conservation of Nature (IUCN). According to the IUCN, a protected area (PA) is: “A clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values” (Dudley, 2008). As a type of PA, the IUCN defines an MPA as: “Any area of intertidal or subtidal terrain, together with its overlying water and associated flora, fauna, historical and cultural features, which has been reserved by law or other effective means to protect part or all of the enclosed environment” (Kelleher, 1999).

The IUCN has created a classification of six management categories and definitions that can be applied to PAs/MPAs. These include: Ia- Strict Nature Reserve, Ib- Wilderness Area, II- National Park, III- National Monument or Feature, IV- Habitat/Species Management Area, V- Protected Landscape of Seascape, and VI- Protected Areas with Sustainable Use of Natural Resources—also referred to as a Protected Area for Managed Resources (APRM) (Day et al., 2012). This study focuses specifically on National Parks, which contain inside their boundaries a Strict Nature Reserve and an APRM (see Table 1). An MPA’s objectives depends on its management category, thus having clear definitions are crucial for establishing an MPA’s goals and objectives.
Table 1: Management Category Definitions (Day et al., 2012)

<table>
<thead>
<tr>
<th>IUCN Management Category</th>
<th>Definition</th>
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<tbody>
<tr>
<td>Ia- Strict Nature Reserve</td>
<td>“Strictly protected for biodiversity and also possibly geological/geomorphological features, where human visitation, use and impacts are controlled and limited to ensure protection of the conservation values”</td>
</tr>
<tr>
<td>II- National Park</td>
<td>“Large natural or near-natural areas protecting large-scale ecological processes with characteristic species and ecosystems, which also have environmentally and culturally compatible spiritual, scientific, educational, recreational and visitor opportunities”</td>
</tr>
<tr>
<td>VI- Protected Area for Managed Resources</td>
<td>“Areas which conserve ecosystems, together with associated cultural values and traditional natural resource management systems. Generally large, mainly in a natural condition, with a proportion under sustainable natural resource management and where low-level non-industrial natural resource use compatible with nature conservation is seen as one of the main aims”</td>
</tr>
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</table>

There are a variety of MPA management approaches that range from government-driven (top-down) to locally-based (bottom-up) (Kelleher, 1999). Examples of different types of MPA management approaches include government-led, decentralized governance (including public-private partnerships with non-governmental or private organizations), community-led, private-led, or lastly no clear governance framework being in place (Jones, Qiu, & De Santo, 2011). According to the IUCN, ideal MPA management involves balancing bottom-up and top-down approaches (Kelleher, 1999).

One on hand, this is because MPA success is often connected with local support and involvement; research shows that social factors, rather than biological or physical factors, are primary determinants of MPA success (Charles & Wilson, 2009; Christie, 2004; Kelleher, 1999; Mascia, 2004; Pomeroy, Mascia, & Pollnac, 2007). The ecological and biological performance of MPAs is closely related to stakeholder participation (Charles & Wilson, 2009; Pita, Pierce, Theodossiou, & Macpherson, 2011; Pollnac et al., 2010). On the other hand, government involvement helps to establish clear legal frameworks and regulatory measures (Kelleher, 1999). As a tool for managing human behavior in marine...
and coastal environments, MPAs are a product of social institutions and local socioeconomic and political variables affect the creation, management, and performance of MPAs (Mascia, 2004; Pomeroy et al., 2007).

MPA management is important because, despite the full range of possible benefits that MPAs can provide, if not managed properly the desired outcomes will be difficult to achieve. Known as ‘paper parks’, these MPAs are theoretically legally protected, but lack practical enforcement (Davis, 2012). Features of paper parks tend to include lack of monitoring, enforcement, and compliance on behalf of resource users (Jameson, Tupper, & Ridley, 2002). Therefore, an MPA’s ability to succeed depends on its management effectiveness. According to the IUCN, management effectiveness is defined as: “…the degree to which management actions are achieving the goals and objectives of a protected area” (Pomeroy, 2004). Similarly, management effectiveness evaluation is assessing “…how well the protected area is being managed—primarily the extent to which it is protecting values and achieving goals and objectives” (Hockings, Stolton, Leverington, Dudley, & Courrau, 2006).

Evaluating management effectiveness is important because it can lead to better management, improve effective resource allocation, encourage accountability and transparency, and improve community support (Hockings et al., 2006). This is key for improving the performance and management outcomes of MPAs, as the majority of global MPAs fail to meet their management objectives (Garces, Pido, Tupper, & Silvestre, 2013). However, the concept of evaluating MPA management effectiveness has been a continual challenge for marine conservation efforts in the tropics (Garces et al., 2013). In response, the concept of adaptive management is increasingly gaining
popularity as a way for MPAs to measure and improve performance. Adaptive management is the continual process of testing assumptions, learning from outcomes, and further improving management strategies (Pomeroy, 2004). Adaptive management is beneficial because it can result in improved effectiveness and increased progress towards the meeting of goals and objectives (Pomeroy, 2004).

Currently, 5.1% of the global ocean is designated as MPAs, and this includes recent increases in MPA coverage (UNEP-WCMC & IUCN, 2016). The Convention on Biological Diversity’s Aichi Biodiversity Target 11 calls for 10% of the world’s oceans to be protected by 2020 (Juffe-Bignoli et al., 2014). Even still, a recent study shows that in order to sufficiently protect biodiversity, preserve ecosystem services, and achieve socioeconomic priorities, a target of at least 30% must be met, with benefits significantly increasing if more than 50% of the ocean is protected (O’Leary, Winther-Janson, Bainbridge, Aitken, & Hawkins, 2016). In response to these findings, the World Parks Congress suggested increasing the Aichi Biodiversity Target 11 from 10% to 30% of global ocean protection (O’Leary et al., 2016).

1.2 Caribbean Marine Ecosystems and MPAs

The Caribbean supports some of the world’s highest levels of marine biodiversity, covering 10% of all coral reefs and over 1,400 species of fish (TNC, n.d.). Because 70% of the human population resides along the coast, peoples’ livelihoods are closely connected to marine resources (TNC, n.d.). Therefore, healthy marine ecosystems in the Caribbean play an important role in both ecosystem protection and economic development. In 2015, travel and tourism contributed $51.9 billion, 14.6% of the GDP, and is expected to continually increase (WTTC, 2015). With ‘sun and sea tourism’ as a
major component of Caribbean countries’ economies, Caribbean coral reefs provide invaluable ecosystem goods and services such as fisheries, dive tourism, and shoreline protection to almost 40 million people (Bustamante et al., 2014; Dixon, Scura, & Vanthof, 1993; Jackson, Donovan, Cramer, & Lam, 2014).

However, the health of marine ecosystems throughout the Caribbean is on the decline. A continual pattern of overfishing, sedimentation, pollution, and coastal development threaten coral reefs, seagrass beds, mangroves, and beaches throughout the region (Burke & Maidens, 2004; Bustamante et al., 2014). The challenges of balancing economic development with conservation, as well as the current status and trends of marine ecosystem health throughout the Caribbean, illustrate the need for effective coastal management in the region. In addition, given the region’s emphasis on sun and sea tourism, a growing niche for sustainable tourism involving MPAs could show promise for the sustained long-term protection of the Caribbean’s marine ecosystems and economic growth.

In the Caribbean, there are over 700 MPAs, which cover more than 300,000 square kilometers, or 1.5% of the coastal and shelf waters (Guarderas, Hacker, & Lubchenco, 2008). However, the majority of Caribbean MPAs are considered ineffectively managed (Bustamante et al., 2014). Results from a 2004 assessment reveals that only 6% of Caribbean MPAs are well managed (Bustamante et al., 2014). These findings are attributed to the fact that most MPAs do not have management plans and have little implementation due to lack of qualified personnel, limited financial resources, lack of enforcement of rules and regulations, and low levels of stakeholder involvement in the planning and management process (Bustamante et al., 2014). In the Caribbean, most
MPAs are managed by government entities, and therefore few non-governmental organizations or local groups—shown to be important contributors to MPA success—are incorporated into management processes (Bustamante et al., 2014).

However, several programs are underway to improve the performance of Caribbean MPAs and to extend regional coverage. In 1997, the Caribbean Marine Protected Area Management Network and Forum (CaMPAM) was established within the framework of the United Nations Environment Programme’s Caribbean Environment Programme and the Cartagena Convention’s Specially Protected Area and Wildlife Protocol (CaMPAM, n.d.). As a regional network and program, CaMPAM’s objective is to increase MPA capacity-building through training, technical assistance, and pilot projects (Bustamante et al., 2014; CaMPAM, n.d.). Additionally, in 2008, the Caribbean Challenge launched with The Nature Conservancy as an initiative joined by Caribbean governments, companies, and organizations aiming to protect 20% of the Caribbean marine environment by 2020 (CaMPAM, n.d.; CCI, n.d.)

1.3 Cuba’s MPAs: Ecological Trends and Legal Frameworks

Cuba is the largest island in the Caribbean Basin. There are more than 5,746 kilometers of coastline and over 4,000 keys (see Figure 1) (Decree Law Number 212, 2000). Its coastal zone is comprised of diverse marine ecosystems. Greater than 95% of the country’s outer marine shelf is lined with coral reefs, and over half of the total shelf is covered with seagrass beds (UNDP, 2004). Reef crests are most abundant along the four regions of the Cuban shelf: the Gulf of Guanahacabibes (northwest), the Sabana-Camagüey Archipelago (central north), the Gulf of Ana María (southeast), and the Gulf of Batabanó (southwest) (Alcolado, Claro-Madruga, & Estrada, 2000). Many of the coral
reefs form reef tracts, which are separated from the coast by wide lagoons. These lagoons, in conjunction with archipelagic cays, have helped to buffer anthropogenic influences on coral reefs (Spalding, Ravilious, & Green, 2001).

Figure 1: Map of Cuba (Larrabee & Turner, 2015)

In addition, the lack of large-scale development and tourism resulting from the effects of the U.S. embargo has afforded Cuban marine ecosystems a degree of protection that is rare for the 21st century. Cuba’s reefs have been considered “some of the world’s… least disturbed coral reefs” (Whittle, Lindeman, & Tripp, 2003). However, the rapprochement of U.S.-Cuba relations initiated between Presidents Barack Obama and Raúl Castro in 2014 could potentially impact the health of Cuba’s marine ecosystems. As restrictions on remittances, travel, and banking begin to ease, tourism and development are rapidly expanding at unprecedented rates (Felter, Lee, McBride, & Renwick, 2017). For example, the number of U.S. visitors to Cuba increased from 91,000 in 2014 up to 300,000 in 2016 (Feinberg & Newfarmer, 2016). Total international tourist arrivals increased by 16% in 2015 up to 3.5 million, and this could rise to ten million by 2030, not including an additional five million cruise passengers, as cruise operations include Havana and other coastal cities as ports of call (Feinberg & Newfarmer, 2016).
Despite the unique ecological and political factors that previously played a role in conserving Cuba’s coral reefs, these ecosystems face the same threats, such as ocean warming and acidification, which are causing regional decline. Therefore, designing and implementing effective MPAs in Cuba is crucial in order to protect marine resources in light of increasing pressures on the marine environment, resulting from rising tourism and development associated with the normalization of U.S.-Cuba relations, as well as global climate change impacts.

MPAs in Cuba are a subsystem of the National System of Protected Areas (SNAP); this subsystem is referred to as the Subsystem of Marine Protected Areas (Estrada et al, 2004). SNAP is administrated by the National Center for Protected Areas (CNAP) within the Ministry of Science, Technology and Environment (CITMA).

The main legal frameworks upholding SNAP are Law 81 and Decree Law 201. Passed in 1997, Law 81—known as Law of the Environment—introduced principles of environmental management to be carried out by CITMA, making it the main administration for environmental protection, playing a “supervisory” role in overseeing environmental responsibilities (Houck, 2000). Every few years, CITMA releases the National Environmental Strategy, which is a “consciously aspirational document” that identifies current environmental problems and solutions (Houck, 2000).

Decree-Law No. 201 developed SNAP. Passed in 1999, this law established regulations and classifications for both terrestrial and marine PAs. Cuba follows the IUCN’s PA management categories ranging from Natural Reserve (Category I, most restrictions) to Protected Area for Managed Resources (Category VI, least restrictions) (Garcia & Tunnell, n.d.). In addition, Cuban PAs can be further classified as Protected
Areas of National Significance, Protected Areas of Local Significance, and Special Regions of Sustainable Development (Garcia & Tunnell, n.d.). SNAP is composed of various entities and institutions involved in three levels of MPA management at the national, provincial, and local levels (de Jesús & Augusto Valdés, 2013). The main administrative organs of SNAP are CITMA and the National Enterprise for the Protection of Flora and Fauna (ENPFF) within the Ministry of Agriculture (MINAG) (de Jesús & Augusto Valdés, 2013). To a lesser extent, other administrative organs include the Integrated Forest Enterprise, different provincial entities of CITMA, and other organizations and non-profits (de Jesús & Augusto Valdés, 2013).

According to the National Protected Areas Plan 2014-2020, there are currently 211 identified PAs within SNAP (see Figure 2) (Hernández, Perera, & Oquendo, 2013). 106 MPAs have been proposed within Cuba’s MPA network, 58 of which are legally declared and 13 of which are managed (Perera Valderrama et al., 2017). Together, these 106 MPAs protect approximately 30% of coral reefs, 24% of seagrass beds, and 35% of mangroves, and cover over 25% of Cuba’s insular shelf (Perera Valderrama et al., 2017). This is an impressive statistic, considering that when looking at a global comparison, only 12.7% of all marine areas within national jurisdiction are protected (UNEP-WCMC & IUCN, 2016).
For an MPA to be established in Cuba, certain criteria and main elements must be taken into consideration. These include: the existence of well-conserved coral formations, sites important to biodiversity from an ecological and economic perspective, significant elements of relief (such as blue holes), and the location of terrestrial PAs that could be enlarged to include adjacent marine areas (Garcia & Tunnell, n.d.; Hernández et al., 2013). Ongoing goals within MPAs include: “Protect outstanding landscapes and seascapes and representative samples of marine-coastal biodiversity”, “Contribute to the sustainable management of fisheries”, and “Represent the most outstanding geographical features of the marine-coastal zone of Cuba, as well as historical and cultural values” (Garcia & Tunnell, n.d.). Main activities taking place in MPAs vary from surveillance and protection, research and monitoring, economic activities such as fishing, and public use for tourism (Garcia & Tunnell, n.d.).
Chapter 2: Study Sites

This research focuses on case study comparisons of performance outcomes and management effectiveness between Punta Francés National Park (PFNP), located in the Canarreos Archipelago, and Jardines de la Reina [Gardens of the Queen] National Park (JRNP), in the Jardines de la Reina Archipelago (see Figure 3). These sites were chosen based on their various shared similarities.

Both MPAs are IUCN management category II, National Park, meaning they share the same primary objective, which is to “protect natural biodiversity along with its underlying ecological structure and supporting environmental processes, and to promote education and recreation” (Day et al., 2012). PFNP and JRNP are managed by the same government agency, ENPFF. Both MPAs also share geographic and ecological similarities, in that each is located in Cuba’s southern archipelagos and host similar types of ecosystems and species. A gap analysis of Cuban MPAs identifies both the Canarreos Archipelago and the Jardines de la Reina Archipelago as maximum priority conservation.
sites and CNAP considers both sites as Protected Areas of National Significance (Areces, Gerhartz Duttit, & Martínez, n.d.; CNAP, 2013). Together, these southern archipelagos are proposed as a World Heritage Site (UNESCO, 2003).

Despite these similarities, previous research illustrates varied effectiveness between PFNP and JRNP (Angulo-Valdés & Hatcher, 2013; Navarro Martínez, 2015; Pina-Amargós, González-Sansón, Martín-Blanco, & Valdivia, 2014). First, it is worth noting that despite the commonalities mentioned above, JRNP encompasses a much larger geographic area and is more remote than PFNP. PFNP demonstrates poor management effectiveness and has lower fish abundance inside park boundaries than the surrounding area (Angulo-Valdés & Hatcher, 2013; Navarro Martínez, 2015). On the other hand, JRNP demonstrates higher fish density inside the reserve for several commercial fish species and has proven spillover effects outside park boundaries (Pina-Amargós et al., 2014). By focusing on these two study sites, this research seeks to better understand why seemingly similar MPAs can have varying degrees of success with performance and management outcomes, and to identify key lessons learned from MPA management in order to measure and improve MPA effectiveness moving forward.

2.1 Punta Francés National Park

PFNP is located in the special municipality of the Isle of Youth, an island off the southern coast of Cuba, which forms part of the Canarreos Archipelago (see Figure 4). PFNP encompasses approximately 18 square miles, with the terrestrial component including 6 square miles and the marine component including 12 square miles (CNAP, 2013). It is situated more than 90 kilometers from Nueva Gerona, the capital of the Isle of
Youth, to the west of the Carapachibey Peninsula in the southwestern tip of the island. The closest community, Cocodrilo, is 25 kilometers away from.

![Figure 4: Map of Punta Francés National Park (de la Guardia, Angulo, González-Sansón, Aguilar, & González-Díaz, 2004)](image)

PFNP is very remote with two forms of access: by land and by sea. By land, there is a 120-kilometer road beginning in Nueva Gerona that passes through the Lanier Swamp region, where there is a military checkpoint marking the border of the APRM, which comprises the southern section of the island including Cocodrilo. In total, given the very poor conditions of the roads and limited means of transportation, it would take well over 4 hours to reach PFNP from Nueva Gerona by road. The more common form of access is by sea from the Colony Marina in the Siguanea Cove, located 60 nautical miles from PFNP. The marina is located nearby the Colony Hotel, which is the accommodation closest to PFNP and only place for tourists to PFNP to stay, unless they are visiting by cruise ship.

Initially proposed in 1996, the Executive Committee of the Council of Ministers (CECM) 7233/12 legally approved PFNP in 2012 (CNAP, 2013). It was established as a
National Park under IUCN Management Category II and in addition, forms part of an APRM under IUCN Management Category VI. Prior to its official establishment as a National Park, in 1996 the Ministry of Fishing Industry—previously its own ministry, which is now housed within the Ministry of Food Industry (MINAL)—declared the area as Zone Under Special Regime of Use and Protection (ZUSRUP) through Resolution 560. A ZUSRUP is defined as “…a management classification of protected areas, with the aim of using them in a sustainable way, in places where tourism and conservation activities can be interacting under special rules and strict regulations and delimitations” (Avalon, n.d.). Prior to its official approval as a National Park in 2012, the ZUSRUP served as a type of marine reserve because fishing was prohibited, or limited to particular conditions (Angulo-Valdés, 2005). Only an artisanal spiny lobster fishery was allowed within the area, and this regulation carried over following PFNP’s formal establishment.

Since its legal approval, PFNP has operated under two management plans, one from 2000-2004 and the other from 2005-2010. PFNP is currently operating without an updated management plan. Until 2008, the Ministry of Science, Technology, and Environment managed the area, but in 2009 responsibility for park management switched to ENPFF (CNAP, 2013).

2.2 Jardines de la Reina National Park

JRNP is located in the Camagüey-Ciego de Avila Provinces within the Jardines de la Reina Archipelago (see Figure 5). JRNP encompasses approximately 838 square miles, with the terrestrial component including 62 square miles and the marine component including 776 square miles, making it the largest marine reserve in the Caribbean (CNAP, 2013; Ocean Doctor, n.d.).
Initially proposed in 1996, CECM 6803/10 legally approved JRNP and it was expanded in 2010 (CNAP, 2013; Goode, 2015). The government administration in charge of managing JRNP is ENPFF. It was established as a National Park under IUCN Management Category II, and in addition the marine component forms a Strict Nature Reserve (marine reserve) under IUCN Management Category I. JRNP is also declared as a ZUSRUP allowing only for artisanal lobster fishing and bonito (tuna) fishing south of the MPA (Avalon, n.d.)

The management structure at JRNP is based on a unique model of cooperation between government institutions involved in JRNP’s park management and Avalon, an Italian ecotourism company. The area is an ecotourism destination for diving and catch-and-release fly-fishing operations, and these activities are run exclusively by a public-private partnership between Avalon and Marlin Náuticas y Marinas, the Cuban government’s agency responsible for overseeing Cuba’s marina-based tourism (hereafter
referred to as Avalon-Marlin). Avalon-Marlin operates high-end diving and sport fishing excursions in JRNP via a fleet of live aboard hotels. Park regulations under these operations include a yearly cap of 1,000 sport fishermen and 2,000 divers, utilizing over 80 dive sites. No more than 20 boats are allowed in JRNP at any given moment, with boats rotating through areas in the park every 10 days. This carrying capacity was intentionally set very low in order to maintain a sustainable business model for conserving JRNP’s natural ecosystems and to offer a quality experience. In exchange for being the only licensed dive operator in JRNP, Avalon-Marlin helps to enforce the marine reserve’s fishing restrictions and under this arrangement shares its profits with the Cuban Ministry of Tourism (MINTUR) (Burke, 2014).
Chapter 3: Objectives

The goal of this thesis is to determine what factors influence management effectiveness in Cuban MPAs, with a focus on PFNP and JRNP. This research seeks to demonstrate what factors allow for success, or lack thereof, in the management of MPAs in Cuba, and to highlight why certain MPAs exhibit higher degrees of success than others. Ultimately, key lessons learned will be highlighted in order to strengthen the management capacity of PFNP and JRNP. Given the reestablishment of diplomatic relations between the U.S. and Cuba, there is a sense of urgency for Cuban MPAs to uphold the integrity of marine and social environments. The objectives of this research include the following:

1. To identify and assess the factors related to management success in two Cuban MPAs
2. To determine how these factors can be utilized to strengthen MPA performance across the island’s MPA network in light of increasing pressures on Cuba’s marine environment
Chapter 4: Methods

According to the IUCN, the evaluation of management effectiveness is achieved through the assessment of criteria characterized by related indicators that reveal status and trends in PA effectiveness (Hockings et al., 2006). In order to gather this information for the purpose of this study, data acquisition relied primarily on the use of key informant interviews, complemented by information provided by relevant secondary sources. Because there is no standardized method for measuring MPA effectiveness, several frameworks exist. This study used the World Wildlife Fund’s Rapid Assessment and Prioritization of Protected Area Management (RAPPAM) Methodology.

4.1 Material

As a perception study on MPA management effectiveness, this study selected the RAPPAM Methodology as the appropriate assessment tool because it is designed to serve as a benchmark assessment intended for use in comparative assessments of PAs with similar broad objectives (Ervin, 2003). The RAPPAM Methodology is a tool for identifying management strengths and weaknesses and developing next steps for improving management effectiveness (Ervin, 2003).

This study used a condensed and edited version of RAPPAM’s Rapid Assessment Questionnaire through key informant interviews consisting of 21 open-ended questions. The Rapid Assessment Questionnaire took into consideration five assessment elements: Context, Design and Planning, Inputs, Management Processes, and Management Outputs. Illustrated below are the assessment elements and sub-elements from the Rapid Assessment Questionnaire examined in this study (see Table 2). Additionally,
information from secondary sources, including scientific publications and Cuban legislation, was added to questionnaire results where applicable.

**Table 2: Rapid Assessment Questionnaire Elements (Ervin, 2003)**

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<thead>
<tr>
<th>Context</th>
<th>Design &amp; Planning</th>
<th>Inputs</th>
<th>Management Processes</th>
<th>Management Outputs</th>
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<td>• Pressures</td>
<td>• Objectives</td>
<td>• Infrastructure</td>
<td>• Management Planning</td>
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<td>• Threats</td>
<td>• Legal Security</td>
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<td>• Management Decision-Making</td>
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<td>• Biological Importance</td>
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<td>• Research, Monitoring, and Evaluation</td>
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<td>• Socioeconomic Context</td>
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**4.2 Participants and Procedure**

Thirteen semi-structured key informant interviews were conducted using the Rapid Assessment Questionnaire: seven key informants for PFNP and six key informants for JRNP. All key informants had significant experience working in either PFNP or JRNP and held extensive knowledge about the National Park; many were regarded as experts within their respective field. Key informants were stakeholders including researchers, conservation professionals and tourism operators/dive masters with expertise in marine science, biology, economics, ecotourism, and park management. Interviews were conducted using the snowball effect: selected key informants were chosen based on initial recommendations from marine biologists and conservation professionals from both Cuba and the U.S. who had several years worth of experience working on marine conservation projects in Cuba, a later on from recommendations by key informants themselves.

Two fieldwork trips to Cuba were conducted in June and October 2016. The purpose of these trips were to establish connections with Cuban marine scientists, to lay the groundwork for beginning to conduct key informant interviews, and to examine
Cuba’s marine ecosystems firsthand. Not only did these trips facilitate in-person interviews while in Cuba, they also created connections that allowed for future interviews to occur via phone, Skype, and email questionnaire once back in the U.S. Both trips provided essential opportunities for meeting key informants and receiving suggestions of other key informants to speak with. Overall, visiting Cuba encouraged information exchange that otherwise would have been difficult to access.

The first trip in June 2016 was ten days long and time was spent on the Isle of Youth in Cocodrilo and the Colony Hotel. Having the opportunity to visit these places allowed for greater understanding of the challenges facing this fishing community, highlighted the conflicting needs between provision of livelihoods and conservation, provided context on PFNP’s tourism infrastructure, and created opportunities to meet and interview key informants for PFNP. The second trip in October 2016 was a weeklong and the majority of time was spent in Cayo Coco to attend the Center for Coastal Ecosystem Research’s (CIEC) conference on coastal ecosystem science and management. This created the opportunity to learn more about CIEC’s research efforts in JRNP, network with Cuban scientists, and interview key informants for JRNP.

4.3 Limitations

Cuba’s marine ecosystems are understudied and have baseline gaps (EDF, 2013). Additionally, infrastructural challenges make it hard to reach people and travel around the country. As such, conducting research in this data-poor environment is challenging and created certain limitations for this study. Issues capturing data included a lack of data, trouble accessing management plans, and difficulties finding the appropriate people to speak with.
Chapter 5: Results

5.1 Punta Francés National Park

Pressures and Threats

An analysis of both pressures (current impacts) and threats (possible expected impacts) was conducted. Noted pressures currently existing in PFNP include: overfishing/illegal fishing (occurring inside the boundaries of the National Park as well as outside the boundaries of the National Park using fishing gear not allowed within Cuban law), introduction of invasive species, cruise ship tourism, coral bleaching, increase in macro algae, anchoring on reefs, overuse of dive sites, and deforestation in coastal areas. Noted threats possibly expected in the near future include: decrease of commercial fish populations in abundance and biomass, increase of non-biodegradable waste from cruise ship tourism, climate change-related impacts (such as coral disease and increased bleaching episodes), increases in tourism from cruise ships and divers, and the continuation of illegal fishing.

Biological Importance

SNAP considers PFNP as a Protected Area of National Significance because of its importance in marine biodiversity value (Estrada et al., 2004). PFNP’s main marine and terrestrial ecosystems are those typical of tropical environments including coral reefs, seagrass beds, mangroves, vegetation on sandy coasts, and semi-deciduous forests. The marine portion of PFNP covers extensive ecosystems that are priority sites for conservation. PFNP is home to a great diversity of fish (especially commercially important fish, such as snapper and grouper), sharks, rays, sea turtles, dolphins, manatees, corals, spiny lobster, sea urchins, sea snails, hutias, birds, and endemic butterflies and
moths. While PFNP does host an abundance and diversity of fish, there is a lack of large fish biomass (Angulo-Valdés, 2005).

The area performs several critical landscape functions, serving as a spawning migration site for cubera snapper, an important nursery ground for tarpon, a nesting site for sea turtles such as loggerhead turtles (vulnerable), and is also a significant place for the capture and commercialization of the Caribbean spiny lobster. Overall, the habitats are in good conditions because of their remoteness from human activities, resulting from its very limited and difficult access.

The following species and ecosystems are identified as conservation targets: American crocodile (vulnerable), Cuban crocodile (critically endangered), loggerhead sea turtle (vulnerable), hawksbill turtle (critically endangered), Desmarest’s hutia, Antillean manatee (endangered), commercial fish and their spawning sites (particularly mutton snapper; near threatened), coral reefs (Elkhorn coral; critically endangered), Caribbean spiny lobster, beaches with sandy coastal vegetation, semi-deciduous forests, and aquatic birds.

According to coral reef monitoring programs, live coral cover at reef crests and flats is 16.7%, which is slightly above the regional average of 16.3%, with the majority of coral species comprised of Mustard Hill coral and Blade Fire coral (Caballero Aragón & Perera Valderrama, 2014). Diadema cover is 3.2 diadema per 10m²; recent coral mortality is .1%, and non-recent coral mortality is 9%, which is significantly lower than recent coral mortality rates of other MPAs in the region (Caballero Aragón & Perera Valderrama, 2014). Live coral cover at reef fronts is 13.1%, which is below the regional average of 17.3%, with the majority of coral species comprised of Lettuce coral and
Massive Starlet coral (Caballero Aragón & Perera Valderrama, 2014). There are no diadema per 10m²; recent coral mortality is .2%, and non-recent coral mortality is 10.2% (Caballero Aragón & Perera Valderrama, 2014). The median total of fish density (individuals/1000m²) on reef crests from 2010-2013 was 15.03±1.32, and the median total of fish biomass was 25.86±2.76 (Pina Amargós, Salvat Torres, Cobián Rojas, Espinosa, & Chevalier Monteagudo, 2014). According to sea turtle monitoring programs, there were 48 nests in PFNP between 2010-2013, which is significantly less than other MPAs in the region (Moncada Gavilán et al., 2014).

**Socioeconomic Context**

The relationship between PFNP and Cocodrilo is almost non-existent, aside from the presence of two park staff from the community. This demonstrates PFNP’s low level of linkage with Cocodrilo, and the community receives no direct benefits from PFNP. Overall, the community is excluded and disconnected from the National Park, which was an area with mostly fishing interests for local fishermen prior to park establishment.

The current socioeconomic system lacks support for the proper functioning of the National Park. PFNP makes money from cruise ship tourism, but this money is directed towards the central government and is not reinvested back into the area. With a very low monthly salary of $10-15 Cuban Pesos and poor living and working conditions for park staff (including a shortage of food at the ranger station), there is a lack of incentive to protect the area. This results in a low retention and frequent turnover of park staff. Overall with the current conditions, a sense of belonging, awareness of care, and protection and preservation of the park resources are compromised.
The community is not fully aware of park objectives, and the interests of the community are not reflected in the management objectives of the MPA. The community lacks a sense of belonging to the park because it does not get any benefit from park activities and does not feel identified with it in any way. In a general sense, interview findings show that communities on the Isle of Youth support the management objectives since there is public consensus on the importance of the area for touristic activities, but PFNP’s objectives represent the country’s wider interests while community interests are not directly represented.

**Vulnerability**

There is a high level of vulnerability for the development of illegal activities, such as illegal fishing (predominantly spearfishing) and woodcutting. Despite the Ministry of Fisheries fin fishery ban in Punta Francés in 1996, fishing activity using non-selective gears along the borders of the MPA does occur. There are noted issues regarding illegal fishing within the MPA because of PFNP’s poor surveillance and enforcement (Angulo-Valdés, 2005). Often, fishery enforcement officers from MINAL are unable to visit PFNP due to a lack of boats, fuel, etc. Patrolling is almost non-existent because park staff do not have access to a fully functioning boat, thus their range of action for enforcement is limited. In addition, the conflicting interests of the fishing and tourism industries led to ongoing disagreements between the Ministry of Fisheries and the Colony Hotel (Angulo-Valdés, 2005).

The regulations that are established as legal rules are not effective because PFNP suffers from a lack of material and financial resources that does not allow it to reach stability with its surveillance and monitoring programs. Thus, despite the rules and
regulations that exist on paper, there is no ability of direct control over the illegal activities taking place inside PFNP. While the regulations exist, their lack of effectiveness is a consequence stemming from the low capacity of responsible institutions to apply them.

Objectives

Because Cuba follows the IUCN’s management categories for MPA designation, the objectives of PFNP are in line with the IUCN’s objectives for Category II, National Park. According to the IUCN, the primary objective of a National Park is “To protect natural biodiversity along with its underlying ecological structure and supporting environmental processes, and to promote education and recreation” (Day et al., 2012).

Historically, the main objectives of Punta Francés have not been conservation-based. Rather, it is considered an MPA rooted in economic purposes (Angulo-Valdés, 2005). Prior to 1976, Punta Francés was used primarily for fishing, but its ecological richness facilitated its selection as the site of international underwater photography contests (Angulo-Valdés, 2005). Due to its high levels of marine biodiversity and SCUBA facilities at The Colony Hotel, Punta Francés became Cuba’s most influential SCUBA diving spot (Angulo-Valdés, 2005). For the last 25 years, the main activity occurring in PFNP has been SCUBA diving (Angulo-Valdés, 2005). However, it is worth noting that since 1998 there has been a constant decline of SCUBA diving and tourism income, attributed to the decline of the Colony Hotel’s facilities, a decrease of customer service, SCUBA diving issues relating to safety, competition from cruise ship tourism, and competitiveness with other Cuban SCUBA operations (Angulo-Valdés, 2005).
Legal Security

PFNP’s boundaries are not well demarcated, resulting in a lack of public awareness regarding the zoning and functioning of PFNP. In legislation, park boundaries exist but there is no physical indication of these boundaries, except for some hiking trails in the terrestrial portion. Little by little the limits of PFNP have become better known, but there is not an overwhelmingly clear fishermen consensus on park boundaries. The differing opinions represent an information problem: many fishermen think the MPA only occupies the southern part of the peninsula, but it includes the northern part of the peninsula as well (see Figure 6). Thus, no clear indication of park boundaries perpetuates misinformation and undermines PFNP’s legal security.

Figure 6: Boundaries of Punta Francés National Park (SNAP, n.d.)
Infrastructure

PFNP’s infrastructure is insufficient for ensuring enforcement, and has several main gaps in resources. Main gaps include a lack of human resources (especially of specialists and technicians); proper equipment for the development of surveillance, protection, monitoring, and research programs (such as radios for communication and a functioning boat--there is currently a small boat with an outboard engine, but the engine is broken and there are fuel shortages); poor living conditions at the ranger station; and the need for a body of permanent fishery inspectors by rotating groups that contribute to the patrolling of the area. Overall, there is a need for increased human capacity and equipment to ensure enforcement and monitoring activities.

Finances

ENPFF, the central government’s agency in charge of park management, is the main source of funding for PFNP. ENPFF pays the park staff’s salaries and maintains the existing infrastructure. However, oftentimes salaries are not paid on time, and this is a problem that affects most of the country’s PA workers. Aside from central government funding, it is very difficult to access external funding. Commonly, it is CNAP that applies to external funding and distributes it in order of interests and priorities to the system of PAs throughout the country, but it is very difficult for administrators to access external funding.

Management Planning

PFNP has operated under two management plans, one from 2000-2004 and the other from 2005-2010, both managed by CITMA. A 2011-2016 management plan draft
by ENPFF was produced, but it was never implemented. Thus, PFNP is currently operating without an active management plan.

**Management Decision-Making**

PFNP’s management structure at the local level is represented by ENPFF. Beyond that, there is an inter-institutional control structure, involving the country’s Coordinating Council of PAs, which verifies the facilitation of decision-making between different actors. However, PFNP does not have a clear mechanism for involving structured collaboration with the local community. The management decision-making process is rather closed and does not allow for participation from outsiders. In management plans, the community is mentioned with a certain degree of participation, but in reality these plans have not taken affect in practice.

**Research, Monitoring, & Evaluation**

PFNP has been biologically monitored for more than 15 years by the Center for Marine Research (CIM) at the University of Havana (UH). While CIM has gathered information based on students’ research, baseline information exists but is incomplete. Baseline information for certain ecosystems such as coral reefs, beaches, and populations of fish and birds is more complete. Every year, biological monitoring of the coral reefs and terrestrial ecosystems is done by CIM and the faculty from the UH Biology Department.

**Outputs**

Improvement is needed in all management areas, including but not limited to enforcement, wildlife management, community outreach, infrastructure, research and monitoring, and funding. Greatest success is from the ecological research conducted by
UH faculty and students in PFNP. In addition, PFNP’s geographic remoteness is a success in itself in that it has restricted access and coastal development, allowing for healthy habitats to exist.

Quoted perceptions of PFNP’s management effectiveness and performance included “regular”, “poor”, “very poor”, “terrible”, and “none at all”. Other research is in accordance with these sentiments. According to the Evaluation of the Management Effectiveness of Protected Areas by the Cuban methodology, PFNP can be classified as Moderately Satisfactory. Past research on the management effectiveness of PFNP found the ratio of current benefits to possible benefits being 28.5%, which classified PFNP’s effectiveness as poor (Angulo-Valdés, 2005).

5.2 Jardines de la Reina National Park

Pressures & Threats

An analysis of both pressures (current impacts) and threats (possible expected impacts) was conducted. Noted pressures currently existing in JRNP include: illegal fishing in the eastern part of the National Park, overfishing outside of park boundaries, opposition from fishermen, and the effects of climate change (specifically rising sea surface temperatures and its impacts on coral bleaching). Possible expected threats include: continuation of illegal fishing inside the MPA, commercial overfishing outside the MPA, climate change impacts (especially increasing hurricane frequency and intensity, ocean acidification, and sea level rise, which put stress on coral reefs and nesting beaches), and increasing tourism pressures resulting from the potential lift of the U.S. Embargo. This could put pressure on challenging the cap on the number of tourists allowed in JRNP, with temptation to expand park infrastructure to allow for more U.S.
visitors and yacht owners to enter the park. Indirectly, rising levels of tourism could cause investment and advancement in fisheries and agriculture resulting from food demands, which could cause increased fishing pressure and chemical runoff of pollutants into the ocean.

**Biological Importance**

Like PFNP, SNAP considers JRNP as a Protected Area of National Significance because it is known to host Cuba’s greatest marine biodiversity (CNAP, 2013; Estrada et al., 2004). The Jardines de la Reina Archipelago is comprised of hundreds of islets with ecosystems such as seagrass meadows, mangrove forests, coral reefs, and coastal wetland habitats including coastal lagoons and estuaries. It is the site of fish spawning aggregations, mangrove nursery grounds and shelter for snapper, grouper, parrotfish, sharks, and lobster; breeding grounds for nurse sharks; feeding grounds for hawksbill, green, loggerhead, and leatherback sea turtles; nesting beach sites for green, hawksbill, and loggerhead sea turtles; and reproductive areas for bird colonies. Other key ecosystem functions include protection of wave energy from the open sea and interconnectivity for the Gulf of Mexico.

JRNP is known for its impressive abundance, density, and biomass of larger reef fish and sharks, and they serve as JRNP’s most important attraction. Species include snapper, goliath grouper, Caribbean reef sharks, silky sharks, lemon sharks, nurse sharks, occasionally tiger sharks, eagle rays, sea turtles, manatees, marine birds, and all kinds of invertebrates and corals. JRNP is an important site for coral reefs, where crests with big patches of Elkhorn coral can still be found, which was once in abundance but now a rarity for the Caribbean.
According to coral reef monitoring programs, live coral cover at reef crests and flats is 13.1%, which is slightly lower than the regional average of 16.3%, with the majority of coral species comprised of Blade Fire coral and Mustard Hill coral (Caballero Aragón & Perera Valderrama, 2014). Diadema cover is 16.2 diadema per 10m², which is by far the highest diadema cover in the region; recent coral mortality is .8%, and non-recent coral morality is 26.4% (Caballero Aragón & Perera Valderrama, 2014). Live coral cover at reef fronts is 16%, which is slightly below the regional average of 17.3%, with the majority of coral species comprised of Massive Starlet coral and Mountainous Star coral, which is listed as endangered by the IUCN Red List (Caballero Aragón & Perera Valderrama, 2014). Diadema cover is .78 diadema per 10m²; recent coral mortality is .9%, and non-recent coral mortality is 10% (Caballero Aragón & Perera Valderrama, 2014). The median total of fish density (individuals/1000m²) on reef crests from 2010-2013 was 62.72±8.21, and the median total of fish biomass was 36.16±3.79, which is significantly higher than other MPAs in the region (Pina-Amargós et al., 2014).

According to sea turtle monitoring programs, there were 1,236 nests between 2010-2013 (Moncada Gavilán et al., 2014). The health of reef ecosystems in JRNP is indicated by lack of bleaching and presence of large fish, most especially sharks. According to studies by Dr. Fabián Pina Amargós, past director of CIEC, there are ten times as many sharks inside the reserve than outside, and since the creation of the MPA fish populations have increased on average 30% (Goode, 2015). The sheer size and isolation of JRNP—located 50 miles from the mainland—increases its effectiveness (Benchley, n.d.; Goode, 2015).
Socioeconomic Context

A number of coastal communities have some relationship to the park, but the relationship and public opinion varies, which depends on the economic implications of the park on different communities. Those that view the park favorably are workers of the touristic operation, Avalon-Marlin, while those in less support of JRNP are affected by loss of fishing grounds.

The town of Jucaro is the gateway to JRNP and the community with the most relationship in terms of benefits. The marina for Avalon-Marlin is based in Jucaro, which used to primarily be a fishing town, but with the creation of JRNP has shifted towards tourism as well. Many of Avalon-Marlin’s fishing guides are former fishermen, and others from Jucaro are employed as cooks and captains. Some employees of JRNP are from Jucaro but they are very few. In terms of community-wide impact, the park generates limited jobs and direct and indirect economic benefits. However, park benefits remain limited and current efforts are underway to examine the ways in which tourism activities could provide more direct benefits to Jucaro.

A main obstacle for Avalon-Marlin in hiring more locals as fishing guides is due to the Cuban Government’s regulations for employment in the tourism sector. There is an education-related employment regulation in place that requires Cuban workers to have at least half of 12\textsuperscript{th} grade completed, but most people have completed up to 9\textsuperscript{th} grade. Avalon-Marlin would like to hire more local fishermen to work as fishing guides since they know the local fishing best, but there are certain limitations in place that prevent this at the moment.
Santa Cruz del Sur is a nearby fishing community. Fishermen from Santa Cruz del Sur fish more closely to the park and were the community most affected by JRNP’s creation. This is because fishermen used these fishing grounds prior to park creation. While it is argued that the spillover effect benefits the fishing industry in the outskirts of the park, the establishment of JRNP limited their fishing grounds to outside JRNP boundaries and caused fishermen opposition. On the other hand, the artisanal lobster fishery allowed in JRNP is profitable, thus fishermen’s views are shaped by the fishery they are involved in. Overall, Santa Cruz del Sur receives a lesser extent of park benefits and employment opportunities than Jucaro. However, Avalon-Marlin is working towards increasing opportunities between their operation and Santa Cruz del Sur. While Avalon-Marlin would like to employ more fishing guides from the local community, the strict employment requirements for the tourism industry set in place by MINTUR make this difficult to achieve.

**Vulnerability**

JRNP is very vulnerable to illegal activities (such as illegal fishing) because it covers such an extensive area, making it difficult to have strong surveillance and effective regulations in a context where park boundaries are poorly monitored. At the same time, it is less vulnerable than other MPAs in Cuba because it is far off from the coast, roughly 4-6 hours by boat from Jucaro.

However, because of touristic operations in JRNP, Avalon-Marlin speedboats are frequently ranging throughout the park, serving as a rather effective surveillance system. Avalon-Marlin is very concerned with enforcement and their guides serve as the eyes and ears that help park management operating in a low resource environment. Avalon-Marlin
boat captains are the first line of enforcement, and when their boats witness poaching they call in and report it to the nearby fisheries inspector base. In addition, Avalon-Marlin has an agreement with MINAL to host fisheries inspectors on their liveaboard fleet up to 15 days at a time, providing the inspectors with boats and fuel that would otherwise be lacking. This allows the fisheries inspectors to act whenever Avalon-Marlin boats see any suspicious activity. Ultimately, it is this circle of cooperation between Avalon-Marlin and the various agencies involved in park management that allows JRNP to have enforcement in an area that would be otherwise to be too extensive to enforce given its lack of surveillance technology.

Objectives

As a National Park, JRNP shares the same objectives as PFNP in line with the IUCN’s objectives for Category II, National Park. As mentioned earlier, this is “To protect natural biodiversity along with its underlying ecological structure and supporting environmental processes, and to promote education and recreation” (Day et al., 2012).

Legal Security

Legal security is a difficult and main issue for the conservation of the area. The demarcation of JRNP’s boundaries has not been completed yet (see Figure 7). Through a mooring system, buoys are starting to be placed in certain critical areas to demarcate the most important boundaries and avoid conflict and confusion with fishermen from Santa Cruz del Sur. Most fishermen know the boundaries, but if not demarcated disagreements can cause disputes and affect enforcement.
JRNP’s zoning was recently reviewed with the new 2017 management plan. Most of the National Park is a conservation area; only artisanal lobster fishing is allowed for a limited number of boats clearly agreed upon between all stakeholders. Areas within the zoning are originally derived from the ZUSRUP and include conservation zones, diving zones, catch and release fishing zones, no-touch zones, monitoring zones, control zones, areas for boat mooring, and areas for lobster-fishing.

Infrastructure

Whether or not JRNP’s infrastructure is sufficient for ensuring enforcement depends on the management approach. If based on current practices of Avalon-Marlin serving as primary enforcer through the use of their speedboats for touristic activities, Avalon-Marlin has the minimum capacity for managing the park’s enforcement. However, improvements could be made for ENPFF to play a larger role in park management. Main
gaps in resources include the need for the following: more ENPFF staff, greater technical training of staff, increased economic incentives of ENPFF staff, a visitor’s center, boats and fuel for enforcement, and improved surveillance infrastructure. A solution for the surveillance and enforcement dilemma facing JRNP’s extensive area would be the use of surveillance systems based on more advanced technology, such as drones.

Another noted gap is compliance on behalf of fishermen. Enforcement efforts will be fruitless unless fishermen have an incentive to follow regulations. An important incentive in the case of JRNP is spillover, and conviction that it is occurring. In other words, this is a communications issue in terms of how well the spillover effect has been communicated to fishermen. Overall, despite all gaps, JRNP is considered the most advanced MPA in Cuba, and there is no other park with this kind of infrastructure.

**Finances**

JRNP’s administrative funding comes from the general fund of the central government. ENPFF’s most important funding, the salary of its workers, comes from the government as well. Avalon-Marlin and ENPFF have a contractual agreement, where Avalon pays ENPFF an operational license fee for each visitor its brings to the park, so in that regard Avalon-Marlin becomes a source of funding for the park as well on this contractual basis. ENPFF receives funds from Avalon-Marlin for diving licenses, and MINAL receives funds from Avalon-Marlin for fishing licenses. However, it should be noted that these profits are then directed towards national funds.

**Management Planning**

JRNP has two types of management plans. The first is an operative management plan released annually, and the second is a regular management plan released on a five-
year basis. The creation of the JRNP management plans is not something ENPFF alone can do, because it requires working with all the different actors of the area (such as MINTUR, CITMA, MINAL, and MINAG).

Management Decision-Making

While there is a clear organizational management structure on behalf of ENPFF, they do not have enough of a presence yet to effectively manage the park. There are two ranger stations in JRNP with five park staff working at each station, but with a lack of transportation and means of communication, it is difficult for rangers to move between them. Essentially, park staff knows what needs to be done for park operations, but cannot always accomplish this due to a lack of resources.

Currently, several initiatives are in the works aimed at making management structures more effective. At the moment, fisheries inspectors are from the National Office of Fishing inspection, housed within MINAL. Now, the switching of this responsibility is in progress; the creation of an MPA fisheries inspector body within ENPFF is currently being formed. Recent changes in the Cuban legislation merged the Office of Fishing Inspection with Food Inspection, and new changes could not guarantee the permanent presence of inspectors in JRNP. Because ENPFF is responsible for the protection of the park, they are asking permission to create a corps where rangers are trained and capable of enforcing fishing regulations in addition to the ecological monitoring work they currently do.

Additionally, other improvements are being made to the management structure. Because JRNP encompasses two provinces, the park is divided into sections managed by two different divisions of ENPFF. Currently in the works is a new proposal for JRNP and
two other nearby MPAs to be created as a single management unit, which would allow it
greater financial independence and more focus on conservation. This would take away
from the unnecessary management complications of have three parks within one general
area each being managed by its own small management unit, and will allow for the
cohesion of a single management team.

Also, Avalon-Marlin and ENPFF are working on the creation of an information
system for surveillance and a database for keeping and recording all issues happening in
the park. This database would work as a log where everything is written down (such as
whenever illegal fishing is spotted), so that eventually this database could build a better
understanding of what is going on in the park and help to identify park trends. These
trends would demonstrate where are the areas with the greatest threats, what measures are
being implemented, and how effective they are. Lastly, a mooring system in being
established, which will help boats coming in to visit JRNP book mooring buoys for their
stay.

Regarding structured collaboration with stakeholders, stakeholders indirectly
participate through different agencies, but are not directly represented and there is not a
public-hearing process like there is the U.S. This information is not only pertinent to
JRNP, but to Cuban MPAs in general.

Research, Monitoring, and Evaluation

Research and monitoring takes place twice per year by CIEC, once in the rainy
season and once in the dry season. Baseline information exists for the central portion of
JRNP, which is where CIEC has done most of its work due to issues of accessibility and
shortage of resources. Other parts of JRNP have baseline gaps.
Outputs

Improvement is needed in all management areas, but main gaps include funding for research and the need for increased monitoring activities as well as enforcement. However, the most cited need for improvement is engagement of local communities, related to community participation, involvement, relations, and outreach. In other words, finding ways to benefit the local communities through increased job opportunities and improved fishing will create incentives for locals to feel like JRNP is impacting their lives in beneficial ways. An example of this is SOS Pesca, a community-based sustainable fisheries initiative in Playa Florida and Guayabal (Whittle, 2013).

Outside JRNP, there is a need for fisheries management through tools such as rights-based management, in order to rethink how to engage communities and provide them with fishing opportunities. Compliance with JRNP’s regulations could be improved by giving fishermen greater interest in protecting the park. However, these issues are part of a wider picture and not limited just to the situation in JRNP. Lastly, JRNP’s public-private partnership model with Avalon-Marlin helps provide benefits, especially regarding enforcement and employment that would otherwise be lacking. Thus, there is a noted potential for this model to be replicated in other MPAs outside of JRNP.

Greatest success are the quality of scientific research occurring in JRNP on behalf of CIEC, and the cooperation and its related benefits between tourism and park management. Avalon-Marlin’s sustainable business model keeps tourism numbers and associated impacts low. The way Avalon-Marlin runs its diving and fly-fishing programs contributes to the sustainable management of JRNP’s natural resources. Additionally, Avalon-Marlin’s efforts towards enforcement supplement ENPFF’s limited abilities
stemming from a lack of financial and material resources. Tourism’s role to be an engine for protecting the park effectively upholds its value and quality as a National Park. But there remains a need for ENPFF to have a stronger role in park management. Administration of JRNP was granted to ENPFF only 6 years ago, and its role as park manager is growing slowly. Lastly, the wider end result of this is JRNP serving as an example of a communications success; it is well known because of the positive media attention it has received, and this resulting international awareness increases government accountability towards protecting JRNP.

Regarding the effectiveness of MPA performance and management, quoted perceptions include “effectiveness is high, but could be better”, “very effective”, “pretty high”, “the best preserved marine park in Cuba”, and “100% more effective than anything”. This is demonstrated through the conditions of reefs and populations of fish stocks, which have improved significantly and are a tangible and direct improvement of biological resources. The spillover effect, while scientifically proven but perhaps not well communicated to fishermen, is a benefit to socioeconomics, and JRNP has the ability to act as an economic engine providing jobs and revenue that are beneficial for the country as a whole.
Chapter 6: Discussion

PFNP and JRNP share many similarities, as well as key differences (see Table 3). Despite profoundly different performance and management outcomes, PFNP and JRNP exhibit similarities in the following categories: pressures, threats, legal security, infrastructure, research and monitoring, and outputs. However, key differences that explain varied levels of management effectiveness between PFNP and JRNP are displayed in socioeconomic context, vulnerability, and management planning. Ultimately, it is the role of public-private partnerships in MPA management that allows for JRNP to achieve greater success in management effectiveness than PFNP, resulting in a more meaningful biological and socioeconomic impact. The niche for public private partnerships to contribute to MPA management is a worldwide trend; examples of effective MPAs managed partly or primarily by private organizations include Tubbataha Reefs Natural Park in the Philippines and Chumbe Island Coral Park in Tanzania (Jones, Qiu, & De Santo, 2013).
Table 3: Summary of Results

<table>
<thead>
<tr>
<th>Similarities</th>
<th>PFNP</th>
<th>JRNP</th>
</tr>
</thead>
</table>
| Pressures    | • Illegal fishing  
               • Overfishing  
               • Climate change  
               • Invasive species  
               • Cruise ship tourism | • Illegal fishing  
               • Overfishing  
               • Climate change |
| Threats      | • Illegal fishing  
               • Overfishing  
               • Tourism | • Illegal fishing  
               • Overfishing  
               • Climate change  
               • Tourism |
| Legal Security | • Boundaries not demarcated  
                      • Perpetuates misinformation on park boundaries | • Demarcation incomplete  
                      • Mooring buoy system in progress |
| Infrastructural Gaps | • Human capacity  
                                • Enforcement equipment  
                                • Living conditions at ranger station  
                                • Need for permanent fisheries inspector presence | • Human capacity  
                                • Enforcement equipment  
                                • Visitors center |
| Output Success | • Scientific research by CIM and UH Biology Department | • Scientific research by CIEC |

<table>
<thead>
<tr>
<th>Key Differences</th>
<th>PFNP</th>
<th>JRNP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Socioeconomic Context</td>
<td>• Community receives no direct benefits</td>
<td>• Locals hired as staff by tourist operator; provides alternative livelihoods</td>
</tr>
<tr>
<td>Vulnerability</td>
<td>• Patrolling limited due to lack of resources</td>
<td>• Role of tourist operator as surveillance system</td>
</tr>
<tr>
<td>Management Planning</td>
<td>• No management plan</td>
<td>• Active management plans</td>
</tr>
</tbody>
</table>

The performance and management of PFNP and JRNP are both pressured by the impacts of illegal fishing inside MPA boundaries, overfishing outside MPA boundaries, and climate change effects, particularly as it relates to coral bleaching. The integrity of both National Parks are threatened by the continuation of illegal fishing, overfishing, climate change effects, and expected increases in tourism. Regarding legal security, both PFNP and JRNP have boundaries not yet well demarcated, which causes lack of clarity and disputes with fishermen, which challenges enforcement efforts and undermines legal security. With capacity of infrastructure, PFNP and JRNP share gaps in resources, including the need for more park staff and enforcement equipment, such as boats and
fuel. Both National Parks serve an important role as natural laboratories for the respective academic and governmental institutions conducting scientific research in these areas. For both PFNP and JRNP, the quality of scientific research taking place has been noted as a main area of success for management outputs.

However, ecotourism operating through JRNP’s public-private partnership provides many benefits not seen in PFNP. By serving as a mechanism for effective park protection, tourism activities in JRNP help to decrease park vulnerability to illegal activities. This is primarily due to the key role that Avalon-Marlin plays in contributing to JRNP’s park management, especially towards enforcement, where park resources would otherwise be lacking. Avalon-Marlin’s role in contributing to enforcement measures makes an otherwise unenforceable area (given JRNP’s extensive range and limited resources) have a rather effective enforcement system. In fact, recent research on worldwide trends on MPA performance cites staff and budget capacity as the strongest predictors of conservation impact (Gill et al., 2017). The role of public-private partnerships in MPA management can supplement human and financial capacity of park management, and this is successfully demonstrated in JRNP. This cooperation and collaboration is the greatest success of JRNP, playing a key role in JRNP’s enforcement and conservation.

Additionally, JRNP exhibits stronger performance and management outcomes than PFNP due to the role that ecotourism plays in improving the socioeconomic context. As mentioned earlier, research shows that social factors are primary determinants of MPA success over biological or physical factors (Charles & Wilson, 2009; Mascia, 2004; Pomeroy et al., 2007). The importance of social determinants of success is evident with
JRNP, where there are greater connections between park benefits and local communities through employment and other economic opportunities generated by Avalon-Marlin’s operations. In JRNP, a system of incentives is established to continue ensuring the sustainability of ecosystems on which tourism depends. These include incentives such as promoting economically and ecologically sustainable resource use through spillover effects and the enhancement of direct and indirect use values of resources, promoting alternative livelihoods, and participative enforcement (Jones et al., 2011). There exists an active motivation to protect the National Park from its own vulnerability because of the conservation and resulting tourism benefits it provides. This system is not present in PFNP, where the possible opportunities resulting from public-private partnerships in MPA management—such as ecotourism demands and community benefits—is lacking, and thus the resulting incentive structure is not in place. Instead, low levels of inclusion between PFNP and Cocodrilo create a dynamic in which the community is not encouraged or incentivized to protect PFNP’s natural resources. Developing a public-private partnership in PFNP could increase its management effectiveness and encourage community involvement and support. While tourist operations in JRNP serve many benefits for increasing its management effectiveness, there too is a cited need to further improve community engagement. If community engagement efforts can be successfully implemented and/or expanded, stakeholders will be provided with greater opportunity to develop incentives to protect park resources.

Lastly, the varied degrees of management effectiveness between PFNP and JRNP illustrate the importance of having an updated management plan released on a regular basis. This allows for rules and regulations to clearly be understood by park staff and
involved stakeholders. Management plans help to clearly guide management objectives and establish program guidelines for meeting these expectations.

6.1 Lessons Learned: Punta Francés National Park

Based on PFNP’s performance and management outcomes, the following actions aimed at current administrative, socioeconomic, and biological conditions are suggested to increase management effectiveness, further discussed in detail below (see Table 4):

Table 4: Suggested Management Actions for Punta Francés National Park

<table>
<thead>
<tr>
<th>Administrative</th>
<th>Socioeconomic</th>
<th>Biological</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Increase human capacity and</td>
<td>• Develop ecotourism activities with community</td>
<td>• Expand monitoring programs to develop an</td>
</tr>
<tr>
<td>technical training of park staff</td>
<td>outreach components (visit Cocodrilo, hire</td>
<td>active baseline</td>
</tr>
<tr>
<td>(especially specialists)</td>
<td>more locals, etc.)</td>
<td></td>
</tr>
<tr>
<td>• Improve living and working</td>
<td>• Revamp the Colony Hotel’s accommodations and</td>
<td></td>
</tr>
<tr>
<td>conditions at ranger station</td>
<td>diving center</td>
<td></td>
</tr>
<tr>
<td>• Acquire enforcement equipment (boats</td>
<td>• Develop an exit survey for divers</td>
<td></td>
</tr>
<tr>
<td>and radios)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Place mooring buoys at dive sites</td>
<td></td>
<td></td>
</tr>
<tr>
<td>to prevent anchor damage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Implement an updated management plan</td>
<td></td>
<td></td>
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<td></td>
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</tbody>
</table>

PFNP represents a unique situation where there is low management effectiveness, yet relatively healthy ecosystems due to the National Park’s geographic remoteness and limited human impacts. Therefore, rather than directing management actions towards ecosystem restoration, management priorities should focus on increasing human capacity of park staff, (particularly specialists) improving their living and working conditions, placing mooring buoys at dive sites to prevent anchor damage, acquiring enforcement equipment (especially boats and radios), and upholding regulations. The latter depends on an updated management plan being formed and implemented, so that it is clear to park management and stakeholders what rules and regulations are currently in place. Thus, it is crucial for PFNP to create an updated management plan to allow for proper functioning. Additionally, the ability of park staff to sufficiently patrol the area and
uphold regulations directly depends on the acquisition of sufficient enforcement equipment.

PFNP has great potential for expanding sustainable touristic activities that could create more park revenue, as well as develop community engagement programs; therefore it is a possible candidate site for the development of a public-private partnership management model similar to JRNP’s. In the meantime based on current conditions, resources for touristic activities should be directed towards revamping the Colony Hotel’s accommodations and diving center to make it more attractive to tourists and increase PFNP’s revenue from tourist activities, which has greatly declined since the late 1990s (Angulo-Valdés, 2005). Establishing a divers’ exit survey could allow for gaining tourist feedback and reestablishing PFNP’s reputation as a desirable diving destination. If tourism programs were revamped, this could serve as a finance mechanism for the National Park, which currently operates severely under-resourced. Ecotourism activities could include visits to Cocodrilo, where tourists could participate in snorkeling and diving trips and community engagement programs. Additionally, a greater number of park staff could be hired from Cocodrilo, where fishermen already have a good understanding of local ecology.

Lastly, suggested biological management actions to be undertaken include: fish monitoring (to determine fish diversity and abundance) coral reef monitoring (to measure the extent of coral coverage, diversity, mortality and disease), monitoring mangrove health, and monitoring the structure and composition of vegetation. Increased monitoring would contribute to the development of an active baseline, where there are currently many gaps.
In addition to the lessons learned based on the findings of this study, CNAP currently has general recommendations for PFNP’s biodiversity monitoring system in the following programs: protection and security, public use, research and monitoring, and administration (see Table 5). CNAP’s recommendations are summarized in the table below:

Table 5: Recommendations for Punta Francés National Park’s Biodiversity Monitoring System (Hernández-Ávila, 2014)

<table>
<thead>
<tr>
<th>Program Area</th>
<th>Management Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection and Security</td>
<td>• Reinforce protection and security against fishing activity in the MPA</td>
</tr>
<tr>
<td>Public Use</td>
<td>• Enforce compliance with visitor caps established in SCUBA diving sites in the MPA. Strictly follow regulations for reef protection established for this activity</td>
</tr>
<tr>
<td>Research and Monitoring</td>
<td>• Maintain the network of fixed monitoring stations for reef conditions, as well as the early warnings for coral bleaching or disease outbreaks. More accurately monitor and assess recent coral mortality</td>
</tr>
<tr>
<td></td>
<td>• Evaluate <em>in situ</em> reef conditions after hurricanes or other meteorological phenomena of great intensity. Accurately check and evaluate possible damage</td>
</tr>
<tr>
<td></td>
<td>• Monitor macro-algal relationships</td>
</tr>
<tr>
<td></td>
<td>• Conduct comprehensive studies to determine the causes of increase in fleshy macro algal biomass</td>
</tr>
<tr>
<td></td>
<td>• Initiate studies to implement the propagation of corals and sea urchins</td>
</tr>
<tr>
<td>Administration</td>
<td>• Commence marine zoning with the establishment of mooring buoys, demarcation of SCUBA diving zones, and delimitation in areas of the MPA still lacking this</td>
</tr>
</tbody>
</table>

6.2 Lessons Learned: Jardines de la Reina National Park

Based on JRNP’s performance and management outcomes, the following actions aimed at current administrative, socioeconomic, and biological conditions are suggested to increase management effectiveness, further discussed in detail below (see Table 6):
Table 6: Suggested Management Actions for Jardines de la Reina National Park

<table>
<thead>
<tr>
<th>Administrative</th>
<th>Socioeconomic</th>
<th>Biological</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Increase human capacity of park staff</td>
<td>• Expand community engagement efforts (increase environmental education programs, hire more locals, find ways for local businesses to benefit)</td>
<td>• Expand monitoring programs to cover baseline gaps</td>
</tr>
<tr>
<td>• Acquire more enforcement equipment (boats and radios)</td>
<td>• Bridge communications gap with fishermen regarding spillover effects</td>
<td></td>
</tr>
<tr>
<td>• Create more advanced surveillance infrastructure through acquisition of drones and radar</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Establish a visitors center</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Although many consider JRNP to be the best preserved MPA in Cuba and no others have its kind of infrastructure due to the public-private partnership between Avalon-Marlin and the agencies involved in park management, there is still room for improvement. Administrative actions should be directed towards daily park operations, including increasing human capacity of park staff, creating a visitors center, acquiring sufficient enforcement equipment for patrolling the area (boats and radios), and creating a more advanced surveillance infrastructure through the acquisition of drones and radar that will enable effective surveillance for such an extensive area.

In particular, there is a cited need for increased community engagement efforts in the communities surrounding JRNP. This could be done through the expansion of successful community-based program such as SOS Pesca, hiring more locals to work for Avalon-Marlin and as park staff, increasing environmental educations programs, and finding ways for local businesses to benefit from park tourism during their stay and travels through Jucaro on the way to JRNP (Whittle, 2013). Additional socioeconomic measures that could be undertaken include increasing community involvement and support and the creation of a socioeconomic monitoring program. This could include measuring the amount of profit staying in the areas surrounding JRNP, the proportion of
local employees, and the development of an indicator that shows the change of people’s perceptions towards nature. Lastly, given the proven spillover effects from JRNP, and yet continued fishermen opposition, scientific efforts should be made to bridge communication gaps with fishermen to improve local understanding of the National Park’s benefits. This could improve fishermen compliance and support of JRNP. If this were achieved, there would be less enforcement issues surrounding illegal fishing inside the boundaries of the National Park.

Regarding biological actions, consistent biological monitoring should be continued, focused on the same types of habitat health assessments as PFNP. Main points of focus could include fish monitoring (to determine biomass, measure spillover effects, and identify spawning aggregation sites), coral reef monitoring (to determine coral coverage and responses to climate change), and monitoring the health of invertebrates and shark populations. There is great potential to expand science and research programs, as JRNP serves as a marine science lab for Cuba and is an ideal location for more scientific educational research projects.

In addition to these recommendations, CNAP currently has general management recommendations for JRNP’s biodiversity monitoring system in the following programs: research and monitoring and administration (see Table 7). CNAP’s recommendations are summarized in the table below:
<table>
<thead>
<tr>
<th>Program Area</th>
<th>Management Recommendations</th>
</tr>
</thead>
</table>
| Research and Monitoring | • Continue monitoring hawksbill turtles and increase monitoring of loggerhead and green turtles  
• Research in depth the variables that have to do with the low success of the hawksbill turtle nests, since it is the species with lower success rates  
• Resume iguana monitoring programs in the National Park  
• Maintain the network of fixed monitoring stations for reef conditions, as well as the early warnings for coral bleaching or disease outbreaks.  
• More accurately monitor and assess recent coral mortality  
• Evaluate *in situ* reef conditions after hurricanes or other meteorological phenomena of great intensity. Accurately check and evaluate possible damage  
• Initiate studies to implement the propagation of corals and sea urchins  
• Implement a management plan for Lion Fish in the MPA  
• Continue seagrass programs, incorporated into both sectors of the MPA  
• Maintain mangrove monitoring in established plots, and increase the number of plots in the Ciego de Ávila sector  
• Continue monitoring actions for coastal sand vegetation, with an emphasis on Cayo Caguama and others to the west of the PA                                                                                                                                                                                                                     |
| Administration     | • Create the necessary infrastructure in Cayo Caballones to implement planned monitoring programs in the MPA, which are part of the project but not implemented  
• Complete the establishment of marine zoning with delimitation buoys and strict conservation zones that are still not placed in the Camagüey sector                                                                                                                                                                                                                                                                                     |
Chapter 7: Conclusion

This study focused on management effectiveness of MPAs in Cuba with a comparative analysis between PFNP and JRNP. These case studies were chosen based on geographic and ecological similarities, as well as the fact that both MPAs are National Parks managed by the same government agency; yet, they exhibit profoundly different performance and management outcomes. A driving question was why do certain MPAs exhibit higher degrees of success than others? The goal of this thesis was to determine what factors influence management effectiveness in Cuban MPAs, with a focus on PFNP and JRNP. Objectives included: 1) identifying and assessing the factors related to management success in two Cuban MPAs, and 2) determining how these factors can be utilized to strengthen MPA performance across the island’s MPA network in light of increasing pressures on Cuba’s marine environment.

Key informant interviews and relevant secondary sources were used to determine perceptions on MPA management effectiveness. This study used a condensed, edited version of the WWF’s RAPPAM Methodology’s Rapid Assessment Questionnaire to gather data and compare results between National Parks. The questionnaire’s framework took into account five assessment elements: Context, Design and Planning, Inputs, Management Processes, and Management Outputs. The framework developed in this study can be applied to other MPAs in Cuba or elsewhere in order to analyze MPA management effectiveness. The results of this study help to identify management strengths and weaknesses with a comparative focus.

The results of this study demonstrate that PFNP and JRNP share many similar trends in pressures, threats, legal security, infrastructural gaps, and output success. Both
National Parks are pressured by illegal fishing, overfishing, and climate change impacts which affect coral health and sea turtle nesting beaches. Their integrity is threatened by the continuation of these factors, as well as anticipated increases in tourism. The legal boundaries of both areas are not fully demarcated, which undermines legal security and causes conflicts with fishermen. Shared infrastructural gaps include a need for greater staff capacity and enforcement equipment. Both National Parks act as important natural laboratories for Cuba, and their main noted success are scientific research outputs. Lastly, suggested management actions for PFNP and JRNP emphasize community engagement efforts, which remain a key gap for both National Parks and reflect broader issues with Cuba’s MPA network and community involvement.

However, PFNP and JRNP exhibit key differences in socioeconomic context, vulnerability, and management planning that cause varying levels of management effectiveness. This study illustrates the role public-private partnerships can play in strengthening MPA management effectiveness: ultimately, JRNP exhibits greater management effectiveness than PFNP because of Avalon-Marlin’s contributions to park management. This is significantly attributed to the role that ecotourism plays in improving the socioeconomic context through providing alternative livelihoods to locals and generating economic revenue. Additionally, ecotourism operations serve as a mechanism for effective park protection through contributions to enforcement measures, where park management would otherwise lack the human capacity and resources to be able to carry out enforcement, as seen in PFNP. Lastly, this study highlights the importance of having a management plan to clearly guide management actions and objectives.
Ecotourism can play a key role in MPA management; this study illuminates its importance moving forward for Cuban MPAs as tourism is expected to significantly rise (Feinberg & Newfarmer, 2016). Given the relatively well-preserved conditions of Cuba’s marine environments compared to the wider Caribbean region, as well as the Cuban Government’s legislative frameworks for environmental protection, Cuba is poised to develop itself as an ecotourism destination. This is also an opportunity for strengthening MPA management effectiveness, where ecotourism and MPA management could intertwine to benefit environmental conservation, tourism activities, and park management. Although there is room for improvement, especially related to expanding community engagement, the public-private partnership model for MPA management is well worth replicating in other MPAs across the country to improve management effectiveness and balance tourism with conservation efforts.
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