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Rapid Fisheries Sector Assessment

Three Bays National Park, Haiti

Submitted by James Miller, November 2015

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Acronyms

ACP Fish II	Atlantic, Caribbean and Pacific Fisheries Program of the EU
APD	Asosyasyon Peche Derack
APDK	Association Paysans pour le Developpement de Caracol
APF	Association Pecheurs Fort Liberté
APJ	Asosyasyon Peche Jakzil
ASJPF	Association des Jeunes Pecheurs Fayeton
ASPF	Association Pecheur Fayeton
BID	Banque Inter-Americane de Développement (IDB in English)
BMA	Brigadier Maritime en Action
CEPROBAC	Cooperative Environnementale pour la Protection de la Baie de Caracol
CFI	Centre de Facilitation des Investissements
CMBP	Caribbean Marine Biodiversity Program
CPD	Koperasyon Pech Derak
DPAQ/DFAQ	Department des Pêches etAquaculture – Dept. of Fisheries and Aquaculture
EC	European Commission
EU	European Union
FAO	Food & Agriculture Organization of the United Nations
FSAP	Fisheries Sector Action Plan
FOPROBIM	Fondation pour la Protection de la Biodiversite Marine
Gdes	Gourdes – 52.8 gdes = \$US 1.00
GPF	Groupman Peche Fayeton
IDB	Inter-American Development Bank (BID in French)
IUU	Illegal, Unregulated, Undocumented (fishing)
Kg	Kilogram
LMMA	Locally Managed Marine Area
M	Million
MARNDR	Ministere de l’Agriculture, des Ressources Naturelles et du Developpement Rural
MGW	Mega Watt
MPA	Marine Protected Area
MSC	Monitoring, Surveillance and Control
MT	Metric Tons
OMPBL	Organisation Marins pour la Protection de Bord de Mer Limonade
OPBL	Organisation Pecheurs de Bord de Mer de Limonade
OPDM	Organisation pour le Développement Pêcheurs de Madras
PIC	Parc Industriel de Caracol; Industrial Park of Caracol
RFSA	Rapid Fisheries Sector Assessment
3BNP	Three Bays National Park
UGEBFO	Unité de Gestion pour la Protection de la Baie de Fort Liberté

Figure 1. Google Earth Image of the Three Bays Park



Rapid Fisheries Sector Assessment of the Three Bays National Park

1. Introduction

1.1. Overview

Few countries in the world face the environmental degradation found in Haiti, where the “tragedy of the commons” is on full display. The country has lost most of its forests, leaving its mountains bare, and massive erosion is causing heavy siltation over inshore bottom habitats and coral reefs. Most people live along the lower altitudes near the coast, in highly populated fishing communities that have overfished the inshore waters for decades and exploited valuable mangrove forests for charcoal. Haiti has a population of 10 million and an unemployment rate estimated at 40–60%. Many of these unemployed people turn to fishing, using practices that damage marine habitat and further tax fishery resources. The totally open-access fishery, with no control by government or by fishers, has resulted in gross overfishing along a narrow continental shelf of some 5000 km².

Haiti remains the most food insecure country in the western Hemisphere, and imports more than 50% of its food, including some 20,000 tons of fish per year (ACP Fish II, 2012). About 50,000 fishermen live in 400 fishing communities along the 1,770-km coast, operating at a subsistence, artisanal level and using basic gear and small (10–15 foot), wooden, locally made boats. The limited capacity of Haiti’s largely un-motorized, aging skiffs has further concentrated fishing in the inshore waters, as existing vessels are mostly powered by sail or oars and are inadequate for fishing in offshore waters. Haiti has 140 fisher associations, including 12 in the Three Bays National Park (3BNP) (Table 2).

Haiti’s antiquated Fishing Law dates back to 1978, when François Duvalier ruled the country with top-down dictates. This law fails to adequately consider fishermen’s needs or establish co-management practices and is overdue for a revision. A number of official fisheries missions have proposed revisions in vain over the years.

The marine environment in the Caribbean is composed of 82% marine waters and only 18% land (CARICOM, 2011). Institutionally, Haiti’s fisheries fall under the Ministry of Agriculture, Natural Resources and Rural Development (MARNDP). Within this ministry, the Department of Fisheries and Aquaculture (DFAQ) is a neglected department with few staff and insufficient resources. Due to the lack of policy framework and enforced regulations, there is no effort to manage and conserve fisheries and marine resources. Therefore, fishermen have attempted to organize themselves through the 140 fisher associations to mitigate the decline in catch observed throughout the country. Unfortunately, no efforts have measurably reversed the decline in catch. Clearly, the fishermen have good intentions but lack the leadership capacity to carry out sustainable initiatives to improve their fisheries. Nevertheless, within the Three Bays National Park, all fishermen who were interviewed and who spoke at meetings expressed a desire for change and were supportive of Fondation pour la Protection de la Biodiversité Marine (FOPROBIM) leading an organized effort to reverse the decline in catch due to overfishing.

The fish catch around Haiti has been declining for decades. The World Bank reported an average annual catch of 48,000 tons from 1991 to 1993, but the catch as reported by the FAO declined to 6,000 tons by Bellmans 1999. Such numbers cannot be verified, but they do indicate a dramatic decline in catch. All 161 fishermen who were interviewed in the park stated that the declining catch was their major concern; clearly, the fishermen want to see change. The DFAQ reports fish production at some 13,000 tons per year (personal communication, Director of Fisheries) with a potential maximum range of 23,000 to 25,000 tons (presumably if the fisheries were in good condition). However, these figures cannot be confirmed, as there are no efforts

to collect fish catch data or document fishing activities with specific gear or boats. Including imports and local production, annual fish consumption is estimated to range from 1.7 kg to 4.5 kg per person (FAO, Breuil 1999; Felix, 2012), compared with 17 kg in Jamaica and 18 kg globally (Felix, 2012). Fish consumption is thought to be much higher in the 3BNP, but there are no data to quantify this.

1.2. Objectives of This Report

This report presents the findings of a Rapid Fisheries Sector Assessment (RFSA) on the fisheries in the northeast part of Haiti in the 3BNP. This park is one of four seascapes (Jamaica; the Dominican Republic; Haiti; and the Grenadines-Grenada, St. Vincent and the Grenadines) being evaluated by The Caribbean Marine Biodiversity Program (CMBP). The program, which is funded by USAID for \$US 10m over five years, is addressing major problems in these seascapes. Its goals are to diversify livelihoods and change other activities to protect biodiversity and develop sustainable fisheries. Among the four seascapes, Haiti faces the most challenges due to its high degree of poverty and lack of support.

This report seeks to diagnose and analyze important problems, weaknesses, and opportunities to create a sustainable fisheries sector in the northeast part of Haiti. The assessment is based on meetings with stakeholders, focus groups, and fishermen, as well as questionnaires that involved double checking of responses carried out over a month in seven fishing communities within the 3BNP. The total population of these communities is estimated at 25,000. No census on these small towns was available, but an estimated 1,000 fishermen are primary users of the resource, in addition to 5,000–6,000 secondary users. These estimates account for about 25% of the total population in the seven fishing communities: Bord de Mer Limonade, Madras, Caracol, Jacquezy, Phaeton, Fort Liberté, and Derac.

The project is clearly a stakeholder-driven effort, built on extensive participatory efforts, often under challenging conditions. Due to the lack of statistics and the difficulties in obtaining accurate information, the findings of this assessment are somewhat irregular. They underline the need for serious data collection over time among the fishing communities.

A concerted data collection effort should include a census of fishermen, gear, and vessels; organizations of fishers (associations or cooperatives); catch effort; seasonal trends; marketing; information that could be used to develop an efficient value chain; identification of major species; spatial overlap between fishers and spawning and nursery areas; and potentially length and maturity data of catch. Unfortunately, there are no catch data to answer many of the most pressing questions. Boundaries for fishing by community are not defined.

However, the fishermen are starting to understand that their open-access fishery is contributing to overfishing, and they see the need to establish zones in their fishing grounds in order to protect their resource (a first step toward a closed-access fishery). Given the lack of government support to fisheries in this marginalized area of Haiti, it is very important to build the capacity of the Fishers Associations to gather information and sustainably manage the fisheries in the 3BNP, which is a Marine Protected Area (MPA). Proper management of marine protected areas calls for leadership capacity and technical skills. It is necessary to establish a learning network among stakeholders that can facilitate joint problem solving and reflection among stakeholders and fishers.

This effort will involve a lengthy process of empowerment and building trust, but there is no alternative; problems facing fisheries in the 3BNP can only be solved from within and from the bottom up. Fisheries elsewhere have succeeded using this approach (Maina and Samoilys, 2011). In Haiti, it is essential for local partners to facilitate the capacity building of fisher associations and other key actors. Such partners could include the University of Limonade, the CFI, and others. Training programs for fishermen and associations should be carried out in Creole, the language most fishers speak.

2. The Fisheries Sector

2.1 Institutional Support

2.1.1. Department of Fisheries and Aquaculture

Fisheries in Haiti fall into three categories: 1) inland freshwater fisheries, 2) aquaculture, and 3) marine fisheries. They are led by the DFAQ, under the MARNDR, which focuses most of its limited resources on agriculture. The DFAQ has limited staff and most of their efforts are in the south, where several international projects are based, deploying important resources. More proactive leadership is needed to promote fisheries and management in the DFAQ, in order to put fisheries at a priority level to receive greater support at the MARNDR. Reports from several official missions on fisheries indicate that the department is a difficult collaborator, as shown by difficulties in organizing meetings with staff, getting replies to internet queries, and receiving information about fisheries.

The MARNDR should focus on strengthening the department, clarifying and revising laws and regulations, and creating a professional career pathway for mid- to upper-level managers. The central roles of the department should be to create a workable institutional framework, provide technical support to fishers and fish farmers, and help the private sector develop sustainable fisheries.

In addition, a Monitoring, Surveillance and Control (MSC) program for Haiti's waters is needed. Such a program could reduce IUU (illegal, unreported, unregulated) fishing. The scale of IUU in Haiti is unknown, but it is an enormous problem globally, with an estimated \$US 10–24 billion worth of fish caught illegally worldwide. This is the equivalent of 11–25 million tons of fish (World Bank/FAO, 2008; Caribbean Regional Fisheries Mechanism, 2013). Without an operational Coast Guard to carry out MCS, the degree of IUU fishing off Haiti's coasts cannot be determined.

No data have been recorded on fish catch or production; thus, there are no fisheries statistics available. A census and registry of fishermen was called for in the Fisheries Law of 1977, but has not been completed. No efforts have been made to carry out research, nor is there a plan for professional career development of government officials to encourage them to work on fisheries.

Co-management in fisheries should be at the core of the mission statement of the fisheries department. The sharing of power and responsibility between government and local resource users was not acceptable in 1977 when the Fisheries Law was established, because the law was created under dictatorial leadership. However, 38 years have passed, and all progressive fisheries institutions elsewhere embrace the participatory process for improved, rational management of fisheries. In Haiti, the government lacks resources and the fishermen lack management skills, but by working together to co-manage the fisheries, they can create a win / win situation to provide healthy livelihoods for the fishermen, develop sustainable fisheries, and collect data that show the system is working.

2.1.2. Inland Fisheries

Inland fisheries are essentially to people living around continental water bodies, who depend on them for both water and fish. Haiti has three large lakes, along with a number of small dams in rural areas. Fish production from these water bodies totals some 600 tons of fish a year (Felix, 2012) and supports about 800 fishermen. Periodic droughts have greatly affected these water bodies, causing significant fluctuation in water level.

2.1.3. Aquaculture

Several private-sector freshwater fish farms have been developed, mainly for tilapia. An exhaustive review of fish farming in Haiti was carried out by a team of consultants funded by the European Commission through the ACP Fish II program in 2012. This study seriously questioned the DFAQ's activities regarding importation of a predatory Asian catfish and suggested that encouraging commercial fish farming was unlikely to be economically viable because of the need to import expensive feeds and the competitive market for low-cost fish. Extensive rural fish farming exists in much of the country, but the lack of technical support from the DFAQ limits the success of rural farmers, who may practice fish farming integrated with pig or poultry farming. Nevertheless, the private-sector hatcheries do provide tilapia fingerlings for fish farming. This offers an opportunity for pilot cage-farming of tilapias in the estuarine and fresh water areas of the 3BNP, but only for non-invasive species (which includes tilapias) and only if arrangements can be made for sourcing fish feeds. To date, all efforts at cage-farming of fish have failed economically, as noted by fishermen in Fort Liberté and Etang Saumautre, near the capital city Port-au-Prince.

2.1.4. Marine Fisheries

Haiti's marine fisheries are largely non-mechanized, small-scale commercial operations that practice severe overfishing. Dramatic commentary on this problem appeared in an article in September 2011 in the *New York Times* about Haiti's "Ailing Reef," which linked significant reef die-offs to overfishing. Gregor Hodgson, director of an NGO which first noticed the die-off, told the *Times*, "It's probably the worst overfishing I've seen anywhere in the world."

Haiti's most productive fishing grounds are in the south, where there are thousands of fishermen and boats, including fiberglass boats, of which some 36% are motorized. Fishing contributes greatly to employment, food security and the local economy. A limited fisheries value chain has developed in the southern region, dominated by middlemen or intermediate buyers of fish, who have been successful in supporting fishermen with equipment and loans. Because they are poorly organized and have a highly perishable catch, the fishermen are vulnerable to entering inequitable relationships with buyers and becoming indebted to them, which is a common problem among artisanal fishers worldwide.

How can this situation be changed? First, an improved value chain is needed with organized fishermen, designated landing sites with basic infrastructure (following pilot test sites, with the full backing of fishers' associations), improved processing and handling of fish, and better marketing. Strong fishermen's associations could improve marketing and reduce the number of middlemen, giving more income to the fishermen. This arrangement will be important in the larger CMBP.

Increased fish production around the southern peninsula of Haiti is reported to benefit from installation of Fish Aggregating Devices (FADs) in the deeper waters, which attract high-quality pelagic fish. There is much debate about the impact of FADs in this region, but they, along with improved equipment and motorized boats, have contributed to increasing Haiti's fish production to 16,000 tons in 2010 (personal communication, Director, DFAQ), a doubling of the estimated production from 2008 (Masters, 2010). Unfortunately, there are no catch data to support these estimates, and they appear to be baseless and made only to support the current fisheries project involving the DFAQ.

How much can small-scale fishermen catch in a year? In other countries that collect some statistics, such as the neighboring country the Dominican Republic, artisanal fishermen may catch 1 to 2 metric tons per year. If fish are sold by weight at \$US 1.50/kg, then a fisherman could earn \$US 1,500/year or more.

2.2 Constraints to Fisheries Development

Based on the literature, knowledge of Haiti over 30 years, and findings of the present mission, we present the following summary of constraints to development of sustainable fisheries:

Institutional

1. Lack of institutional framework for policy on fisheries resources
2. Absence of fisheries management
3. Lack of resources and weak capacity among government fisheries staff
4. Lack of organized landing sites with infrastructure for processing and storage
5. Lack of data on fish catch, effort, and population with which to track the fisheries
 - a. Lack of information on the identification, distribution, abundance, life history, and spatial structure of the fisheries resources and fish habitats
 - b. Lack of information to estimate seasonal variation in catch
6. Lack of a plan for sustainable fish production
7. Totally open-access fisheries
8. Fishermen's lack of effective organization into Associations or Cooperatives
9. Lack of census and licenses for fishermen, and boats
10. Lack of research capacity for fisheries
11. Lack of a professional career track to promote fisheries officials to management positions
12. Lack of MSC in Haiti's waters, due to lack of personnel and financial resources; no efforts are made to protect national waters or national parks

Practical / Human Resources

13. Overfishing
14. Use of fine-mesh seines, causing degradation of fisheries and marine habitat
15. Limited education among fishermen, only 12% of whom are literate
16. Limited capacity of fishermen's boats, permitting only inshore fishing. Boats are poorly constructed and too small for safe, extended fishing in the open sea; fishermen lack skills for extended open sea fishing (they are familiar with the use of nets, not long-line fishing)
17. No enforcement of fishing regulations in general, including restrictions on sizes of fish caught or seasons for fishing, as with lobster and conch
18. Lack of information on the spatial and temporal overlap between fisherman and natural resources, which is essential to designing spatial and temporal management regulations
19. Recruitment of many unemployed people who lack experience and skills to fisheries
20. Lack of alternative livelihoods

Marketing / Value Chain

21. No fixed landing sites that have basic infrastructure
22. Limited use of ice for storage of catch
23. No quality control in fish handling
24. Vulnerability of fishermen to control by intermediate fish buyers
25. High post-harvest losses
26. Lack of marketing chain for fisheries
27. Lack of value-added fish products

Because of the desperation among Haiti's poor fishermen, who lack support from government, the marine fisheries have developed in a chaotic manner without regulations or restrictions on catch of immature, juvenile fish, mollusks, and crustaceans. Even though the majority of fishermen understand that there is overfishing, largely caused by the use of fine-mesh beach seines, they lack initiative to organize themselves to solve this problem. They remain in a vulnerable position, while the numerous fish buyers have virtually taken control of most of the fisheries. Haiti's totally open-access fishery needs controls on the movements of fishermen to reduce overfishing. A more developed value chain created by strong fisher associations who market fish effectively could reduce the middlemen who prey on vulnerable fishermen. This could provide a more equitable relationship among stakeholders and consequently generate more income for the fishermen.

3. Political and Socio-Economic Context

3.1 Lack of Institutional Support and Infrastructure

Haiti's fishermen have not received institutional support from their government for decades, and there is no resource management at any level. Within the seven communities in the 3BNP, 81% of the fishermen claim they have never seen a government fisheries agent. This is a unique situation, as in most countries governments provide some form of management and enforcement of regulations, with technical support by fisheries extension agents and training. Nevertheless, the neglect by government institutions and poor leadership is ubiquitous in Haiti. The lack of government support for co-management or any system of management has prompted the establishment of more than 140 Fishermen's Associations in the country. The Associations' ability to effect change is in some cases handicapped by the fishermen's low level of education, including a 10–12% literacy rate.

In countries with sustainable nonindustrial fisheries, government infrastructure and regulation guides the fisheries. In Haiti, not only is there no organization and no support from government, fishermen are not even aware of the benefits of such infrastructure. On Haiti's beaches, where fish are landed, conditions are often unsanitary due to potential large crowds of people and animals, including dogs and pigs. There are no stations for quantifying fish catch and collecting data.

Ice is usually manufactured by block ice makers based in large population centers, trucked to fishing communities, and kept under sawdust in unsanitary conditions. There is no available cold storage in much of Haiti, apart from a few chest freezers. Ice is mainly used by women fish mongers in small quantities. Many fishermen do not take ice when they go fishing. There are no fish inspections or quality control, which could affect the health of consumers and post-harvest loss. There is no processing, as fish are sold whole to a non-discerning public in small rural markets. Each fisherman keeps 10–20% of his catch for personal consumption and sells the rest of his fish to the fish monger, who rushes to a nearby market. Here, the fish are sold "fresh," perhaps 8–20 hours or more from the time of catch, often with little or no use of ice.

3.2. Socio-Economic Context

Most of Haiti's fishermen function without organization and are very vulnerable to exploitation by intermediate fish buyers and others. The level of indebtedness to middlemen is high among fishermen, as they experience peaks and lows in fish catch throughout the year, in keeping with the "boom or bust" nature of their business. Like fishermen elsewhere, they splurge at peak catches and borrow when catches are low. Fishermen are prone to gambling and spending on the lottery. Education is needed to help fishermen make wiser financial choices; support groups might also be useful. Fishermen need to be more involved in supporting their families and children, and education could contribute here as well.

Major monetary concerns for fishermen are health care; paying school fees; providing food, clothing, and shelter for the family; and having money for fishing gear and boat repair. Common health problems among fishermen and their families include diabetes and high blood pressure. Elevated salt content in well waters in some coastal communities contributes to high blood pressure. The diet of fisher folk often lacks sufficient fruits and vegetables, leading to vitamin deficiencies. Health emergencies and the need for first aid can be critical issues in most fishing communities, which may lack clinics, doctors, nurses, or pharmaceutical dispensaries. When an emergency occurs, often there is no transportation available, except by motorcycle to a clinic some distance away.

Fishing as a livelihood is attractive to people in Haiti, even though fishers are at the lower end of the economic scale, because fishing provides them with food security as well as a small income for their families. However, fishermen's lives in Haiti are a vicious circle of limited income, lack of organization, overfishing, large families, and indebtedness. Because of their vulnerable status in society and their lack of organization and indebtedness, it is very difficult for them to improve their situation. A fishing community calendar is presented in Figure 6.

However, training can alleviate these problems, if it is presented in the right context with trainers who understand the fishermen and their conditions and who speak their language. Focused training can help good leaders emerge to provide the leadership necessary to enable fishers to make good decisions regarding their future.

A small number of fishermen do try to increase their earnings by taking fish to market themselves or with their wives, rather than by selling to a buyer. Direct marketing allows the fishermen to reap a greater profit. This approach can be applied by fishermen who are organized in fisher associations.

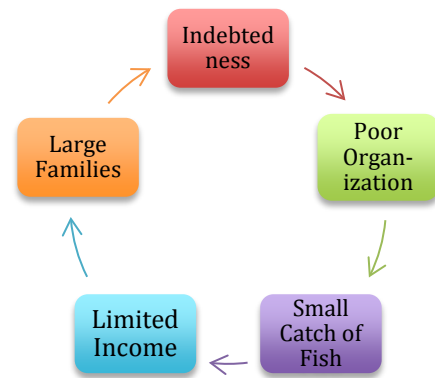


Figure 2. Vicious Circle Faced by Haiti Fishermen

Culturally, fishermen in Haiti have little experience working together because of the controlling environment in the past, when Duvalier's secret police, the macouts, spread distrust and fear. Although the government has changed, the mentality of distrust persists and limits fishermen's ability to collaborate and build durable associations capable of managing sustainable fisheries. This situation can be reversed through improved education which would involve role playing and decision making in challenging situations to demonstrate a path to sustainable fisheries. Leadership in fisher associations needs to be strengthened to overcome this problem.

3.3. Value Chain

The lack of a developed value chain is an impediment to fisheries development. Fishermen are subject to the will of the middlemen, who eagerly await their arrival along the beaches, wading into the waters to buy fish right off the small boats. A value chain that empowered the fishers and gave them negotiating power could create small and medium fisheries enterprises with employment throughout the chain.

Most fishermen claim to buy ice, but many do not carry ice to sea (the intermediate buyers do tend to carry it). Catch is either tossed in the bottom of the boat or placed in basins or 10-gallon coolers, with or without covers. If ice is used, it is chipped from a large block of ice. Fish bought initially from a fisherman on his boat may be rapidly resold as soon as it reaches the beach. Most fish exchange hands several times before being bought by the consumer. Lack of organization and poor collaboration among fishermen maintains this situation. In spite of the rush to market, there is high fish loss after harvest, up to 40% according to IRAM (2007). Fishers earn low revenues for their efforts.

In contrast, the middlemen are empowered and are good negotiators with the fishermen, which affords them good income for their families. The wives of a few fishermen are involved in fish buying and selling.

4. The Three Bays National Park

The 3BNP presents a unique opportunity to create a sustainable fishery in an MPA through a participatory process of empowerment and delegation of roles and responsibilities. The present unmanaged status of fisheries and limited capacity of the fisher associations indicates that this achievement will be a long process.

4.1 Physical Description of the 3BNP

Fisheries in the 3BNP, like fisheries in the rest of Haiti, are characterized by overfishing carried out by impoverished, vulnerable fishers who are largely controlled by fish buyers. The park covers an area of 900 km² and includes the three large bays of Limonade, Caracol, and Fort Liberté, as well as the Lagon aux Boeufs, encompassing fresh and brackish water environments as well as marine waters. The area is rich in mangrove forests, sea grass beds, and fisheries habitats with some 250 species of fish.

The 3BNP marine environment is an open-access fishery, in which anyone desiring to fish can do so. The government's fisheries department has no staff in the area, and no technical support services are provided. National regulations establish minimum sizes of fish which can be kept in order to exclude the harvest of juveniles, but these regulations are not enforced. Respect for closed seasons on lobster (April–September) and conch are not applied and most of the lobsters captured are noticeably undersized. The park is in an arid region with little rainfall, which limits farming and animal husbandry.

Figure 3 depicts minimum and maximum temperatures and rainfall for Cap-Haïtien. A cooler rainy season dominates from November through January, and the hot season lasts from June through September. Total rainfall ranges from 700 to 1300 mm annually in the northeast, thus limiting crop farming, especially in the eastern portion of the 3BNP. A number of fishers in the park maintain small livestock, which they sell to pay school fees at the start of school or to cover medical emergencies. The area had a large sisal plantation (the Dauphin Plantation) during the world war II, but it was abandoned long ago.

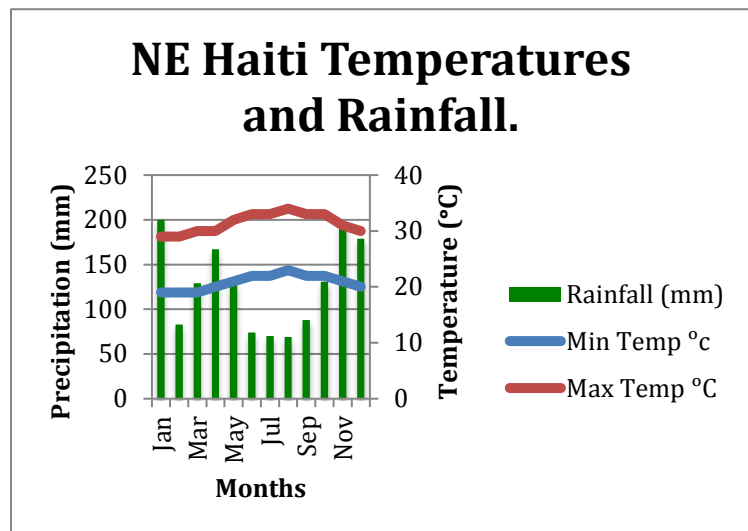


Figure 3- minimum and maximum temperatures and rainfall for Cap-Haïtien

The Caribbean's main currents pass along the southern coast of Haiti, where the country's main fishing grounds are found, with inshore demersal and offshore pelagic fisheries. The northeast coast of Haiti receives far fewer favorable currents and has less potential for fisheries. However, the northeast does have the benefit of experiencing fewer hurricanes than the south.

4.2. Development on Land in Caracol

The seven fishing communities in the 3BNP are coastal towns with year-round, gravel-road access. All main roads through the area are paved and well traveled, as the area is the gateway to the border with the Dominican Republic to the east, beyond Fort Liberté. Housing was constructed over the years through government and donor funding, and most fishers and their families live in small, cement-block houses, often built in rows laid out in a grid. A number of old wooden plank houses remain. Each community has local

government offices and a number of small shops selling a variety of drinks, sweets, and basic food items. A few pharmacies exist in several larger communities. Special items can only be found in the large towns, such as Fort Liberté or Cap-Haïtien. The national lotto ticket sales are especially high in fishing communities, with lottery kiosks everywhere. Lottery ticket sellers are even seen at the beach as fishermen arrive.

In 2012, the 600-acre Parc Industriel de Caracol (PIC) was installed in Caracol. It includes several garment factories that employ around 5,000 people and is intended to eventually include more factories and employ up to 20,000 people. A total of 366 farmers, including some fishermen, reportedly sold their land to create this industrial park. Facilities include a water treatment plant and a 10-MGW power plant that furnishes reliable electricity for area communities. Initial plans for the industrial park included development of a port, but this idea was dropped in favor of improving the port in Cap-Haïtien. The PIC has greatly increased employment in the region as well as increasing local population growth. The PIC was jointly funded (\$US 300 m) by the Inter-American Development Bank, Clinton Foundation, and others. This industrial development has stimulated employment in this marginalized region in northeast Haiti and is generally viewed favorably by the local population. However, some fishermen express concerns about the potential risks to “their fisheries” when waste waters are released by the industrial park authorities. They fear that chemicals and dyes used in treating cloth could harm the environment.

The University of Limonade is part of Haiti’s State University system. It was built within the past 10 years and features spectacular architecture. This institution of higher learning was a gift from the government of the Dominican Republic. The University has eight areas of study, 120 permanent staff members, 110 part-time lecturers, and 2,600 students and seeks to expand up to 10,000 students. This institution seeks partnerships through MOUs with international schools and others, as part of their continuing fund-raising efforts. As it includes areas of study in health, agronomy, engineering, education, human resources, and environment, the university is a valuable asset to the northeast region of Haiti and could partner in the development of a sustainable fishery in the 3BNP. Strengthening the capacity of the University is a priority for the President, Dr. Bien Aimé Audalbert, who is searching for a fisheries specialist to launch a course of study in this field.

4.3 Fishers in the Three Bays National Park

4.3.1 Number of Fishermen

Our survey estimated that there were 978 fishermen in the seven fishing communities (Table 1); the 161 questionnaires that we administered represents 16% of this population. However, an indeterminate number of fishers are transient and may even double the number of fishers in the 3BNP during peak fishing. In later meetings, fishermen indicated that there were many more fishermen than they mentioned earlier. For example, we initially estimated that there were 200 fishers in Bord de Mer Limonade, but later a group of fishermen informed us there were 473. Other fishermen from Caracol and Madras (a very small town) insisted that there were 1,500 and 430 fishermen, respectively, in their areas! Such estimates cannot be reconciled with the small number of boats observed at the shores in some of these small villages.

These discrepancies underline the lack of valid information regarding the totally open-access fishery. Surprisingly, fishers in Caracol spoke of fishermen from Fort Liberté coming to fish in their waters, as if this was a normal occurrence. In fact, local fishermen should be concerned about transient fishers removing their resources and limiting their income.

Our initial estimated number of fishermen in the seven fishing communities was 978, as mentioned. Later, fishers at two local committee meetings insisted that there were up to four times as many fishermen; thus, our initial estimate was only about 25% of the fishermen’s estimate. This mismatch in numbers was discussed at length. It appears that many of the fishermen are actually laborers who work for the owners of the large beach seines. A crew of 6–8 people is needed to set and bring in the very long net (which can be more than

800 feet long). These laborers actually owned no boats or fishing gear and only worked when they were called by the owners of the big nets. Therefore, they are not considered fishermen in this report.

A census is needed to verify information about the fisher population. Preferably, it should be carried out by the fisher associations, after training and supervision by FOPROBIM. Training is required to ensure that any census is transparent. The Fisheries Law of 1977 calls for all fishermen to be registered, but it has not been enforced.

Most fishermen interviewed claimed to be full-time fishers. However, only 30-40% appear to be involved full time in fishing, with the remainder supplementing their incomes by maintaining livestock or cultivating crops; a few may be involved in small commercial enterprises. This diversification is a risk strategy to secure income from several sources in order to always have enough money for food, school fees, etc. Nevertheless, few fishermen carry out farming in the northeast part of Haiti, especially in the eastern part of the 3BNP, where conditions are typically arid and soils are largely sandy with small gravel and desert-type vegetation. The hot, dry, coastal plain in this area lies at the foot of the mountains. As the day progresses, moisture from the sea rises, creating clouds that are carried inland by the wind, over the hot plains and toward the mountains, where the cooler air promotes precipitation.

4.3.2. Women Fishers

Fishermen working from boats are all men; however, women fish in the “closed waters” in intertidal flats and freshwater pools that collect just above high tide from freshwater streams flowing to the coast. During the dry season, these pools start drying up or are reduced in area, and the women wade in these shallow waters with baskets to collect tilapias, other small fish, and freshwater shrimp. Several of these women fishers were interviewed in Bord de Mer Limonade. This type of fishing is done on a part-time basis, allowing the women to remain near their children and take care of the household. The women were very proud of their fishing activities, which enabled them to provide more food and some additional income to their families.

Women are also very active in fish marketing, providing the conduit between the fishers and the markets in larger towns. Women are the majority of the intermediate fish buyers and earn a good profit from their efforts to rush the fish from the beach to markets, often on hired motorcycles.

4.3.3. Fishing Gear Used

Fishermen appear to specialize in using a specific type of fishing gear. Independent fishers tend to be divers or to use gill nets, trammel nets, or traps or to practice hook and line fishing. Owners of the very long beach seines, trammel nets, and gill nets hire workers who set nets in teams of 4–8 people. The teams of workers handling the nets make it appear that there is a large number of fishermen, but these hired laborers are not considered fishermen, as they have no gear of their own. In some communities where seines are the dominant type of gear used, independent fishers share boats.

Table 1 presents the numbers of fishermen, boats, and gear used in the seven fishing communities in the 3BNP, as revealed by the 161 questionnaire responses. These initial statistics are offered in hopes that they will be replaced by a more comprehensive, less subjective evaluation in the future.

Table 1. Numbers of Fishermen, Boats, and Commonly Used Fishing Gear in the Three Bays National Park

No	Fishing Community	No. Fishers	No. Boats	Monthly Income (gourdes)	No. Seines	No. Gill Nets	No. Trammel Nets	No. Cast Nets	No. Short Lines	No. Long Lines	No. Hooks	No. Divers	No. Traps	No. Shockers	No. Beaters
1	BdM Limonad	200	245	9,142	30	29	10	0	3	17	0	35	60	3	0
2	Madras	60	43	8,750	34	0	0	2	0	8	0	0	3	0	0
3	Caracol	200	213	8,142	38	31	0	0	20	10	7	109	22	5	10
4	Jacquezy	62	45	13,400	0	3	0	0	0	0	15	54	15	0	5
5	Phaeton	100	100	11,684	9	140	3	0	40	10	2	100	24	15	50
6	Fort Liberté	200	64	12,436	27	2	1	0	0	1	0	20	0	4	0
7	Derac	156	85	9,644	8	50	0	10	3	8	5	23	8	4	0
Average				10,456											
Totals		978	795		146	255	14	12	66	54	29	341	132	31	65

Notes: The numbers of fishers presented are estimates. A comprehensive census is required to obtain accurate numbers, and this census could be carried out as part of the Action Plan for the 3BNP. The initial number of fishers (978) represents only about 25% of the number given by fishers in later meetings, although the later numbers may have included laborers hired by owners of large beach seines.

We observed that in August, no large quantities of fish (no more than 20–30 kgs of fish) were caught by any fishermen during the assessment.

4.3.4. Results of Questionnaires Submitted by Fishermen

The fishers in the 3BNP appear to be stable members of their communities, as 53% of them have lived in their current home for more than 10 years. The majority of households have 6–10 members with an average of 6. The average age of fishers interviewed was 46 years, with a range from 36 to 63.

The 10 female fishers who were interviewed conducted basket fishing in the “closed waters” of small brackish lagoons lying just beyond the beach at the normal high-tide level. A number of these women fishers were interviewed in Bord de Mer Limonade.

Fishing was the primary source of income for 91% of the household heads interviewed. Most fishers also maintain a few livestock as a “bank” for emergencies or to pay school fees.

Housing is not a problem for most fishermen and their families, as 75% live in small, cement-block houses and 78% claim to own their homes.

Most fisher families (68%) purchase their drinking water, which costs them about 2–3% of their income. All communities had kiosks where potable water was sold, often set up by NGOs. Another 25% of fishers drink well water. Some wells have high salinity, which can be a health hazard because it causes high blood pressure. Wells should be analyzed; if fishers have access to good-quality well water that is protected from contamination, they might save some money by using well water rather than purchasing water.

In spite of the large generator at the Caracol Industrial Park, only 49% of fishers had electricity at home. Electrification of fishers' homes could help create more livelihoods and employment and provide a better environment for children studying and reading at night.

The questionnaires revealed that 39% of fishers rely on motorcycles for their public transport, and 35% of fishers have bank accounts.

According to the questionnaire responses, 42% of fishers use sailboats for their fishing activities. Surprisingly, 4.8% of those interviewed claimed to have outboard engines for their boats, even though almost all boats observed were powered by sails and oars rather than being motorized.

Detailed findings from the household questionnaire are presented in Table 6. Around 10–15% of fishers were interviewed in each community.

There were 12 fisher associations in the 3BNP, and 61% of those interviewed were members of an association.

Although most fishermen complained about the hardships of fishing as a profession, 45% of them anticipated that their children would also become fishermen. All of the fishers interviewed felt that the catch had been in decline for some years. The decline has reduced income and 71% of the fishers admitted to being in debt to their relatives or to informal money lenders, including intermediate fish buyers.

Although 87% of fishers claimed to buy ice, a number of fishers observed returning to shore with fish had no ice with them, and the fish were lying in unsanitary buckets or wash basins, in piles in the open sun. Fish is a highly perishable product and must be placed on ice to maintain its freshness from the time it is landed in the boat. In most modern fisheries, ice must be present in order for the operation to meet quality control standards.

Hardships were faced by all fishermen, and 31% reported that their fishing gear was stolen in the past year. Some fishers complained about minor accidents or injuries from working with fish, while 4 or 5 fishermen reported having lost their boats and gear in high seas. Several also were caught fishing in Dominican waters and had their boats and gear confiscated by the coastal authorities there. Many fishermen complained about the limited capacity of their small, 10–15-foot long wooden sailboats, which do not allow them to fish in the open sea for highly valued pelagic fish.

All fishermen complained about having a low income. The average income was 10,456 Haitian gourdes (gdes) per month, with a range of 8,142–13,400 gdes that varied in the different communities, as shown in Table 4. No fishermen had any records of catch or income, so there was no support for this information. Furthermore, it was not possible to correlate the level of estimated income with use of any particular fishing gear or even with particular communities known for their high catch. Fishermen were asked how much they might make in one day, and this figure was multiplied by the number of days that they typically fished per month. We estimate that fishers fish only about 150 days per year, as reported in the Dominican Republic. Income is discussed further in this report.

Information on use of income by fishermen was pretty consistent and is considered reliable, as similar results were found in all seven communities. School fees, food, and health care each required 15–17% of income. Rent for housing required 4% of income, while repair of boats and purchase of new fishing gear took up 21%. The remaining 24% is believed to be used for food and other needs.

Of those interviewed, 29% reported that health care was their primary concern, while 28% indicated that food security was the top issue. Of note, 62% of the fishers had met with health care officials who visited their communities to discuss illnesses, including HIV and AIDS.

Fishermen's families consumed up to 20% of the fisherman's catch. The remaining 80% was sold directly to the intermediate fish buyers 73% of the time. The remaining time, the fishermen or their wives went to the market themselves to sell their fish. There are several opportunities for fishers' associations to implement changes that would benefit the fishers, including getting involved in marketing, implementing procedures such as use of ice to improve the quality of fish, and encouraging fishermen to sell their fish directly, thus reducing the number of fish buyers.

The fishermen in the 3BNP are generally in good communication with others, as 91% own or have access to a mobile telephone. This is another opportunity to effect change, as a fisher association could help communicate market news via phone, which could help fishermen obtain better prices for their fish.

The fishermen were asked their opinion of the 3BNP and 82% felt that the park could help them as fishers to reduce overfishing and generally improve their standard of living. Regarding the Caracol Industrial Park, 58% viewed it as good for the area in general, but 28% commented that it could be bad for fishing.

4.4. Fisher Associations

With great effort, FOPROBIM has established two committees for oversight and follow-up on the fisher associations in the two main regions of the park:

- **West – CEPROBAC** (*Coopérative Environnementale pour la Protection de la Baie de Caracol*), representing the communities of Bord de Mer Limonade, Madras, Caracol, and Jacquezyl
- **East – UGeBfo** (*Unité de Gestion pour la Baie de Ft Liberté*), representing Phaeton, Fort Liberté, and Derac

These committees will work with the 12 associations in the park to build capacity and to provide guidance to FOPROBIM regarding the overall development of the park. The associations in each area and community are presented in Table 2.

The challenge for FOPROBIM is to develop sufficient leadership in these associations that they can manage the park's resources and guide the development of sustainable fisheries. Reaching this point will involve many training programs and exchanges with partners and will require several years of effort. About 88% of fishers are illiterate, and it will take time for good leaders to emerge. The associations will need to support some activities that are not necessarily associated with fisheries, but that are included in the Action Plan for the 3BNP. These activities could include education/training in management, improvements in health care, improved drinking water availability, animal husbandry, crop farming in certain areas, and creation of small businesses. It is vitally important to diversify livelihoods in the fishing communities, and success in this area will depend on leadership from the fisher associations, which appear to be the only groups with strength or concerns about fisheries in these communities.

Table 2. Fisher Associations in the Three Bays National Park

Town	Region	Association
1. Bord de Mer Limonade	West	1. Organisation Marin pour la Protection de Bord de Mer Limonade (OMPBL): 11 members 2. Organisation Pecheur de Bord de la Mer de Limonade (OPBL)
2. Madras	West	3. Association pour le Developpement Pecheur de Madras-3 members (OPDM)
3. Caracol	West	4. Association Paysans de Developpement Caracol (APDK) 5. BMA-Brigadian Maritime en Action (BMA)
4. Jacquezyl	West	6. Asosyasjon Peche Jakbi (APJ): 17 members
5. Phaeton	East	7. Association Pêcheur Fayeton (ASPF) 8. Association des Jeunes Pêcheurs Fayeton (ASJPF) 9. Groupement Peche Fayeton (GPF)
6. Fort Liberté	East	10. Association Pêcheurs Ft Liberté (APF)
7. Derac	East	11. Koperation Pech Derak (CPD) 12. Asosyasyon Peche Derack (APD)

Discussions with focus groups in meetings revealed that most associations exist largely on paper. A few associations, such as those in Bord de Mer Limonade and Fort Liberté, carry out clean ups of the beach and landing area and manage mangrove nurseries in order to plant more mangroves. More efforts of this kind are needed. In addition, it is hoped that associations can be transformed into income-generating cooperatives. Such cooperatives have succeeded in Haiti, in the coffee and cacao industries. The lessons learned in such cooperatives could possibly be replicated in fisheries, and this should be evaluated. For now, the two Apex committees (CEPROBAC and UGeBFO) need to assess the activities and capacities of each association and compile a list of their members.

In Africa, fisheries cooperatives are often self-supporting with a mix of income-generating activities, which provide not only services for fishermen, but also benefits to members. Cooperatives may be involved in buying and selling fish to provide a consistent market and price for members. Other possible activities for associations in Haiti to consider include making and selling flake ice, selling fishing materials, leasing fishing gear, collecting catch data, and raising fish or lobster in protected areas. Associations can also create a regular market list of prices of fish, which can be sent via SMS to members.

Branding of fish is another activity that associations should consider. With proper fish handling, use of ice, packaging, and labeling, fresh fish from the 3BNP may be considered a high-quality product and there may be high demand for it by consumers in the large towns. Value addition to increase fish sales is another area that offers scope for improvement. Quality fish markets can respond to the demand for quality fish from discerning consumers, as can high-quality restaurants and eateries in Cap-Haïtien. Clearly, a fish marketing study is needed.

4.5. Fishing Gear Used in the 3BNP

Fishers in the park routinely use 12 types of fishing gear (Table 3). The questionnaires did not elicit reliable information on gear use from fishermen, and much of the information on gear in this report was sourced in a separate undertaking, through more interviews and phone communications.

4.5.1. Fine-Mesh Seines

An estimated 146 fine-mesh beach seines are being used in the park. These seines catch all species and mostly capture small, immature fish, which should be recruits for next year's catch. Fishers and buyers could not estimate frequency of species or sizes, as they were rushing to get the fish to market. However,

observations of catch revealed forage fish species, including grunts, tangs, and soldier fish. There were also parrotfish, which clean algae from coral, and moray eels. All fish observed were small juveniles.

More seines may be in use around the park. These nets are non-selective and may be 800 feet or longer. A crew of 6 or more fishers is required to deploy the net from a boat some 300 feet offshore in shallow waters. The net is set in a circle and then the fishermen draw in the lead line to encircle the fish. These nets are usually not set from the beach, as they would be obstructed by boats anchored in the area or other objects in the water. The mesh size on these nets is approximately 10 mm stretched mesh. Many such seines are made by hand, using polyfilament line; this is a labor-intensive task and the cost could range from 100,000 to 200,000 gdes (\$US 2000–4000) for one net. There is universal agreement among the fishers, including owners of such seines, that they are the cause of the decline in the fisheries and lead to overfishing.

4.5.2. Gill Nets

A transition from seines to large-mesh gill nets, through a buy-back replacement program, can help transform the fisheries in the 3BNP. About 255 gill nets are in use in the 3BNP at present. Even though gill nets can be even longer than the seines, they are made of monofilament twine and have large mesh, so their cost is a fraction of that of a beach seine. Materials for gill nets could be purchased in bulk, perhaps through a fisheries association or cooperative, which would then allow members to mount their own nets at low cost. Gill nets catch a wide variety of fish, depending on their mesh size. Most such nets observed had a stretched mesh of at least 2 inches and ranged up to 5 inches. Fish caught with gill nets included snappers, jacks, groupers, and barracuda.

4.5.3. Trammel Nets

These multi-mesh nets are underutilized in Haiti; only 14 were recorded in use in the 3BNP. Yet they can catch a wide variety of large fish, including tuna and other pelagic fish, shark, and even lobsters. Their somewhat complicated design and time-consuming mounting process probably discourage many fishermen from trying them. Nevertheless, the high use of these nets in other parts of the world makes them worth considering further in Haiti.

4.5.4. Cast Nets

Few cast nets are used in the 3BNP; only 12 were recorded, and none were observed in use. However, they are employed more in the south to catch small fish for baiting long lines. These circular nets are relatively easy to make and can be an asset to fishermen who use long lines and require bait. It is also possible to catch larger schooling fish with large-mesh cast nets.

4.5.5. Line Fishing and Long Lines

Fishing with a line and hook continues to be a pillar among fishermen's equipment. A fisherman working at sea typically tries as many ways as possible to catch fish and must return to port that night, so time is precious. A fisherman may trail several lines with baited hooks on his way out to his fishing site. After setting several gill nets, he may also keep several lines of hooks in the water as he waits to pull in his gill nets. Specialized fishermen may use long lines in deep waters ("le canal," as Haitians refer to deep waters) to fish for quality pelagics. Fishermen can be seen in Cap-Haïtien Bay and in the 3BNP line fishing by wading in chest-deep waters with a bucket and several lines that they continually toss out and bring in. Presently, 120 fishermen were equipped for extensive line fishing, and a number of them also fished with gill nets and fish traps.

4.5.6. Hookah Gear ("Compresseur")

Hookah gear is used for spear fishermen seeking high-value fish (snapper, grouper), lobster, queen conch, and sea cucumber. The questionnaire responses revealed 29 hookah compressors and air lines in use throughout the seven communities, mainly in Jacquezy, Caracol, Phaeton, and Derac. Some of these are owned by investors, while other hookah gear is owned by divers who saved up and purchased their own

equipment. These same communities have the largest number of divers as well. A hookah compressor is a large investment for a fisherman, but its use allows extended time under water for spear fishing and collecting bottom-dwelling lobster, conch, and sea cucumber. These high-quality catches or large snapper are usually sold to hotels with restaurants and special seafood shops in larger cities.

The risk in using hookah gear lies in possible malfunction of the compressor, neglect by the person tending the compressor in the boat, and fouling or twisting of the air line, which could block air flow. Any of these emergencies could force a quick ascent by the hookah diver, possibly resulting in an air embolism or the bends, if proper decompression time is not allowed. An air embolism could cause the death of the diver.

4.5.7. Divers

The survey registered 341 divers, representing all the communities except Madras. Many divers work out of Caracol, Jacquezy, and Phaeton and may or may not use hookah compressors. A diver can be equipped at fairly low cost with a mask, snorkel and fins, and a spear gun. No free divers or hookah divers are equipped with a safety vest. Good divers who use a weight belt may work down to depths of 65 feet or so and fish for quality fish such as grouper, snapper, lobster, and others.

4.5.8. Fish Traps

Fish traps have been in use for thousands of years. In Haiti, they are usually made of strips of bamboo and may have different-sized mesh or openings. Traps are usually weighted and set on the bottom with a buoy as marker. Fishermen can catch a wide variety of fish, as well as lobster, with traps. All traps used in the 3BNP are the common Antillian “Z” trap. These are made at low cost by basket weavers and are mainly used in Bord de Mer Limonade, Caracol, Jacquezy, and Phaeton. All traps observed had small mesh openings of 25-35 mm, which would capture small, immature fish. Traps with larger openings could allow these juveniles to escape and reduce fishing pressure on recruits for next year’s catch.

4.5.9. “Batterie” or Use of Light to Attract Fish

Some fishermen fish at night with a light powered by a battery, positioned on the bow of the boat or submerged to attract fish. The fishermen’s description of this technique implied that the fish received an electric shock, but electro fishing in seawater is ineffective, due to the extreme hardness of the water. Night fishing with lights is widely used worldwide to catch a variety of fish. Small pelagic fish are caught in this manner in East African lakes using lift nets. In Haiti, lift nets were not seen, but future questionnaires should seek to revisit the use of this gear.

4.5.10. Beating the Waters to Scare Fish into Nets

This fishing method should be banned, as it is often used in tandem with a small-mesh beach seine and mostly catches small, immature fish. The method involves a few fishermen setting a “corral net” into which the fish will be herded by a large number of persons beating the water. This method is used when fishing catch has been down, as well as when some fishers need income quickly. It is sometimes used in African lakes.

4.6. Summary of Fishing Gear and Returns

According to the survey, the most money is made in Jacquezy, Phaeton, and Fort Liberté (Table 3).

Table 3. Fishing Gear Use and Economic Returns

Location	Average Income (gdes/month)	Types of Gear Used
1. Jacquezy	13,400	Divers (54), hookah (15), traps (15), gill nets (3)
2. Fort Liberté	12,436	Seines (27), divers (20), gill nets (2)
3. Phaeton	11,684	Divers (100), seines (9), gill nets (140), line fishing (50)
4. Derac	9,644	Divers (23), seines (8), gill nets (50), line fishing (11), traps (8)
5. BdM Limonade	9,142	Seines (30), gill nets (29), trammel nets (10), lines (20), divers (35), traps (60)
6. Madras	8,750	Seines (34), lines (8), traps (3), cast nets (12)
7. Caracol	8,142	Seines (38), gill nets (31), lines (30), hookah (7), divers (109), traps (22), shockers/beaters (15)
Average Income	10,456	

Clearly, the survey gathered a great deal of information on the fisheries in the 3BNP; however, caution should be used in applying this information, as it represents rough estimates. To calculate income, for example, the fishermen were asked how much money they made per day, then how many days a week and month they worked. The income reported above is only an approximation of the income of fishers in each of the seven communities. Average catch per basic artisanal fishermen in other countries ranges from 1,000 kg/year to 1,500 kg/year, so the incomes given are comparable, as they fall between 78,000 gdes/year and 117,000 gdes/year, assuming 78 gdes/kg of fish and 8 months of fishing. It should be noted that such small-scale fishermen in Haiti may only fish for 150–180 days per year. Furthermore, the majority of fishermen generate income through other activities in an effort to reduce their risks.

Table 4 presents monthly incomes in gdes and \$US. The average salary of a fisherman is similar to that of a mechanic or plumber and double that of a primary school teacher. Are Haitian fishermen really as impoverished as they claim? The problem may not be insufficient income but high levels of indebtedness and large families, which require more resources than they can accommodate. This situation appears to be true for other Haitians working in the trades as well, as many Haitians have large families.

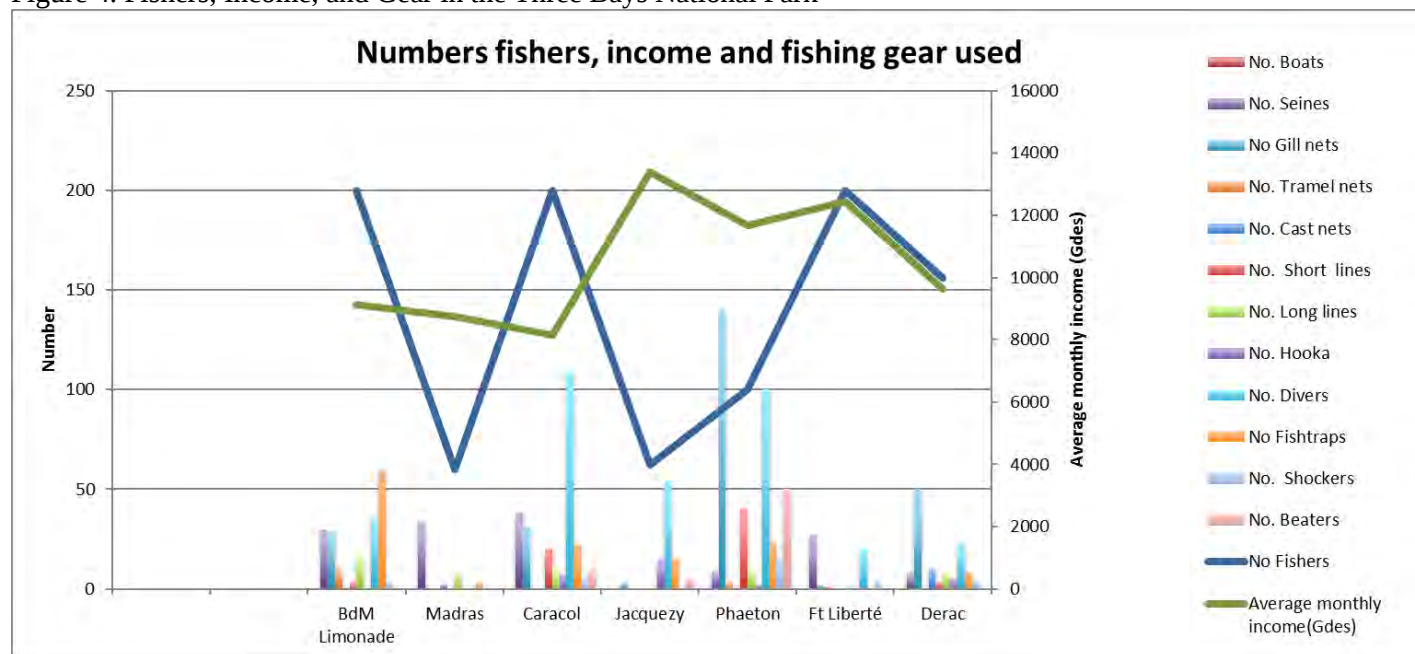
Table 4. Estimated Incomes of Haitian Fishers in the Three Bays National Park, August 2015

Community	Income/mo (gdes)	Income/mo (\$US)	Income 8 months (gdes)	Income 8 months (\$US)
1. BdM Limonade	9,142	175.80	82,278	1,582
2. Madras	8,750	168.27	78,750	1,514
3. Caracol	8,142	156.58	65,136	1,252
4. Jacquezy	13,400	259.62	107,200	2,062
5. Phaeton	11,684	224.70	93,480	1,797
6. Fort Liberté	12,436	239.15	111,924	2,152
7. Derac	9,644	185.46	86,796	1,669

Note: As fishermen only fish about 150–180 days per year in Haiti, annual income was based on 8 months.

The following graphic depicts the relations between income and fishing gear used.

Figure 4. Fishers, Income, and Gear in the Three Bays National Park



There appears to be no relationship between gear used and income. More data are required to better understand this situation, as normally seines and gill nets provide higher catch and incomes. It was difficult to determine the total investment in gear and total income earned by a fisherman for the following reasons:

1. Most fishermen do not own a boat but share one, with varying frequency and varying numbers of other fishers.
2. Several thousand fishermen are in effect day laborers and are not considered in this report. These men work in crews to set and haul in very long seines or trammel nets. They are hired by the owners of seines or large gill nets and generally do not own any gear, but they were considered fishers in one focus group.
3. There are no fisheries statistics, nor are there fixed landing sites where fish are sorted and weighed, and where such statistics could be collected.
4. There is no processing of fish.
5. “Full-time” fishermen all have other small income-generating activities to reduce risk.
6. Fish are sold by the basin or bucket (not by weight) right off the boat to fish mongers, making it difficult to determine the size of the catch.
7. Fisher focus groups wanted a fish market to be built in their town, but most fish are taken to larger markets far away, so most likely, there would be nothing to sell in a local fish market.

The fish mongers take the catch of the day and ride public transport, “tap taps,” or motorcycles to a larger town to sell the fish. Since fishers make up the majority of residents in the fishing communities, and they consume up to 20% of their catch, there appears to be no need for a local fish market. However, some larger towns might need one.

A 12-foot-long wooden plank boat, made locally, is reported to cost 22,700 gdes or \$US 436. This is not a large amount of money, when one considers that an 8-m fiberglass boat in East Africa costs at least \$US 8000 for a basic molded boat with insulated storage compartments for fish and ice. However, the wooden

boats are half as long and lack the capacity for many fish and crew; they are also not capable of sailing the open sea.

Fishers spend more (\$US 2000–4000 for an 800-m net) on beach seines and trammel nets, often sharing the purchase with others. Even gill nets, which are much less expensive, may have several owners. Obviously, a much more comprehensive study is required to sort out the intricacies of Haitian fishermen’s capricious incomes and investments. To lay the groundwork for this process, a fisheries calendar in Figure 6 shows the seasons for fishing, agriculture, school, and other activities juxtaposed with climate.

4.7. Fish Catch Observations

Nearly all the captured fish observed in this study were immature juvenile parrotfish, grunts, tangs, goatfish, angelfish, wrasse, and snappers. On a few days, a number of jacks some 30 cm long were in the catch. In addition, a number of moray eels were caught, and a number of undersized lobsters were caught in Bord de Mer Limonade, Madras, and Caracol. Octopus and squid were captured by divers and small mesh nets, respectively, in Bord de Mer Limonade. It is unfortunate that parrotfish are being caught in large numbers, as they clean unwanted algae from the coral reefs. The fishermen complained that the number of snappers and other fish of high value continue to decline. Few high-value large fish were observed.

It was not possible to sample the buckets and basins of fish that fishmongers were buying from the fishermen and rushing to market. All fish arrived by boat and no ice was present in any of the boats. It takes time to sort fish, so for future studies, it may be necessary to purchase full containers of fish as they arrive in the boats in order to sort them by species and size, and link the catch to the gear used. Some fishermen arrived at shore with only 5–10 fish weighing an estimated 3–5 kg, while the best fishermen brought in catches totaling about 20 kg. Few fishermen spent more than a day at sea. Most boats had 2–3 fishermen, so the division of catch was small. Of some 50 fishermen observed returning to shore, only two possessed outboard engines and the rest of the boats were powered by sails and oars. The following table presents a list of fish and other catch observed during visits to the seven fishing communities.

Table 5. Species Observed in Fishermen’s Catch during the Rapid Fisheries Sector Assessment, August 2015

Name in English	Name in Creole	Comments
1. Snapper	Sard	Many small fish were observed
2. Jack	Karang	Caught in quantities in Caracol
3. Grouper	Neg	Only small fish were observed
4. Barracuda	Bekin	Only 2 were observed
5. Angel fish	Margrit	Few were observed
6. Triggerfish	Bouse	Few were observed
7. Butterfly fish	Goude	Few were observed
8. Sergeant major	Porte	Few were observed
9. Grunt	Kro Kro	Many observed; all small
10. Blue wrasse	Ral Ral	Few were observed
11. Goat fish	Barbarinl – Musque – cochon	Few were observed
12. Hog fish	Domese	Few were observed
13. Trunk fish	Coffre	Few were observed
14. Blue tang	Dr Surgeon	Few were observed
15. Soldier fish	Kadeno teudi	Few were observed
16. Moray eel	Conger	Many were observed in BdM Limonade and Caracol
17. Octopus	Chatouche	30 were caught by divers in Bdm Limonade
18. Squid	Seche	Many were caught in BdM Limonade

19. Lobster	Homnard	Many were caught in BdM Limonade, Caracol, Phaeton, and Fort Liberté
20. Shrimp	Crevette	Few were observed; they live in both marine and freshwater environments
21. Nurse shark	Vache	Not observed, but fishers catch them
22. Ray	L'ange	Not observed, but fishers catch them

4.8. Drivers of Change

4.8.1. Overfishing

Overfishing is the major driver for change among the fishermen, and almost all the 161 fishermen interviewed agree that the main cause of overfishing is the use of the small-mesh beach seines. Hundreds (146 identified by this survey) of these very long seines are scattered throughout the 3BNP, but even the owners agree that they need to be eliminated in order to rehabilitate the fisheries. Elimination of fine-mesh seines in Kenya produced a 60% increase in income among fishers (Johnson, 2015).

4.8.2. Economics

The economic status of most fishermen has diminished over the years, and this is an obvious driver of change. Fishermen are always short of money. However, fishermen in the 3BNP expressed a particular eagerness to see change, due to reasons already discussed such as large families and generally poor fiscal responsibility.

4.8.3. Women Fishmongers

No male fishmongers were observed in the seven fishing communities during the interview process. The fish buyers are empowered individuals who operate successful businesses which support the industry by helping fishermen buy gear and boats. The relationship between the fishermen and fish buyers is not always positive, however, as the fishers feel that the buyers take advantage of them.

4.8.4. Limited Education

The limited education of fishers is beginning to be a driver for change as well. Fishers require training and strengthening of their capacities to manage and to collaborate. As we discuss with fishermen the many issues they face, most of them seem eager to face the challenges ahead.

5. Community-Based Management

5.1 Fishery Management Systems

The lack of any management framework may facilitate adoption of a “co-management” system adapted to the special conditions and needs in the 3BNP. The fisher associations will also play a major role in improving fisheries management. Management must come from within the fishing communities, since the government is unable to provide any support. Elite capture of the associations by powerful, educated individuals is a concern, but leaders are being chosen based on their status as active fisherman. To date, FOPROBIM has done well in establishing the two local committees of CEPROBAC and UGeBfo and selecting as leaders active fishers who reside in the communities.

Co-management in fisheries requires two partners, normally the government and the fishers. In most countries, the government works with the fishers to explain the laws and regulations and why they are needed. The fishers, in turn, are knowledgeable about local fish species, where to fish, and the seasonal variations in fish behavior. They apply the government regulations, with the understanding that regulation protects “their resource” and will lead to sustainability. This leads to a win/win situation for both parties.

In the 3BNP, the key partner of the fishermen is FOPROBIM. In order to implement an adapted co-management system, the first step must be training. This training would center on co-management as well as other topics, such as leadership and general management. A number of qualified consultants in Haiti can provide the training. As fishermen cannot take much time away from fishing and making money, courses must be short and effective, lasting no more than a week.

Of course, co-management is about managing the fishery resources. But management training goes beyond fisheries. It also encompasses leadership training to help new leaders develop the skills they need to lead large groups of fishers. In order to curtail open-access fishing, leaders must be able to stop or limit fishing by fishers who are not from the area. Such community enforcement requires special skills which should be taught in all communities across the park. Every fishermen needs to understand where and how he is permitted to fish.

To enforce limitations, fishermen should be given identity cards. A Three Bays Park Authority (TBPA) should be established with game wardens who can enforce protected no-fishing areas and prevent transient fishermen from entering the park. This enforcement should be done in combination with a public awareness campaign to publicize new controls on fisheries in the park. One promising approach might be convincing fishermen to work together in “combites,” as practiced by Haitian farmers who help each other to clear land or plant fields by hand.

The fisher associations will surely need to eliminate the use of fine-mesh seines, and nearly all the fishermen agree on this issue. They should also establish areas protected from fishing to allow species such as lobster, sea cucumber, and queen conch to re-establish themselves and grow to marketable sizes. Again, all fisher associations need to work together in order to enforce protected areas.

If adequate fish feeds can be sourced, associations might oversee the farming of fish in protected areas or cages. As fish can easily be stolen from a cage, the fishers need to understand the conditions and agree to protect such efforts at mariculture.

In addition to coordinating these efforts, fisher associations might also approve the installation of artificial reefs and possibly FADs. Proper management of all efforts is required to achieve good results.

5.2. Management by Women

Women carry out all fish processing, along with youth, in the seven fishing communities. These activities are performed on the beach, which offers easy access to water. Efforts should be made to assist women in organizing themselves, as they play an important role not only in processing and marketing, but in preparing food for the family.

Girls learn at an early age how to help their mothers clean and prepare fish for meals and for market. In Haiti, women have generally shown themselves to be better managers and organizers of their work than men. They successfully manage small businesses and contribute to equipping fishers. Therefore, they can play important roles in the value chain that build on their skills and capacity to organize.

For example, there are 300–400 women salt producers in Haiti who are using outdated methods in mud salt ponds. An Association of Salt Producers could channel efforts in capacity building for modern salt production, rehabilitate the existing salt flats, and install a modern salt production process. Efforts should focus on the existing salt ponds to avoid further damaging the mangrove habitat.

Salt ponds could also be transformed into production units for oysters, mussels, or shrimp, a possibility worth serious consideration. The choice of organisms should be limited to endemic species from the region. To rear bivalves, it may be possible to join two ponds in a production unit, adding organic fertilization to one in order to provide algal blooms that feed the bivalves and shrimp. Intertidal fluctuations can drive the water exchanges.

Seaweed farming is actively being carried out in East Africa by women and can be replicated in Haiti. If it is protected, seaweed can grow in some bays with limited tidal fluctuations and large, fairly flat, sandy areas.

Women could also become involved in eel farming. Young eels (elvers) can be collected at the mouths of rivers in large numbers at certain times of the year, including near Fort Liberté. People collect them using fine-mesh dip nets and sell them to buyers who ship them live in plastic bags to Asia. This practice should be banned, as it may lead to overfishing and decline in catch. Instead, fisher associations should examine whether it is possible to raise eels in Haiti, using acceptable, low-cost feeds.

Women may be better suited than men to manage farming of fish or eels or seaweed production, as they carry out much of the farming in Haiti.

Meanwhile, if fishing restrictions are implemented, some fishermen need to become farmers. In Africa, fishermen have had difficulty transitioning from a livelihood that is essentially that of a hunter to being sedentary farmers, who must wait for the harvest and a delayed pay-off. Fishermen are more accustomed to a quick catch and immediate payment, and delayed satisfaction is not always their strength. Nevertheless, with proper training, both men and women can become good managers and producers of fish and other crops, including value-added products.

6. Recommendations

The Rapid Fisheries Sector Assessment provides an overview of the seven fishing communities in the 3BNP in northeast Haiti, using studies carried out over a month in August 2015. The interviews with 161 fishermen and two questionnaires relating to fisher households and fishing provided a great deal of information. Our findings only underline the need to perform official data collection in order to better understand and protect the biodiversity and fishery resources of the park. The data collection efforts may best be carried out by the fisher associations, with assistance from university students.

All recommendations have been made by or with fishermen, so this is a bottom-up approach to solving Haiti's problems regarding fisheries. The future of the park will largely depend on the fisher associations, which in turn require strengthening of their capacities for leadership and management in order to promote a transformation to a sustainable fishery. Figure 5 presents a one-page summary of the broad recommendations. The following are notes on each area of the color-coded graphic, starting on the upper left with the brown color references to institutional support.

6.1 Institutional Support (Brown Frames)

Awareness of the Action Plan for the 3BNP should be launched through a regional conference on fisheries, called for example "Challenges and Future Perspectives in Haiti's Fisheries." This conference could be held after the initial trainings and census of fishers have been carried out, perhaps after two years of activities. The name for the conference could be decided by the donors. It could be held at the University of Limonade and could bring in speakers from other seascape countries in the CMBP program. Planning for such an event will require much effort and time and will require collaboration with staff from the other countries. All Directors of Fisheries would be requested to give a presentation, as well as fisheries scientists from the region, providing an opportunity for comparative review of progress in the different areas and countries. The meeting should be planned through the fisher associations in order to maintain a highly participatory approach.

Clearly, some quick action that shows satisfying results needs to be initiated rapidly to demonstrate a commitment to the fishermen, all of whom have very high expectations. If the program to buy out the fine-mesh seines and replace them with gill nets could be done following the initial training and census of fishers and gear, this could be a very convincing demonstration and bring about good faith regarding delivery of results in the upcoming program.

The Fisheries Law of 1978 and other fishing regulations need to be updated. The Fisheries Department provides no technical outreach in the northeast part of Haiti, and this is unlikely to change in the short term. Fishermen are determined to proceed, with support from FOPROBIM, in re-establishing good fishing in the park. Later, if the DFAQ becomes open to change, it might provide managerial and technical training to leaders in the fisher associations.

6.2. Role of Fisher Associations (Yellow Frames)

Fisher associations are key to establishing good management and conservation of fishery resources in the park and to launching other programs to assist fishing communities. There is much energy among fishermen to improve their situation, but it needs channeling through good leadership. Therefore, emerging leaders of the associations need to receive training in management techniques. Practical, experienced trainers for such capacity building need to be comfortable working with small-scale fishers and clearly must speak Creole.

A Three Bays Park Authority (TBPA) should be established with game wardens to enforce fishing limitations. This entity should be established through local government and the local committees, with support from FOPROBIM. The TBPA will assert its authority through a slow process in parallel with leadership and management training of the associations and other activities, including identification of protected zones and replacement of fine-mesh seines.

Programs will be implemented through the fisher associations in each community. Initially, a census of fishermen and boats will be carried out and each fisherman will receive his own identity card, featuring his color photo and contact information. Fishermen must agree to join an association in order to benefit from the program. The Action Plan will propose that Associations manage landing sites by sorting the fish catch, producing flake ice with their own ice machine, properly handling the fish and storing them in hygienic containers, and processing and marketing the fish. The Associations will communicate regular market prices via telephone to all fishermen, who will receive a guaranteed price for their fish from the Association. The Associations will manage a marketing network to find out the best prices for fish at a given time. A branding program will be initiated for all seafood products from the 3BNP. Overall supervision will be the responsibility of FOPROBIM. Through partners, adult education and health programs will be launched. As the Associations gain capacity, it is hoped that they can transform into Cooperatives running income-generating activities.

An Association of Salt Producers should also be created for the 300–400 women salt producers in the park. They would receive training in management and modern production of salt. This program would modernize the salt ponds and install modern salt processing. Some salt ponds could also be converted for production of bivalves and shrimp. The Salt Association would be involved in marketing the branded product from the 3BNP, which will ultimately result in a high-quality, in-demand product.

6.3. Protection of Natural Habitat (Green Frames)

Mangroves provide the nurturing environment for basic production of fish in the park. They should be protected rather than being harvested to make charcoal. The Associations are already involved in managing mangrove nurseries, and plantings are planned. Educational programs and trainings regarding mangroves can be carried out through Associations in each fishing community, through short informational videos and short brochures. A number of partners are interested in contributing to protect the mangroves, as they play a key role in seafood production and protection of the coast from erosion. They will play an even larger role soon, as the world faces the effects of climate change.

An alternative to charcoal is highly fuel-efficient modern wood cook stoves made of fired clay. Distribution of such stoves could serve as a pilot program for replication.

In addition, the protection of seagrass beds and nearshore habitat is vital to conservation efforts and restoration of the fisheries. These areas harbor sea turtles and are key habitat for a number of species.

6.4. Elimination of Small-Mesh Seines (Red Frames)

Elimination of small-mesh seines is the major priority for transforming the fisheries of the park. Catching only small fish is a sure sign of overfishing. The associations should implement a buy-out/replacement program that would buy all seines and replace them with large-mesh gill nets. With at least 146 seines in the park (there may be 200), buying out the seine owners will depend entirely on the associations' ability to organize the buy-out program and manage it. Training needs to be provided to the Associations, and the census of fishers and gear must be completed, prior to taking on this key activity.

Old retired seines can be cut up immediately and transformed by Association members into hammocks and fencing for small poultry enterprises. Part of the Action Plan program could include starting up small poultry farms for egg and meat production. To meet their fencing needs, seine netting could be used. Maina and Samoilys (2011) examined 10 gear replacement programs in East Africa and identified 11 conditions (see sidebar) for optimizing results.

6.5. Ban on Destructive Fishing Practices (Red Frames)

Several fishing methods are very damaging to the fish populations, such as large groups of fishermen scaring fish by beating the waters to "herd" the fish into small mesh nets. This practice should be officially banned and the ban should be enforced by the Park Authority. The indiscriminate fishing of undersize lobster is another practice that needs to stop. According to the national fishing regulations, a ban on fishing lobsters exists from April 1 until September 1 each year, spanning the rather lengthy reproduction period for these high-value crustaceans. Association members would assist in enforcement of essential fishing regulations, in conjunction with the TBPA game wardens. Members of fisher associations would be involved in a joint training program with the Park Authority Wardens and would work hand-in-hand to enforce regulations.

The use of FADs is under consideration, perhaps as a pilot study.

6.6. Sea Farming (Brown Frames)

A number of mariculture programs are recommended for the 3BNP. Salt farming is already practiced but should be improved and updated to modern methods. Another idea is raising lobsters, sea cucumber, and conch in protected areas. Through partners, it may also be possible to farm oysters, tilapia, and eel if suitable feeds can be sourced economically. Seaweed can also be farmed, and women can be trained to farm specific species of seaweeds that are adapted to the conditions in Haiti. Sea farming can support many jobs, but care must be taken to avoid introducing exotic and invasive species and to avoid habitat destruction.

6.7. Management of Landing Sites and Education (Blue and Brown Frames)

Conditions for a Successful Gear Exchange Program

1. Carry out awareness trainings extensively to avoid conflicts and misunderstandings among fishermen.
2. Establish strong fisher organizations that can handle Beach Management Units (BMUs).
3. Share background knowledge about beneficiaries in a gear exchange program.
4. Maintain social cohesiveness and be convincing about the approach to restore the fishery for everyone.
5. Learn about different fishing gear, which can have different impacts. Unfortunate capture of sea turtles or unwanted bycatch could result from the use of large-mesh nets as bottom set gill nets (not used at present).
6. Enforce fishing regulations consistently by the fishery associations and game wardens of the park.
7. Discourage overfishing and disposal of acquired gear.
8. Establish a park authority with game wardens who enforce fishing regulations, as well as overseeing BMUs.
9. Maintain stakeholder participation and keep communication open with community leaders.
10. Do monitoring and evaluation of progress in the exchange program to ensure continued support by fishermen's associations and donors.
11. Support alternative income-generating activities to diversify livelihoods away from fishing activities and avoid a return to the use of destructive fishing gear. (Maina and Samoilys, 2011)

There are no fixed landing sites in the 3BNP. Identification of landing sites is essential to collect catch data and to develop an extensive value chain for fisheries. First, baseline information must be gathered in order to quantify progress in implementation. The Associations can help establish fixed landing sites that provide ice; identify, measure, sort, and weigh fish; ensure proper handling of fish in hygienic containers with ice; and conduct fish inspection, processing, and marketing. If capacity exists, students at the University of Limonade could contribute to data collection by participating in a training program with specialist staff. The staff could also provide a few basic courses in fisheries, coastal zone management, etc.

6.8. Fisheries Value Chain Development (Dark Green Frames)

A more developed fish value chain can help create more employment and other opportunities for fishermen. Almost 70% of the fish are sold by intermediaries who make most of the profit. Fishing Cooperatives can help manage the marketing aspects of fisheries to provide more income to the fishermen, at the same time involving and learning from the successful intermediate fish buyers and marketers. It is essential to involve these key actors to ensure that there will be a place for their entrepreneurship. Training programs should include the fish buyers, as they will participate in the action plan that includes diversification of livelihoods. All capacity building that offers the potential to increase fishers' income should be preceded by training in personal and financial management.

Figure 5. Recommendations for Assisting Fishing Communities in the Three Bays National Park



7. Indicators for Measuring Progress

This Rapid Fisheries Sector Assessment presents the following indicators for measuring progress toward recommendations.

Indicator	Responsible Person or Group	Date Started	Date Achieved	Comments
9.1 Institutions				
<u>Establishment of Park Authority:</u> The Three Bays Park Authority (TBPA) should be established to enforce regulations and protected areas and to carry out monitoring, surveillance, and control in the park.	• FOPROBIM • Local governments in seven fishing communities • Fisher associations	September 2015		This activity is ongoing.
<u>Revision of Fisheries Law:</u> The Fisheries Law of 1978 needs revision, according to official fisheries missions carrying out studies in Haiti.	• Government			Progress on this longstanding issue can only occur when the political will exists to support the much-needed revision and provision of technical assistance to fishermen.
9.2 Training				
<u>Management and Leadership Training</u> is needed for the fisher associations and local officials in the seven fishing communities. Good leadership and management are necessary to implement the Action Plan.	• FOPROBIM • University of Limonade • NGOs			20 fishers from each of the seven communities should be trained, for a total of 140 fishermen.
<u>Training of Game Wardens</u> for the TBPA is necessary to enforce regulations and protected areas. These personnel should be chosen from among local fishermen, with assistance from the fisher associations and FOPROBIM.	• FOPROBIM • Specialized NGOs			One game warden will be assigned to each of the seven fishing communities.
<u>Training to Conduct a Census:</u> A census of fishermen, gear, and boats is much needed and should be carried out by personnel chosen by the local committees and fisher associations.	• FOPROBIM • University of Limonade • NGOs			Three fishermen from each town will receive a short course on the methods of census taking, to make this a complete census with transparency. Each fisher registered in the census will be given an identity card.
<u>Training in Co-management:</u> This important training program	• FOPROBIM • University of Limonade			Co-management training can create a win-win situation that ensures

will introduce the collaborative management concept to fishermen.	• NGOs • Consultants			regulations are fairly applied by fishers.
Diverse Trainings: Short courses and punctual interventions will be carried out on a variety of topics.	• FOPROBIM • University of Limonade • NGOs • Consultants			• Impacts of fishing gear • Gear-exchange program for seines • Conservation of resources • Coastal Resource Management • Associations vs. Cooperatives • Landing Site Management with Beach Management Unit (BMU) • Quality control in fish handling • Fish marketing • Ecotourism
9.3 Census				
Census: Accurate information is essential to controlling protected areas in the 3BNP, access to the fishery resource, and use of appropriate gear. Census takers will receive training.	• FOPROBIM • Fisher associations • Local leaders			Each fisher registered will receive an identity card with color photo, national ID #, address, telephone, etc. The census will define who has which gear (seines, gill nets, traps, diver equipment, etc.)
9.4 Landing Sites				
Landing Sites will be used to collect data on catch, carry out studies, and assure quality control in fish handling.	• Fisher associations • FOPROBIM • Local authorities			Landing sites will be fenced off as clean areas, perhaps using retired beach seines. Access to these sites will be granted only to fishers with an identity card.
9.5 Gear Exchange Program				
Beach Seines: The fine-mesh beach seines should be replaced with large-mesh gill nets. Fisher association members will recycle seines into salable products: hammocks, fencing, wash nets, etc. Association members will mount gill nets for exchange program.	• FOPROBIM • Fisher associations • Local authorities			This program requires much planning, but it can provide an “early success” to encourage fishers to invest in further activities toward a sustainable fishery. It also will create other livelihoods by recycling old seines and mounting new gear.
9.6 Protection of Habitat				
Protection of mangroves, seagrass beds, and other inshore habitats is essential to restoring the fishery, as	• FOPROBIM • Fisher associations			Special training is required to educate fishers as resource users about

these areas serve as nurseries for juvenile fish.	• Local authorities			conservation. Alternative fuel sources and methods of cooking must replace the use of mangroves for charcoal.
9.7 Fish Marketing Study				
Fish Marketing needs to be defined so the value chain can be further developed.	• FOPROBI • CFI • Market consultants			More livelihood opportunities will evolve when the value chain is more developed.
9.8 Protected Areas				
Protected Areas where no fishing is allowed should be created to start the restoration process for fish, lobster, sea cucumber, and queen conch. Areas must be defined by fisher associations.	• FOPROBIM • Fisher associations • TBPA • Game wardens			Full participation of fishers in establishing protected zones is needed for success. TBPA game wardens will carry out day-to-day enforcement.
9.9 Three Bays Park Brand				
Establishing a Brand for products from the Three Bays Park will, over the long term, assure good prices and will benefit fisher associations and their members.	• FOPROBIM • Fisher associations • Consultant			Establishing a brand and associated marketing will require much time, with a focus on producing fish and other items of the highest quality that is recognized by discerning consumers.
9.10 Women's Activities				
Association for Women: An association to support women should be created to advocate for women and their families.	• FOPROBIM • NGO			This association may not be needed if the women in the communities participate in the fisher associations.
Salt Production can be improved to yield a better quality product. A pilot project could be launched to convert 20 salt ponds to use improved methods. Women should participate in such decisions, as they are the salt workers. An Association of Salt Producers could advocate for their interests.	• FOPROBIM • Private-sector salt producer consultant			Improving salt production should be limited to the existing salt ponds to avoid further destruction of mangroves and the environment.
Bivalve Production: A study should be carried out by a specialist to see whether production of mussels is possible in the existing salt ponds.	• FOPROBIM • Private-sector bivalve producer consultant			A pilot project could determine whether more income could be generated from the existing salt ponds with women managers by conversion to bivalve production.

<u>Seaweed Production:</u> A practical pilot study should be carried out to determine the practicability of seaweed production in the bays of the park.	• FOPROBIM • Private-sector seaweed producer consultant			This could be a successful enterprise for women, as done in east Africa. Evaluation of types of endemic seaweeds, herbivores, and market should be considered.
<u>Artisanal Crafts</u> could be made by women and youth to generate income.	• FOPROBIM • Crafts specialist			A specialist could evaluate the feasibility of having women and youth make crafts in the park. Making crafts could be done through a women's association.
9.11 Sea Farming Activities				
<u>Sea Farming Activities</u> could include farming of lobster, sea cucumber, queen conch, bi valves and fish in protected areas.	• FOPROBIM • Mariculture specialist			Careful monitoring needs to be carried out regularly to ensure that predators are not preying on farmed animals. Whether protected areas can be rotated on a 12–18 month basis should be investigated.
9.12 Fish Aggregating Devices and Artificial Reefs				
<u>FADs and Artificial Reefs</u> can reduce fishing pressure on overfished inshore waters, as well as enhancing income for fishers. This idea needs to be critically evaluated, including lessons learned from the south of Haiti.	• FOPROBIM • FAD and artificial reef specialist consultants			A pilot study can evaluate the installation of and benefits from FADs in the park. An artificial reef installed in a barren area could be colonized by flora and fauna, which would attract high-value fish for market.
9.13 Harvesting of Lionfish				
<u>Lionfish</u> should be selectively harvested to eliminate the hazards created by this extremely prolific and destructive fish.	• FOPROBIM • Lionfish specialist			Harvesting of lionfish can help save the coral reefs and reduce the threat to swimmers who can be stung by spines of the lionfish. Monitoring should be done, starting with a baseline count over a given area, to determine whether the lionfish population is being reduced.
9.14 Ecotourism				

Ecotourism can create new livelihoods in the park for eco-guides and fishing guides. Ecotourism is growing in worldwide popularity and now includes social tourism, through which interested persons seek to better understand the social conditions and hardships in the developing world.	• Ecotourism specialist • Travel agents			Two groups are considering ecotourism in Haiti and should be contacted. Travel agents could also become involved.
9.15 Fisheries Conference				
A Fisheries Conference for all four seascape countries could be organized at the University of Limonade. This should be carried out to showcase progress after some improvements have been made.	• FOPROBIM • Conference organizer			A conference will require much planning and collaboration with other seascape countries and donors. It would showcase the 3BNP and activities for the CMBP, as well as bring attention to what is perhaps the most challenging seascape in the CMBP.

Table 6. Findings of Socio-Economic Household Survey, August 2015

No.	Survey Question (Majority of Answers)	Bord de Mer Limonade %	Madras %	Caracol %	Jacquezyl %	Phaeton %	Fort Liberté %	Derac %	Average %
1	Time in house? (10+ years)	37	38	72	70	65	78	53	59
2	Size of household? (6-10 people)	73	25	75	33	50	42	56	50
3	Household migrate? (No)	70	50	50	100	61	57	53	63
4	Respondent is household head? (Yes)	85	88	90	90	100	95	78	89
5	Household head is male? (Yes)	70	75	86	100	100	97	95	89
6	If household head is male, what is age?	41	63	46	51	48	36	37	46
7	Primary activity of household head? (Fishing)	89	87	97	67	100	100	100	91
8	Primary source of income? (Fish)	84	87	100	75	100	95	95	91
10	Secondary source of income?	livestock	livestock	livestock	livestock	charcoal	livestock	business	
11	Type of house? (Wood)	44	25	25	30	12	19	26	26
12	Type of house? (Cement blocks)	56	75	75	70	88	81	74	74
12	Own house?	56	100	81	80	94	58	74	78
j13	Drink well water?	21	25	47	33	18	0	10	25
14	Drink purchased water?	68	37	47	0	82	83	91	68
15	Electricity? (No)	87	37	6	40	83	43	53	49
16	Rely on what type of transport? (Motorcycle)	75	37	15	27	17	46	55	39
17	Have a transport vehicle?	0	13	0	27	56	48	30	35
18	Type of boat power? (Sail)	30	37	60	40	35	43	55	42
19	Type of boat power? (Outboard motor)	0	0	12	0	42	0	9	21
20	Type of boat power? (Oars)	70	63	28	60	23	57	36	48
21	Have a bank account? (Yes)	67	13	11	40	11	35	22	28
22	Own livestock? (Yes)	100	50	74	44	39	50	72	61

Table 7. Findings of Fisheries Questionnaire in Seven Fishing Communities in Three Bays National Park, August 2015

No.	Survey Question (Majority of Answers)	Bord de Mer Limon %	Madras %	Caracol %	Jacquezyl %	Phaeton %	Ft Liberté	Derac %	Average %
1	Member of fisher association?	34	87	55	90	33	78	55	61.7
2	Fishing is activity of household head?	81	100	77	88	100	83	95	89.1
3	Expect children will become fishermen?	38	50	33	50	67	58	23	45.6
4	Fish catch is decreasing?	100	100	100	100	100	100	100	100
5	Household access to boat?	41	75	69	70	50	33	67	57.9
6	Type of boat owned? (wooden plank boat)	100	100	98	100	94	100	94	98.0
7	Own an outboard engine?	0	0	8	0	12	14	6	4.8
8	Access to credit?	25	50	47	40	44	50	22	39.7
9	Credit from family / informal sources?	99	0	89	85	100	96	33	71.7
10	Use ice in fishing?	100	75	97	70	100	69	100	87.3
11	Suffered recent theft of fishing gear?	33	33	42	35	27	25	0	32.5
12	Income per month in gdes?	8,142	8,750	9,351	13,400	11,684	12,436	9,644	10,486
13	Percentage of income used for school fees	17	17	18	18	15	17	16	16.8
14	Percentage of income used for food	16	15	18	16	16	16	16	16.1
15	Percentage of income used for health care	15	17	18	14	12	16	16	15.4
16	Percentage of income used for gear and boat	18	24	23	18	26	20	21	21.4
17	Percentage of income used for house rent	4	2	4	5	1	4	4	3.4
18	Know a government fishery agent?	0	75	38	10	12	3	0	19.7
19	Health is greatest problem?	21	27	34	18	31	24	48	29.1
20	Food security is greatest problem?	20	14	23	21	43	25	52	28.2
21	Contacted official re: HIV/AIDS?	43	17	80	55	45	100	94	62
22	Percentage of catch consumed at home	20	20	20	20	20	20	20	20
23	Fishmonger buys fish?	67	62	91	58	61	76	100	73.5
24	Have access to mobile phone	91	100	91	100	80	88	90	91.4
25	Marine Park is good for fishing?	64	88	-	90	75	87	89	82.1
26	Industrial Park is good for fishing?	51	38	75	35	75	61	72	58.1
27	Industrial Park is bad for fishing?	19	25	-	30	25	15	27	23.5

Figure 6. Calendar of Activities in Fishing Communities in the Three Bays National Park in Northeast Haiti

Activity	Ja n	Fe b	Ma r	Ap r	Ma y	Jun	Jul	Au g	Sep	Oc t	No v	De c	Comments
1. Rainy season													Jellyfish present
2. Hot season													Major fishing period; low prices
3. Crop planting													
4. Crop harvest													Harvest poids, pistaches
5. Windy season													Seasonal winds
6. Hurricane season													Risk of cyclones
7. Cool season													Pelagic fish present
8. School period													
9. Major season for fishing													Bonite, Wahoo, Jacks
10. Low season for fishing													Fish prices high
11. Lobster reproduction													Closed season
12. Lobster fishing													Legal lobster fishing
13. Squid fishing													Squid available year -round
14. Shrimp fishing													Abundant in cooler months
15. Salt production													Year round; less in rainy season

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Appendix 1. List of Consultations / Meetings

- Meeting #1. Inter-American Development Bank (IDB) and Comite de Suivi du Parc des Trois Baies, Port au Prince, Haiti. 31 July 2015.
- Meeting #2. Director of Fisheries and Aquaculture (DFAQ-MARNDR) Jean Robert Badio, Port au Prince, Haiti. 31 July 2015.
- Meeting #3. First Meeting of Stakeholders, Committee of CEPROBAC, Cooperative Environnementale pour la Protection de la Baie de Caracol, “Comité de Pilotage” - Caracol. Office of FOPROBIM. 4 August 2015.
- Meeting #4. Fishermen in Jacquezyl. 6 August 2015.
- Meeting #5. Fishermen in Derac. 11 August 2015.
- Meeting #6. President of University Campus of Limonade, Dr. Bien Aimé Audalbert. 11 August 2015.

Haiti Fisheries Sector Assessment and Action Plan

Section I: Background

The overall objective of the Caribbean Marine Biodiversity Program (CMBP) is “To reduce threats to marine-coastal biodiversity in priority areas in the Caribbean—including high biodiversity ecosystems such as coral reefs, mangroves, and seagrass beds—in order to achieve sustained biodiversity conservation, maintain critical ecosystem services, and realize tangible improvements in human wellbeing for communities adjacent to marine protected areas.” CMBP involves actions at four geographic scales: site, seascape, national, and regional. It specifically targets seven priority marine protected areas (MPAs) within four Caribbean priority seascapes (Jamaica, Haiti, Dominican Republic, and Grenada and St. Vincent and the Grenadines).

To implement the CMBP, The Nature Conservancy has established a consortium of six non-governmental organizations (NGOs), including a well-established local NGO partner that has been working on the ground for many years in the four priority seascapes. The consortium partners include: Caribbean Coastal Areas Management Foundation (CCAM) in Jamaica, CaribSave, Center for the Conservation and Eco-Development of Samana Bay and Its Surroundings (CEBSE) in the Dominican Republic, Foundation for the Protection of Marine Biodiversity (FOPROBIM) in Haiti, and Sustainable Grenadines (working in Grenada and St. Vincent and the Grenadines). Rare is another key partner that will lead social marketing campaigns.

Anchored by five years of USAID funding (\$10M), and supported by additional match funding, the CMBP has an ambitious leverage strategy to establish comprehensive models for effective marine managed areas (MMAs) and sustainable fisheries in the four target seascapes and to actively promote the replication of these models across the entire region. A centerpiece of these models will be generating tangible benefits for people, and more specifically, promoting sustainable income, livelihoods, and food security for local fishers and fishing communities living in the four target seascapes (see CMBP Expected Result #3 in annex below).

A first step towards the design and establishment of these models is the development of a Fishery Sector Action Plan (CMBP Objective 3.1), to serve as a roadmap throughout the course of the five-year program.

Section II: Purpose of Contract

The purpose of this contract is to conduct a Rapid Fisheries Sector Assessment (RFSA) and, drawing on the assessment, prepare a Fisheries Sector Action Plan (FSAP) for the Three Bays National Park. The FSAP will serve as a detailed roadmap outlining a set of strategic interventions and related information to help guide actions under the Haiti CMBP during 2015–2019.

In order to maximize the best use of CMBP resources (time, funding, capacity, and effort) and to design an effective set of strategic interventions to address problems, weaknesses, and opportunities related to the fishery sector, a RFSA will be conducted. Its objectives will be as follows:

1. Diagnosis and analysis: To pinpoint and analyze the most important problems, weaknesses, and opportunities related to a sustainable fisheries sector.
2. Stakeholder engagement and input: To survey and engage a representative sample of stakeholders to guide and inform the RFSA and associated recommendations, and to initiate engagement in the subsequent Action Plan. This engagement process should include men and women, to help ensure that local community inputs are sufficiently representative.
3. Input to Fisheries Sector Action Plan: To provide an analytical and information base for the FSAP.

The description of the scale and focus of the RFSA within the Terms of Reference outlined below is deliberately general. More specifics on scope and focus will be determined jointly, during contract start-up, by the contractor and the CMBP team, taking into account the specific local/national/seascape needs and objectives and the broader CMBP context. The CMBP team consists of the Haiti CMBP Coordinator/TNC Haiti Program Director, TNC Marine Specialist, DR CMBP Seascape Coordinator, and FOPROBIM. For the duration of the contract, the contractor will work very closely with the CMBP team (as defined within the workplan).

Section III: Scope of Work

1. Key questions to be addressed by the RFSA¹

Based on the agreed-upon scope of work and objectives for this contract (as outlined above), the RFSA will address the following key questions:

- Cultural context. What is the cultural context (e.g., family life, cultural practices, lifestyles, aspirations, traditional systems) of the fishing community?
- Scale. At what scale does fishing take place?
- Food, income, and other benefits. How important are fisheries for food and income, as well as other benefits?
- Current status and trends. What are the current status and trends of the main targeted fisheries resources? How many boats and fishers are there, and what type of fishing gear is used for targeted fisheries?
- Key drivers of change. What are the key drivers of change in the fisheries sector?
- Policy/legal/institutional frameworks. What major policies and legal and institutional frameworks govern local fisheries?
- Infrastructure, capacity, and support for management. What are the individual and institutional capacities and willingness to manage the fisheries? What is the state of physical infrastructure, technological capabilities, institutions, and/or human productivity in the fisheries sector?
- Market dynamics. What are the market dynamics, including supply and demand, local and export markets, and related issues?
- Data. What systems are in place to collect, analyze, and disseminate data on fisheries to support fisheries management and development activities, and how effective are they?
- Fisheries management system(s). What fisheries management system(s) and measures are in place to sustain the fishery (e.g., closures, gear, other restrictions)? How effective are these measures?
- Gender differences. What are the different roles of men and women in the industry?

¹ To supplement this list of questions, a list of some fisheries management objectives is included in Appendix 1.

- Species characteristics. What is the inherent vulnerability of targeted species to fishing pressure?
- Habitat and bycatch impacts. For key targeted fisheries, what are the impacts on marine habitats and ecosystems, including bycatch of threatened species?
- Experience promoting sustainable fisheries. To date, what efforts have been made to promote sustainable fisheries? What has worked, what has not worked, and why? What programs are underway or planned in the near future?
- New opportunities. In practical terms, what new opportunities exist for achieving sustainable fisheries (e.g., substitute fisheries or underutilized stocks, mariculture / aquaculture, alternative livelihoods outside the fisheries sector to reduce fishing pressures)?

2. Additional guidance for the RFSA

In carrying out the RFSA, the contractor should refer to *Elements of a Typical Fishery Sector Review* (Appendix 3) and note the following additional guidance:

- Focus of RFSA. The fisheries sector to be assessed may be artisanal, commercial, or both. Specific fisheries to be examined in-depth (i.e., with a special focus) will be determined during the contract start-up period, through a joint exercise involving the contractor and the CMBP Team. The context and needs of the specific seascape will help guide the programmatic focus of the RFSA (e.g., demographic, socio-economic, policy, governance, environmental/biological).
- New stock assessments are not necessary. Given the timeframe and budget available, a new standard fisheries stock assessment is not feasible, as these are generally lengthy, resource- and data-intensive studies that are especially challenging within a tropical reef ecosystem. General status and trends of stocks will need to be determined through existing information, traditional knowledge, and past stock assessments, if available.
- Geographic scope. The geographic scope of the assessment will span the entire targeted seascape, with special attention to the core MMAs and surrounding buffer zones.
- Consultations. The assessment will involve extensive consultations with the CMBP seascape team and a range of key stakeholders and partners, including local fisher associations, other local community members, government agencies, resource users, relevant universities and NGOs, and the wider fishing community—essentially, all those who have a stake in the condition and use of the marine / coastal ecosystems and the fisheries being considered.
- Analytical approach. The assessment will systematically analyze the major problems, weaknesses, and opportunities within the fisheries sector, in order to develop recommendations for addressing them. The approach may entail a Logical Framework Analysis, a SWOT analysis, or other well-established evaluation tools. The assessment must also include a robust and comprehensive analysis of key literature and data if available, covering fish catch levels and species, fishing community demographics, market dynamics of the fishing sector, fishing gear in use, fishery regulations and levels of enforcement, status of local fisher associations, sustainable livelihood options in the area, and past and existing efforts to promote sustainable fisheries. The assessment must analyze gender considerations as well. Although there are few female fishers in the seascapes being targeted, women may play an important role in other aspects of the fisheries sector (e.g., mariculture activities). Recommendations must include elements that will benefit women.

- Standardized methodology. The Marine Stewardship Benchmarking and Tracking Tool from the Marine Stewardship Council (MSC)² or the Food and Agriculture Organisation's (FAO) Ecosystem Approach to Fisheries (EAF) Toolbox are currently being reviewed by TNC as a potential standard methodology and framework to be used within the RFSAs for all the CMBP seascapes.
- Baselines. RFSAs will help to provide a baseline with which to compare conditions before, during, and after CMBP interventions and to assess the success and impact of CMBP efforts throughout the program's duration.
- Assessment example. The *Sample Table of Contents for Fisheries Assessment* (Appendix 4) provides a sample format.

3. Guidance for Fisheries Sector Action Plan

The FSAP should include the following information:

- General. Based on the analysis and findings under the RFSAs, the FSAPs will recommend and elaborate a set of *practical, feasible, concrete, and customized actions* to be carried out in each seascape in order to promote more sustainable fisheries.
- Categories of action. Proposed actions will fall into the following three general categories:
 - (i) site-based fisheries management and livelihood actions
 - (ii) capacity building and training
 - (iii) policy reforms and governance.
- Key questions to be elaborated. The Action Plan will address, at a minimum:
 - *What* results can be achieved by the end of the CBMP? *What* actions are required to achieve such results?
 - *Who* will carry out these actions?
 - *When* will these actions be implemented, and for how long?
 - *What resources* (e.g., money, staff, equipment) are needed to carry out targeted actions?
 - *What type of communication* are needed (target audiences and communications materials)?

The FSAP must be:

- Stakeholder-driven and owned. It is very important that the FSAP be developed in a participatory process in consultation and engagement with all the key fisheries sector stakeholders. The strategies and activities within the Action Plan must be identified, driven, and stewarded by the fisheries sector and its stakeholders; the function of the contractor will be to document, consolidate, and 'package' these. As resources and time may be a limiting factor, significant thought and discussion should occur between the contractor and the CMBP Team about how best to carry out this work. A likely scenario is at least one stakeholder planning and consultation workshop and a series of follow-up meetings.
- Built with socio-economic considerations front and center. It is imperative that socio-economic incentives be embedded within strategies and activities in the Action Plan to help ensure success.
- Complete, clear, and current. The action plan should be

² This tool was designed to provide a consistent method of benchmarking Fishery Improvement Projects (FIPs) against the MSC Fisheries Standard, while also tracking progress as fisheries move towards sustainability.
<http://www.msc.org/newsroom/news/msc-launches-updated-benchmarking-and-tracking-bmt-tool>

- *Complete*. It should list all the action steps or changes to be sought in all relevant parts of the selected fishery/ies.
- *Clear*. It should be apparent who will do what and by what date.
- *Current*. It should reflect current work and anticipate newly emerging opportunities and barriers.
- Appropriate to capacity context. It is of utmost importance that the scope and complexity of the fisheries actions recommended as priorities are appropriate to the capacity of the institutions who will be involved in implementation.

In developing the FSAP, the contractor should refer to the Appendices below for guidance, particularly:

- Fishery Management Objectives (Appendix 1)
- References for Development of Fisheries Sector Action Plan (Appendix 4)
- Excerpt of Fisheries Section in CMBP Technical Application (including Objectives and Illustrative Activities) (Appendix 5).

Section IV: Deliverables

1. **Product 1 – Work Plan** to be delivered upon signing of the contract.
 - Following a first meeting or conference call with the Haiti CMBP Seascope team and key partners/stakeholders, and some very preliminary research, prepare a draft Work Plan detailing the process and methodology/ies to be used for the RFSA and FSAP, with a breakdown of the timeline and individual steps/activities. The Work Plan should refine the scope and focus of the RFSA and FSAP, covering geographic area, specific fishery or fisheries to be assessed, orientation of the assessment (socioeconomic, environmental, biological, etc.), limiting factors such as time and available funding, and other relevant matters.
 - Draft a revised version incorporating CMBP feedback which the Contract Manager (Maxene Atis) will approve, with input from the CMBP Team.
2. **Product 2 – Record of Consultations** delivered on August 15, 2015.
 - Prepare and circulate to the Fishery Sector Teams from each seascope minutes or notes following *all* major consultations with stakeholders, including but not limited to surveys.
3. **Product 3 – Final Version of RFSA Report** to be delivered on September 15, 2015.
 - Prepare presentational materials for an in-country inception meeting with key stakeholders and partners to explain the objectives and plans for this effort, and to solicit their support and involvement as appropriate.
 - As an initial step, prepare a template for the RFSA Report, and circulate to Contract Manager (Maxene Atis) and CMBP Team for comment and approval.
 - Using the approved template, prepare a first draft of the RFSA Report elaborating preliminary findings, and circulate this draft to the Contract Manager (Maxene Atis) and CMBP Team for comment.
 - Prepare a second draft of the RFSA Report, taking into account relevant comments and feedback,

and circulate this draft to the Contract Manager (Maxene Atis) and CMBP Team for comment. This draft will also be disseminated for limited wider review internally and with key partners and stakeholders, and the review process will therefore be longer than the first draft review.

- Prepare a final version of the RFSA Report, taking into account relevant comments and feedback. The Contract Manager (Maxene Atis) will approve this final version.

4. Product 4 – Final Version of FSAP to be delivered on March 21, 2016.

- As an initial step, prepare a concise summary document of recommendations and an approach for development of the FSAP and submit for review and approval to the Contract Manager and CMBP Team (process to be determined with CMBP Team as stipulated above in Section 3, *Guidance for Fisheries Sector Action Plan*).
- Present RFSA findings, assist with facilitation, and document results and recommendations developed within an action planning process involving workshop(s)/series of meetings/consultations/etc. (as defined within recommendations for development of FSAP document).
- Prepare a template for the FSAP, and circulate to the Contract Manager (Maxene Atis) and CMBP Team for comment and approval.
- Using the approved template, prepare a first draft of the FSAP elaborating recommendations and actions, as developed through the action planning participatory process, and circulate this draft to the Contract Manager (Maxene Atis) and CMBP Team for comment.
- Prepare a second draft of the FSAP, taking into account relevant comments and feedback, and circulate this draft to the Contract Manager (Maxene Atis) and CMBP Team for comment; present findings at a (second) stakeholder workshop and/or through more targeted consultation meetings with key stakeholders.
- Prepare a final version of the FSAP Report, taking into account relevant comments and feedback. The Contract Manager (Maxene Atis) will approve this final version.

Section V: Acknowledgments

The Contractor agrees to acknowledge USAID's and TNC's support of the Project, including funding contributions and sponsorship, on all media announcements, programs and publications, as follows:

"This [study/report/audio/visual/other information/media product (specify)] is made possible by the generous support of the American people through the United States Agency for International Development (USAID) and The Nature Conservancy, under the terms of Award No. #AID-OAA-A-14-00064. The contents are the responsibility of The Nature Conservancy and do not necessarily reflect the views of the U.S. Agency for International Development, the United States Government or The Nature Conservancy."

Unless instructed otherwise, all publications, videos, or other information/media products funded or partially funded under this Subaward must be marked with the USAID and TNC logos. Logos and markings of any co-sponsors or authorizing institutions shall be similarly located and of similar size and appearance.

Section VI: Communication and Coordination

Contractor shall maintain close communication and coordination with:

Maxene Atis, MBA

Conservation Coordinator/Contract Manager

matris@tnc.org

(305) 445-8352 ext 109 (office)

(509) 43248705 (Haiti)

(305) 446-6395 (fax)

Skype: marco114512

Appendix 1

Fishery Management Objectives

(Excerpted from *Managing Small-scale Fisheries: Alternative Directions and Methods*, by Fikret Berkes, Robin Mahon, Patrick McConney, Richard Pollnac, and Robert Pomeroy. 2001)

TABLE 3.6 SOME OBJECTIVES OF FISHERY MANAGEMENT.

OBJECTIVE	SUSTAIN- ABILITY	MAIN PURPOSE	
		ECONOMIC	
		EFFICIENCY	EQUITY
1. Maximize catches		✓	
2. Maximize profit		✓	
3. Conserve fish stocks	✓		
4. Stabilize stock levels	✓		
5. Stabilize catch rates		✓	
6. Maintain healthy ecosystem	✓		
7. Provide employment			✓
8. Increase fishers' incomes			✓
9. Reduce conflicts among fisher groups or with nonfishery stakeholders			✓
10. Protect sports fisheries		✓	✓
11. Improve quality of fish	✓	✓	
12. Prevent waste of fish			✓
13. Maintain low consumer prices		✓	
14. Increase cost-effectiveness			✓
15. Increase women's participation			✓
16. Reserve resource for local fishers	✓	✓	
17. Reduce overcapacity	✓	✓	
18. Exploit underutilized stocks		✓	
19. Increase fish exports		✓	✓
20. Improve foreign relations		✓	
21. Increase foreign exchange		✓	
22. Provide government revenue			

Source: adapted from Clark 1985

Appendix 2

Elements of a Typical Fishery Sector Review

(Excerpted from *Managing Small-scale Fisheries: Alternative Directions and Methods*, by Fikret Berkes, Robin Mahon, Patrick McConney, Richard Pollnac, and Robert Pomeroy. 2001)

TABLE 3.2 THE ELEMENTS OF A TYPICAL FISHERY SECTOR REVIEW.

REVIEW OF FISHING INDUSTRY OVERALL

- Identification of individual fisheries that comprise the sector
- Resource base for each fishery
 - Resource types
 - Habitats
- Harvesting sector (including recreational)
 - Fleet
 - Fishers
 - Landing sites and infrastructure
- Post-harvest sector
 - Processing
 - Retailing
 - Exports
- Support services
 - Boat builders
 - Gear and equipment suppliers

REVIEW OF INSTITUTIONAL AND POLICY SUPPORT TO THE FISHING INDUSTRY

- Legal and policy framework
 - Fisheries legislation and policy
 - Fisheries regulations
 - Related national legislation and policy, trade, environment, foreign
 - Linkages at the national level
 - International policy and agreements
- Institutional fisheries management capacity
 - Fisheries department staffing and capacity
 - Fisherfolk organizations

FISHERY-SPECIFIC REVIEWS

- Summary of biological knowledge
 - Local
 - Other relevant studies
- Summary of management options
 - Local
 - Other relevant systems

Appendix 3

Sample Table of Contents for Rapid Fisheries Sector Assessment and Fisheries Sector Action Plan

Rapid Fisheries Sector Assessment

1. Introduction.....	
2. Political and Socio-Economic Context	
3. The Three Bay National Park SEASCAPE Fisheries Sector.....	
a. Profile of Semi-Industrial Fisheries.....	
b. Profile of Artisanal Fisheries.....	
4. Fisheries Policy and Regulatory Framework.....	
5. Community-based management or Co-management.....	
6. Fishery Organizations and Stakeholders.....	
7. Regional Initiatives and External Support	
8. Key Issues and Constraints in the Fisheries Sector	
9. Recommendations and Lessons Learnt	

Bibliography.....	
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APPENDICES

List of consultations/meetings

Terms of Reference

Copy of Power point presentation

Fisheries Sector Action Plan

Appendix 4

References for Development of Fisheries Sector Action Plans

http://www.nmfs.noaa.gov/stories/2011/12/docs/action_agenda_ne.pdf

www.ideels.uni-bremen.de/action_plan_worksheet.doc

http://www.fns.bc.ca/pdf/FNLC_FisheriesActionPlan.pdf

<http://www.scotland.gov.uk/Resource/Doc/175776/0114919.pdf>

<http://www.msc.org/documents/developing-world/fishery-improvement-projects/fishery-improvement-action-plan-overview-template/view>

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Marine Stewardship Council
Fishery Improvement Action Plans Guidance 2013

5. Action Plan Template – a snapshot

There are three Tables in the Word template to help you develop and implement your Action Plan:

1. Action Plan overview
2. Action Plan details
3. Evaluation against Action Plan milestones

Detailed guidance about each of the Action Plan elements and how to complete the Tables is given in Sections 6 and 7 of this document.

Table 1: Action Plan overview

Fishery name:		Start date:
Fishery location:	Fishing method:	End date (anticipated):
Project leaders (organisation responsible for Action Plan):		Improvements recommended by:
Overview of the Action Plan		

Table 2: Action Plan details

Standard requirement	Actions	Resources required	Action lead	Action partners	Stakeholders	Timescale / milestones
1.						
2.						
3.						
4.						
5.						

Table 3: Evaluation against Action Plan milestones

Standard requirement	Actions	Timescale / milestones	Progress / outcome	Revised milestone
1.				
2.				
3.				
4.				
5.				

Excerpt from

http://www.msc.org/documents/developing-world/fishery-improvement-projects/Fisheries_Improvements_Action_Plan_Guidance.pdf/view

Appendix 5:

Excerpt of Fisheries Section in CMBP Technical Application

Expected Result 3: More Sustainable Fisheries Sector by Maximizing Fishery Benefits of MPAs, Promoting Innovative Fishery Management Actions, and Promoting Sustainable Livelihoods

In support of the CARICOM Common Fisheries Policy and other key government commitments on fisheries, CMBA will work closely and collaboratively with fishers and fishery associations to help them implement sustainable fisheries and sustainable livelihood activities. A significant number of women and men living in or adjacent to Core MPAs under this program are poor, with a high dependency on reef fisheries for livelihoods, income and food. In CMBA Core MPAs, over-fishing and destructive fishing practices threaten the wellbeing of local women and men and threaten marine biodiversity. In carrying out each activity under Result 3, special efforts will be made to promote female empowerment and equity within fisheries value chains, drawing on the specific recommended actions in the Gender Action Plan.

Objective 3.1: By 2016, Fishery Sector Action Plans developed for at least three targeted seascapesⁱ.

Activity 3.1.1: Complete Fishery Sector Action Plans. Drawing on existing and new data (including baseline gender assessment), along with extensive consultations, conduct collaborative strategic fishery assessments of the current fisheries sector and the potential for shifts to more sustainable fisheries and fishing practices, as well as supplemental livelihoods outside the fisheries sector. Fishery Sector Action Plan will assess gender roles along the fisheries value chains (i.e. boat and equipment ownership, net repair, fishing, shellfish collection, fish processing, quality control, transportation to markets, marketing, food preparation, etc.) and how proposed changes might impact gender relations. Implementation of the action plan will entail a special effort to enhance women's roles and benefits within the fisheries value chains. Action Plans will guide illustrative activities outlined below.

Objective 3.2: By 2020, the capacity and motivation of fishers and local fisher associations to support sustainable fisheries is significantly strengthened in at least three targeted seascapes.

Activity 3.2.1: Support institutional strengthening and awareness-raising, targeting fisher and fisheries-related associations. Conduct institutional diagnostic assessments (or review existing assessments by FAO, CRFM, etc.) and, based on recommendations, provide support to strengthen fisher and other targeted associations that will play a key role in achieving Result 3 (e.g., board development, leadership, operations, financial management, registration, gender training). This will be done in coordination with regional organizations already supporting fisher associations such as CRFM, CNFO and CANARI. The representation of women on these associations will also be taken into consideration, and women's fishers associations deliberately sought out for engagement.

Objective 3.3: By 2018, major pilot programs are being fully implemented in at least three targeted seascapes to promote sustainable fishing practicesⁱⁱ and sustainable livelihoods for fishers.

Activity 3.3.1: Pilot substitute fisheries and mariculture as feasible. To reduce pressures on reefs and associated habitats, it may be possible to shift to alternative shallow-water species (e.g. sea cucumber) or deeper-water pelagics (e.g. tuna, flying fish) or other commercially-valuable species. Based on assessment to elucidate the different roles of men and women in fishing practices, and supported by extensive training of both as appropriate, this activity could entail: fish aggregation devices, lobster

shades, and linkages to markets (see below), along with efforts to ensure strict management of and access to any new fisheries. It may also be possible to pursue mariculture options (e.g. conch, oyster, seaweed), which could entail: fisher training, provision of seed material, and initial set-up and monitoring. Shallow-water and mariculture pilot activities would be specifically designed to enable women to play a more diversified and independent role in fisheries management by: strengthening women's organizations, increasing their management responsibility, and making credit and other resources available to them.

Activity 3.3.2: Pilot sustainable fishing practices outside of MPAs. Working collaboratively with fishers, this activity will include, for example: encouraging shifts from fish traps to more sustainable practices (e.g. line fishing), shifts to larger-mesh nets, and shifts to modified lobster traps to reduce by-catch. Incentives (e.g. training, gear subsidies) could be used to encourage more sustainable fishing practices.

Activity 3.3.3: Support lionfish harvesting programs and market development. Building on existing initiatives (e.g. TNC's similar program in Puerto Rico), encourage harvest, sale and consumption of invasive lionfish within and around MPAs to control the invasive population and reduce reef-fishing pressure. This could include: (i) supplying gear; (ii) providing improved technologies for processing; (iii) subsidizing transitions from unsustainable fishing practices to lionfish harvesting; and (iv) establishing formal partnerships amongst fishers, distributors, hotels, restaurants, NGOs, and governments, including through Marine Conservation Agreements and Community-Supported Fisheries (CSF) as part of supply chains for local and export marketsⁱⁱⁱ. Trainings under this activity will target women, men and youth.

Activity 3.3.4: Work with the private sector to promote markets for sustainable fisheries. In addition to lionfish, CMBA will assess and promote markets for other sustainable fisheries. For example, we will work with large hotels in the region to encourage their purchase of sustainable product from targeted seascapes^{iv}.

Activity 3.3.5: Protect parrotfish. Parrotfish play a vital role in maintaining coral reef system health by grazing macro-algae. Through social marketing campaigns (see above), we will raise awareness among fishers, marketers, consumers and others; promote parrotfish regulations by government, and promote parrotfish-friendly fish traps (e.g. mesh size changes and escape panels).

Activity 3.3.6: Promote other viable complementary livelihoods outside the fisheries sector. To reduce fishing pressures, CaribSave (through its C-Fish Initiative) and local partners are promoting alternative livelihoods for women and men, based on a recognition of their existing skills, preferences and any barriers to participation (which might include cultural traditions, travel requirements / constraints, literacy etc). Significant work by Consortium members is already underway to promote: (i) tourism (Bluefields, Galleon Bay—working with Sandals, Royal Caribbean, Travel Foundation; Samana Bay; Grenadine Bank; and Three Bays National Park); (ii) local crafts industry (Bluefields and Galleon Bay); and (iii) salt production (Three Bays). CMBA will continue and expand such efforts, which will include, for example: new product development and marketing; and support for start-up businesses, including technical assistance on business planning, seed grants, and possibly concessional loan capital for women and men (see Marine Enterprises Investment Fund above).

Objective 3.4. By 2020, increase coverage / support for fish sanctuaries (no-take zones)^v, including through Marine Conservation Agreements (MCAs) with fishery associations.

Activity 3.4.1: Increase coverage and support for fish sanctuaries. Through activities such as zoning, awareness-raising with local fisher associations, and government policy work, CMBA will promote formal establishment of no-take zones in core MPAs and their larger seascapes. Building on TNC's extensive experience with MCAs (e.g. Gulf of California, Mesoamerican Reef, www.mcatoolkit.org/Field_Guide_html), we will assess the feasibility of MCAs across the CMBA Core sites, and advance MCAs with fishery associations, where feasible. For example, fishers could agree to adhere to no-take

zones in exchange for various types of training, gear, subsidies, and other support for sustainable fisheries outside of no-take zones. We will also systematically monitor changes in fish biomass within and outside fish sanctuaries (already being done by CaribSave in Bluefields and Galleon in Jamaica). Case studies and best practices will be compiled, developed and disseminated on the impacts of fish sanctuaries on gender relations within communities in the Caribbean and other geographies.

Objective 3.5: By 2020, catalyze the adoption and implementation of supportive fishery policies.

Activity 3.5.1: Work with fisheries and MPA agencies on supportive policies. We will work closely with government fisheries and MPA agencies in each target country to promote laws and regulations that advance the above objectives^{vi}, building on existing efforts by TNC and local partners in the Dominican Republic, Jamaica and Eastern Caribbean. We will encourage policies that specifically support female empowerment, equity and benefits in relation to the fisheries sector. Of note, we will work with lead government agencies to create an effective, ongoing process (e.g. multi-stakeholder committee) to implement the two major *regional policy commitments*: CARICOM Common Fisheries Policy and Regional Plan of Action for Coral Reefs, recently adopted by Ministers at the Caribbean Regional Fisheries Mechanism (CRFM) meeting. In addition, CMBA will identify synergies between existing fishery policies and gender equality programs and policies (i.e. national bureaus of women's/gender affairs, CARICOM's Gender and Development Sub-Program, Jamaica's National Policy for Gender Equality, etc.).

ⁱ This exercise will entail consultations with local fishers and fishery associations, and will be conducted in close coordination with fisheries agencies within governments and the Caribbean Regional Fisheries Mechanism (CRFM). The assessment will start with a desk study approach.

ⁱⁱ This Objective, in particular, includes several activities that will entail a significant communications component (e.g. radio, videos, printed materials).

ⁱⁱⁱ TNC has started discussions with the U.S.-based lionfish distributing company *Traditional Fisheries*.

^{iv} TNC has a Sustainable Seafood Program already in place in the U.S. Virgin Islands, linking sustainable fishery product to a set of major hotels and restaurants. We will seek to adapt this program to other geographies. We will also scope the opportunity to pilot some form of certification for such product, contingent on financial resources and technical feasibility.

^v No-take zones are key to maintaining and rebuilding healthy fish stocks, generating spillover benefits for adjacent marine areas.

^{vi} For example, laws, regulations, and policies to: (i) create management plans and restrictions (e.g. seasonal closures, gear) for target species; (ii) advance fish sanctuaries; and (iii) support substitute fisheries and mariculture through programs to subsidize fishery / gear shifts and start-ups through community-based fisheries management.