



*Fondation pour la Protection de la Biodiversité Marine*

**FoProBiM**

[www.foprobim.org](http://www.foprobim.org)



## **Toward the Development of Haiti's System of Marine Protected Areas (MPAs)**

### **ReefFix**

**An Integrated Coastal Zone Management (ICZM) Ecosystem Services Valuation and Capacity Building Project for the Caribbean**

**Funded by: The Government of Mexico and the Government of Monaco**

# Contents

## **1. INTRODUCTION**

The preparations for the **United Nations Conference on Sustainable Development RIO+20** identified the oceans and marine ecosystems as one of seven areas<sup>1</sup> which need priority attention to ensure global sustainability. The very first entry point to discuss ocean governance was a side event of the forum on science, technology and innovation for sustainable development held on June 12, 2012, focusing on science and governance for global sustainability. The panelists and the public called for more and new research, including in economic valuation techniques, to fully understand and evaluate the impacts on marine ecosystems such as coral reefs and mangrove ecosystems.

Noting that current governance remains fragmented along both sectoral and geographical lines that ignore the interconnectivity and scale of ocean issues, they recognized that there is an urgent need for an international framework of cooperation for both ocean research and governance, which will define the conditions for scientist to prepare accurate scenarios for the future. The **Rio Ocean Declaration**<sup>2</sup> called for strong and immediate action to meet the sustainable development goals for oceans, coasts, and **Small Island Developing States (SIDS)** at Rio+20 and beyond. Of the three primary goals one of them is to enhance the capability of SIDS and developing coastal countries to benefit from, and sustainably manage, their marine resources and to adapt to climate change through increased financing, technology transfer, commensurate with the needs and challenges facing developing countries and SIDS, and ocean use agreements to ensure that the benefits derived from the sustainable use of resources in the Exclusive Economic Zones (EEZs) of SIDS and developing coastal countries accrue to them.

As an example, inspired by the Micronesia Challenge, in Curitiba, Brazil on March 31, 2006, the nation of Grenada pledged to put 25 percent of near-shore marine and 25 percent of terrestrial natural resources under effective conservation by 2020 under the **Grenada Declaration**<sup>3</sup>. The Declaration, approved by Grenada's Cabinet, will lead to a nine-fold increase in protection of Grenada's marine environment and more than double protection of its terrestrial environment. Grenada now joins the Bahamas, which in 2005, during the 10 Year Review of the Barbados Program of Action meeting, committed to set aside at least 20% of its productive marine bank areas as marine protected areas.

Coral reefs are sometimes referred to as “canaries of the sea” because of their early warning ability to forecast near-shore oceanic stress. Because of their biological diversity, they are also called “rainforests of the sea”. Coral reefs are vital to the well being of millions of people. Tropical marine and coral reef ecosystems, including mangroves and sea grasses, are vulnerable environmental resources that provide significant economic goods and services. The health of these resources is critical to human well-being. By accounting for coastal marine and coral reef ecosystem economic

---

<sup>1</sup> United Nations Conference on Sustainable Development “7 Critical Issues at Rio+20” available at <http://www.uncsd2012.org/7issues.html>

<sup>2</sup> The Rio Ocean Declaration is available at [http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/SC/pdf/pdf\\_Rio\\_Ocean\\_Declaration\\_2012.pdf](http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/SC/pdf/pdf_Rio_Ocean_Declaration_2012.pdf)

<sup>3</sup> At the 2006 8th Meeting of the Conference of Parties to the Convention on Biological Diversity (COP 8) Grenada pledged the Grenada Declaration

values in management decisions, Small Island Developing States (SIDS) can sustain their flow of goods and services in the interest of current and future generations.

Compared to just a few decades ago, the ever-increasing number and strength of forces affecting coastal ecosystems, including mangroves, require coastal managers to respond and adapt to ensure the sustainability of valued ecosystem services and products. One of the major challenges in the Caribbean region is strengthening the resilience of coastal ecosystems to the climate change-induced sea level rise and temperature increases

The Ocean covers 70% of the surface of the planet, yet we are only beginning to understand the extent and depth of the services it provides to us daily in terms of economic and ecological benefits. The more fundamental role of the ocean in absorbing nutrients, cycling carbon, regulating climate, harboring biodiversity and providing basic life support to planet Earth remains to be quantified. Marine ecosystems provide people with services for their livelihoods, nutrition and environmental security, as well as help defray the costs to society from the loss of ocean services related to pollution absorption, changes in ocean productivity, CO<sub>2</sub> sequestration, and climate regulation as a result of rapidly increasing atmospheric CO<sub>2</sub> concentrations and more local human pressures.

- Fish products are vital for food security and human wellbeing, supplying over 4.2 billion people with at least 15 per cent of their average animal protein intake
- In 2009, fisheries supported the livelihoods of about 540 million people (8 per cent of the world population)
- Approximately 30 per cent of the world's fish stocks are overexploited, depleted, or recovering from depletion and 50 per cent are fully exploited
- Globally, sea levels have been rising at an average rate of about 2.5 mm per year between 1992 and 2011
- Increasing carbon dioxide levels in the air are altering the chemistry of the ocean's surface causing it to become more acidic. The ocean's pH declined from 8.11 in 1992 to 8.06 in 2007, posing threats to marine food webs and ecosystems
- If ocean acidification trends continue, 75 percent of all coral reefs will face high to critical threat levels by mid-century
- International shipping transports around 90 per cent of world commerce and is the safest, most secure, most efficient and most environmentally sound means of bulk transportation
- Marine-based renewable energy (wind, wave and tidal) potential is high, yet in 2008 these energy technologies represented just 1 per cent of all renewable energy production
- The tourism economy, including coastal tourism, represents 5 percent of global GDP and contributes 6 to 7 per cent of total employment. Estimates show global spending on ecotourism is increasing by about six times the industry-wide rate of growth
- The amount of nitrogen reaching oceans and coasts has increased three-fold from pre-industrial levels - primarily due to agricultural run-off and untreated sewage. This can degrade marine ecosystems and groundwater and lead to the formation of oxygen-poor 'dead' zones.

Caribbean Countries have requested technical assistance to achieve the commitments laid out in the World Summit on Sustainable Development (WSSD) Plan of Implementation and the **Convention on Biological Diversity** targets. A critical component of this technical assistance is the availability of appropriate and adequate data with which to establish robust baselines and monitor progress towards the goals.

The **Millennium Development Goals Report 2012** indicated that in 2010, protected areas covered 12.7 per cent of the world's land area, but such protection extended to only 1.6% cent of the total ocean area. Since 1990, protected areas have increased in number by 58% and in their extent by 48%. But growth has varied widely across countries and territories. Terrestrial protection doubled between 1990 and 2010 in 59 of 228 countries with available data, and marine protection doubled in 86 of 172 countries with available data. In contrast, growth of less than 1 per cent, or no growth at all, occurred in the terrestrial protected area system of 54 countries, and in the marine protected area system of 35 countries. Despite their relatively small extent, marine protected areas have expanded at a faster pace than those on land. The extent of protection increased especially in coastal waters out to 12 nautical miles—from 3.1 per cent in 1990 to 7.2 per cent in 2010<sup>4</sup>.

According to the **Millennium Ecosystem Assessment**<sup>5</sup>, **Ecosystem services** are the benefits people obtain either directly or indirectly from ecological systems. Quantifying ecosystem services is a valuable tool for countering private attempts to convert an ecosystem such as a mangrove swamp to a marina, golf, and hotel development. By estimating and accounting for the economic value of ecosystem services, social costs or benefits that otherwise would remain hidden can potentially be revealed and vital information that might otherwise remain outside of the economic decision making calculus at local, national, and international scales can be internalized (**Millennium Ecosystem Assessment, 2005**).

The most important sites for species conservation remain unprotected. Conservation action is slowing the rate at which species are moving towards extinction. New research has confirmed that appropriately located protected areas can reduce declines in status of species. But despite an increase in these areas, half of the world's most important terrestrial sites for species conservation remain unprotected. There are, for example, 588 **Alliance for Zero Extinction** sites (AZE), supporting the only remaining population of one or more highly threatened species. Fifty-one per cent of these critical sites are wholly unprotected, as are 49 % of the 10,993 **Important Bird Areas** (IBAs). Only 22 per cent of AZEs and 28 percent of IBAs are completely covered by protected areas.

Protected-area coverage of these important sites has increased over time. But in terms of proportion, the extent of protected area covering key biodiversity sites as a share of

---

<sup>4</sup> United Nations. The Millennium Development Goals Report 2012 Goal 7: Ensure Environmental Sustainability Pg 49

<sup>5</sup> Millennium Ecosystem Assessment, 2003. Ecosystems and Human Well-Being: A Framework for Assessment. Island Press, Washington, DC

overall conservation land preserves has declined annually since 1950. Adequate protection and management of AZEs and IBAs, among other important sites, is called for to forestall extinctions, safeguard ecosystem services, preserve the benefits that people derive from these sites, and support international commitments under the **Convention on Biological Diversity**.

ReefFix is an Integrated Coastal Zone Management (ICZM) tool that works with SIDS to complete stakeholder analysis and socio-economic valuation with a view towards improving oversight of marine resources to meet commitments made by SIDS to increase coverage and effective management. ReefFix has multi-level linkages that trains participating countries in (i) ecosystem goods and services valuation methodologies (ii) cost effective interventions to improve marine ecosystem health, and (iii) revenue raising techniques of cost recovery and user pays/polluter pays principles. In this process, **ReefFix will use and develop cost-effective techniques that can be replicated throughout the wider Caribbean by applying the ReefFix methodology up to 7 case study sites indicated below at a cost of US\$15k/site that will include capacity building exercises and a workshop to disseminate preliminary results and disseminate lessons learned and best practices.**

This ReefFix project, supported by the governments of Mexico and Monaco, is an Integrated Coastal Zone Management (ICZM) Coral Reef and Mangrove Restoration and Watershed Management Demonstration program that works with Small Island Developing States (SIDS) to restore and effectively manage coastal resources through the use and development of cost-effective techniques and economic validation of ecosystems (OAS/DSD).

The World Resource Institute's (WRI) economic valuation methodology provides a simple and replicable method for estimating the value of coral reefs and mangroves in the Caribbean. The methodology uses the concept of "ecosystem services" – the tangible benefits ecosystems provide which sustain and fulfill human life – as the basis for measurement. The approach looks primarily at the direct economic benefits provided by these resources; it does not attempt to calculate the Total Economic Value (TEV) of coral reefs and mangroves, which would include non-use values (for instance, the 'existence value' non-users place on the presence of the reef). The methodology focuses instead on three important ecosystem goods and services associated with coral reefs: fisheries, tourism, and shoreline protection services. These services comprise an integral part of many Caribbean economies. The methodology also offers guidance on estimating the wider (indirect) impact on the economy of these resources, the consumer surplus associated with their use, and the potential losses or gains in value associated with changes in ecosystem condition. (WRI, Economic Valuation of Coral Reefs, Methodology v2.1, October, 2007)

Key findings from the Reefs at Risk in the Caribbean Report (Lauretta Burke, Jon Maidens and contributing authors: Mark Spalding, Philip Kramer, Edmund Green, Suzie Greenhalgh, Hillary Nobles, Jonathan Kool, September, 2004) include:

- **Nearly two-thirds of coral reefs in the Caribbean are threatened by human activities.** Integrating threat levels from all sources considered in this analysis (coastal development, watershed-based sediment and pollution, marine based threats, and overfishing), the Reefs at Risk Threat Index identified about one-tenth of Caribbean coral reefs at very high levels of threat, one-third at high threat, one fifth at medium threat, and one-third at low threat.
- **An estimated one-third of Caribbean coral reefs are threatened by coastal development.** This includes sewage discharge, urban runoff, construction, and tourist development.
- **Sediment and pollution from inland sources threaten about one-third of Caribbean coral reefs.** Analysis of more than 3,000 watersheds across the region identified 20 percent of coral reefs at high threat and about 15 percent at medium threat from damage caused by increased sediment and pollution from agricultural lands and other land modification.
- **Marine-based threats to coral reefs are widespread across the Caribbean.** Our indicator of marine-based damage and pollution identified about 15 percent of Caribbean reefs as threatened by discharge of wastewater from cruise ships, tankers and yachts, leaks or spills from oil infrastructure, and damage from ship groundings and anchors.
- **Overfishing threatens over 60 percent of Caribbean coral reefs.** Fishing above sustainable levels affects coral reefs by altering the ecological balance of the reef. The removal of herbivorous fish, which consume algae, facilitates algal overgrowth of corals. Declines in coral cover and increases in algal cover have been observed across the region. This analysis identified about one-third of Caribbean reefs at high threat from overfishing pressure and about 30 percent at medium threat.
- **Diseases and rising sea temperatures threaten to damage coral reefs across the Caribbean region.** Diseases have caused profound changes in Caribbean coral reefs in the past 30 years, with very few areas unscathed by disease, even reefs far removed from human influence. In addition, coral bleaching episodes-the most direct evidence of stress from global climate change on Caribbean marine biodiversity-are on the rise.
- **Ineffective management of protected areas further threatens Caribbean coral reefs.** With the growth of tourism, fisheries, and other development in coral reef areas, marine protected areas (MPAs) are an important tool for safeguarding coral reefs. At present, over 285 MPAs have been declared across the Caribbean, but the level of protection afforded by MPAs varies considerably. The Reefs at Risk Project found only 6 percent of MPAs to be rated as effectively managed and 13 percent as having partially effective management.
- **The coastal communities and national economies of the Caribbean region are poised to sustain substantial economic losses if current trends in coral reef degradation continue.** Coral reefs provide valuable goods and services to support local and national economies, and degradation of coral reefs can lead to significant economic losses, particularly in the coastal areas of developing countries, through loss of fishing livelihoods, malnutrition due to lack of protein, loss of tourism revenues, and increased coastal erosion. Analyses carried out by

the Reefs at Risk project indicate that Caribbean coral reefs provide goods and services with an annual net economic value in 2000 estimated at between US\$3.1 billion and US\$4.6 billion from fisheries, dive tourism, and shoreline protection services.

In addition, IUCN – the International Union for the Conservation of Nature has initiated recommendations to for the development of a tool to grow a Red List of Ecosystems. It will be a global standard for how we assess the status of ecosystems, applicable at local, national, regional and global levels and will complement the IUCN Red List of Threatened Species which is the world’s most comprehensive inventory of the global conservation status of biological species.

The RLE will be used to provide the following:

- **Conservation:** to help prioritize action, for example, in terms of ecosystem restoration and land use practices, and as a means to reward good and improved ecosystem management.
- **Land use planning:** to highlight the risks faced by ecosystems and ecosystem services as important components of land use planning, for example, clean water, maintenance of soil fertility, pollination, and natural products.
- **Improvement of governance and livelihoods:** to link ecosystems services and livelihoods, and explore how appropriate governance methods can improve ecosystem management and livelihood security.
- **Macro-economic planning:** to provide a globally-accepted standard that will enable planners to evaluate the risk and related economic costs of losing ecosystem services, and, conversely, the potential economic benefits of improved management.

## **2. OBJECTIVE**

Ecosystem services are the benefits people obtain either directly or indirectly from ecological systems (Millennium Ecosystem Assessment, 2003, page v.) The process of identifying and quantifying ecosystem services is increasingly recognized as a valuable tool for the efficient allocation of environmental resources (Heal et al., 2005; Millennium Ecosystem Assessment, 2003). By estimating and accounting for the economic value of ecosystem services, social costs or benefits that otherwise would remain hidden can potentially be revealed and vital information that might otherwise remain outside of the economic decision making calculus at local, national, and international scales can be internalized (Millennium Ecosystem Assessment, 2005).

However, achieving such an objective requires considerably better understanding of ecosystem services and the landscapes that provide them. Through four case studies, a framework for the spatial analysis of ecosystem service values (ESVs) will be illustrated. Thanks to the increased ease of using Geographic Information Systems (GIS) and the public availability of high quality land cover data sets (in this case through Google Maps), bio-geographic entities such as forests, wetlands and beaches can now more easily be attributed with the ecosystem services they deliver on the ground.



ReefFix is an Integrated Coastal Zone Management (ICZM) tool that works with SIDS to complete stakeholder analysis and socio-economic valuation with a view towards improving oversight of marine resources to meet commitments made by SIDS to increase coverage and effective management. ReefFix has multi-level linkages that trains participating countries in (i) ecosystem goods and services valuation methodologies (ii) cost effective interventions to improve marine ecosystem health, and (iii) revenue raising techniques of cost recovery and user pays/polluter pays principles. In this process, ReefFix will use and develop cost-effective techniques that can be replicated throughout the wider Caribbean that will include capacity building exercises and a workshop to disseminate preliminary results and disseminate lessons learned and best practices.

In this context, ReefFix offers a valuable opportunity for SIDS to strengthen their coastal zone management through one or more of the five options below:

1. Apply 3 ecosystem services valuation methodologies on fisheries, tourism, or economic productivity/ha/year
2. Cost effective analysis of most efficient interventions such as sewage treatment vs. watershed management, reforestation or solid waste management
3. Green tax: Cost recovery mechanisms such as hotel bed tax or tourism tax (\$1% tax to protect reasons that tourists come.)
4. Policy and legislation necessary for the implementation of a payments for an ecosystem services project
5. System Plan of most representative marine ecosystems to meet Grenada Declaration to put 25 percent of near-shore marine and 25 percent of terrestrial natural resources under effective conservation by 2020 under the Grenada Declaration (Caribbean Challenge)

This activity will address options one and five from the list above for Haiti.

### **3. TASKS**

#### **Summary**

This work is based on the examination of the locations for Haiti's first network of marine protected areas from FoProBiM 2000.

The nine sites recommended for the development of Marine Protected Areas by FoProBiM in 2000 are the targets for this study. These sites include (map):

- Caracol/Ft. Liberté/Lagons aux Boeufs
- Baie de l'Acul
- Gonaives/Grand Saline
- Arcadins
- La Gonave East
- LaGonave West
- Rochelois
- Baraderes/Cayemites
- Ile-a-Vaches/Aquin

In an attempt to estimate the monetary value of the services that ecosystems provide various methods of ecosystem valuation have been designed. Dollar-based valuation systems can include: travel cost, productivity, benefit transfer, and others. The Ecosystem Value Transfer (EVT)/Benefit Transfer Method (BTM) was used for this activity in which values which have already been estimated for similar ecosystems are extrapolated to the study site.

In 2004 an assessment by the World Resources Institute arrived at certain key findings concerning Caribbean reefs. They include:

- Nearly two-thirds of coral reefs in the Caribbean are threatened by human activities
- An estimated one-third of Caribbean coral reefs are threatened by coastal development
- Sediment and pollution from inland sources threaten about one-third of Caribbean coral reefs
- Marine-based threats to coral reefs are widespread across the Caribbean
- Overfishing threatens over 60 percent of Caribbean coral reefs
- Diseases and rising sea temperatures threaten to damage coral reefs across the Caribbean region
- Ineffective management of protected areas further threatens Caribbean coral reefs
- The coastal communities and national economies of the Caribbean region are poised to sustain substantial economic losses if current trends in coral reef degradation continue

With over 1,771km of coastline Haiti remains the only Caribbean nation without any type of coastal and marine managed area. Several areas of Haiti have been identified as areas of interest for the development of Coastal and Marine Protected Areas.

The methodology for the development of these areas as reserves/preserves should certainly include periods for public comment from concerned stakeholders and may end in, in the quickest of circumstances, a presidential decree (Arrêté), and otherwise a significantly longer process ending in parliamentary approval.

### **Statement of Work**

#### **Original:**

Compile necessary data on GIS, maps, ecosystems in and around the marine park, tourism, and fisheries data. Complete the 2 methodologies developed by the World Resources Institute:

<http://www.wri.org/map/marine-protected-areas-world>,  
<http://www.wri.org/project/reefscaribbean>, <http://www.wri.org/project/valuation-caribbean-reefs>, and <http://www.buccooreef.org/economic.html>, and a third methodology called Ecosystem Value Transfer (EVT)/Benefit Transfer Method (BMT).

Due to the lack of available information relating to socio-economic conditions, any type of tourism activities or revenue as well as a total lack of reliable information in regard to fisheries activities which would be required to accomplish the socio-economic portion of the original statement of work for the nine target sites, it was revised to the following:

1. Provide the economic value analysis of coral reefs and mangroves using the values/ha/yr methodology for the nine proposed MPA sites using the (EVT/BMT);
2. Design an action plan with recommendations necessary to establish these areas as marine parks.

### **Methodology**

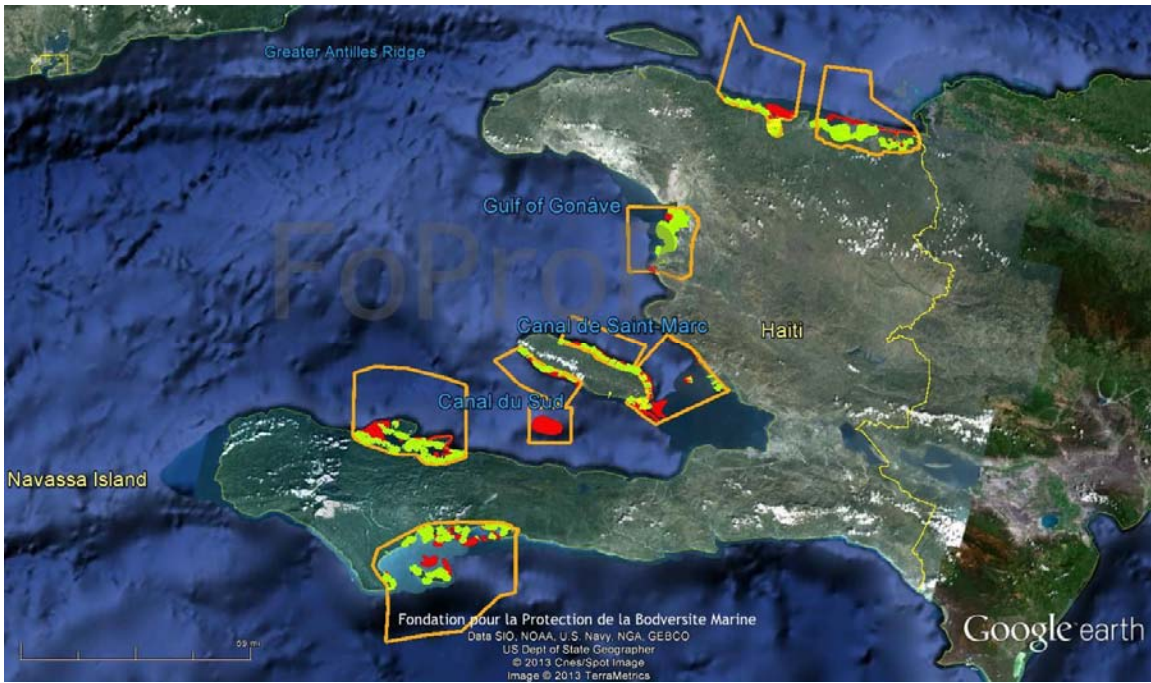
The Ecosystem Value Transfer (EVT)/Benefit Transfer Method (BTM) was used for this activity in which values which have already been estimated for similar ecosystems are extrapolated to the study site.

Maps and tools (path and polygon) from Google Earth Pro where used to estimate ecosystem areas. The latest maps from GE-Pro for the target sites are dated:





### **Economic Valuation of Ecosystem Services Results**

The Ecosystem Value Transfer (EVT)/Benefit Transfer Method (BTM) was used to calculate the estimated value for ecosystem services. In this methodology values which have already been estimated for similar ecosystems are extrapolated to the study site. For this activity, a value of US\$ 20,000 (\$/ha/yr) rate for mangroves, and US\$ 5,000 (\$/ha/yr) rate for coral reefs is used based on a conservative low end average from a high of US\$ 35,000 (\$/ha/yr) for mangroves and US\$ 10,000 (\$/ha/yr) estimated by UNEP.

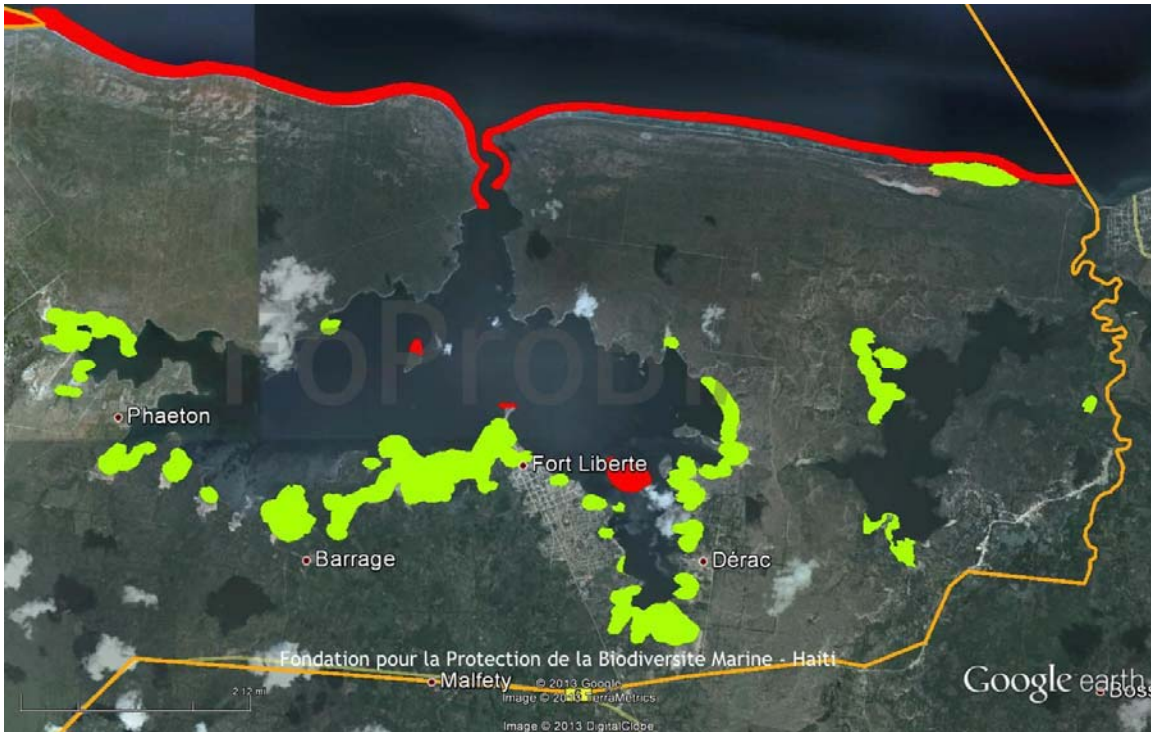
No linear measurements of mangrove only areal.  
No deep water corals.





<b>Caracol</b>			
<b>Ecosystem</b>	<b>Total Area</b>	<b>\$/ha/yr rate</b>	<b>Total</b>
 <b>Mangrove</b>	<b>5,260 ha</b>	<b>\$20,000</b>	<b>\$ 105,200,000</b>
 <b>Coral</b>	<b>900 ha</b>	<b>\$5,000</b>	<b>\$ 4,500,000</b>
 <b>Seagrass</b>			
<b>Total value of ecosystem services</b>			<b>US\$ 109,700,000</b> <i>(does not include seagrass beds)</i>
 <b>Total - MPA Site</b> <i>(mangroves/coral reefs/seagrass)</i>	<b>13,300 ha</b>		









<b>Ft. Liberté/Lagons aux Boeufs</b>			
<b>Ecosystem</b>	<b>Total Area</b>	<b>\$/ha/yr rate</b>	<b>Total</b>
Mangrove	Ft. Liberté	\$20,000	\$ 5,140,000
	Lagons aux Boeufs		\$ 840,000
Coral	Ft. Liberté	\$5,000	\$ 1,015,000
	Lagons aux Boeufs		\$ 0
Seagrass			
<b>Total value of ecosystem services</b>			<b>US\$ 6,995,000</b> <i>(does not include seagrass beds)</i>
<b>Total - MPA Site</b> <i>(mangroves/coral reefs/seagrass)</i>			

Total MPA site (Caracol/Ft. Liberté/Lagons aux Boeufs) = 13,300 + XXXXX = 96,780 ha



<b>Baie de l'Acul</b>			
<b>Ecosystem</b>	<b>Total Area</b>	<b>\$/ha/yr rate</b>	<b>Total</b>
<span style="color: green;">■</span> Mangrove	879 ha	\$20,000	\$17,580,000
<span style="color: red;">■</span> Coral	2,322 ha	\$5,000	\$11,610,000
<span style="color: yellow;">■</span> Seagrass	ha		
<b>Total value of ecosystem services</b>		<b>US\$ 29,190,000</b> <i>(does not include seagrass beds)</i>	
<span style="color: orange;">■</span> <b>Total - MPA Site</b> <i>(mangroves/coral reefs/seagrass)</i>	<b>71,330 ha</b>		

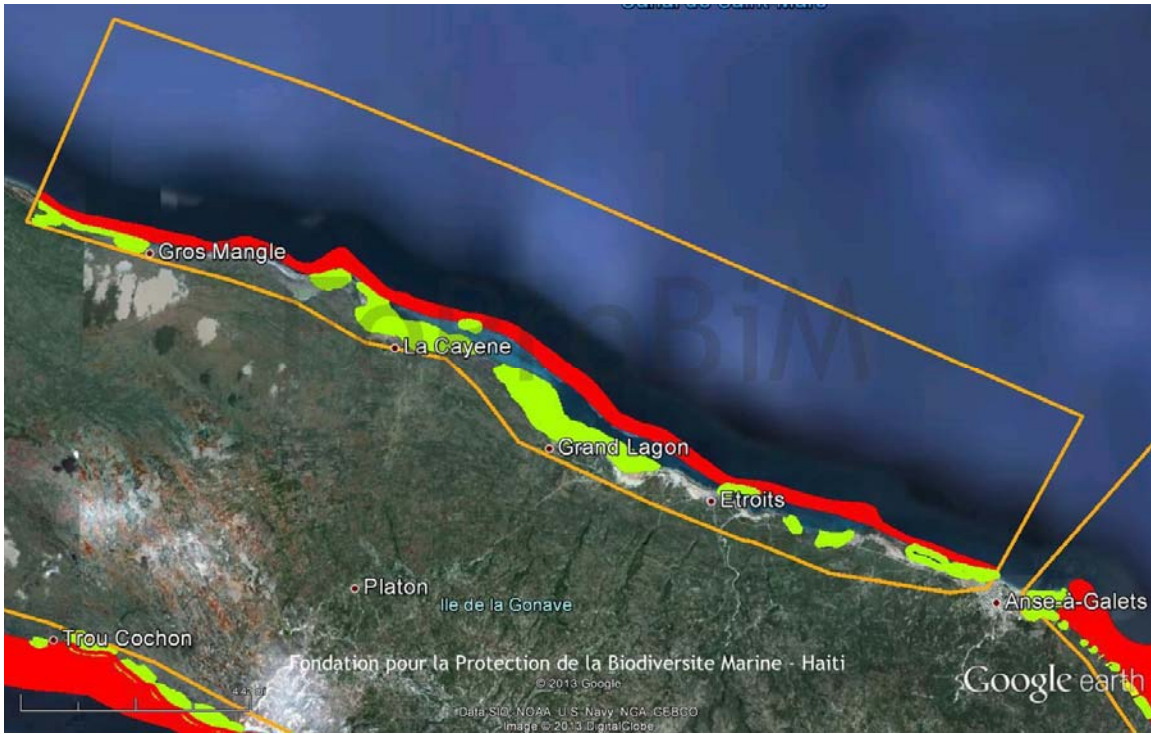






<b>Gonaives/Grande Saline</b>			
<b>Ecosystem</b>	<b>Total Area</b>	<b>\$/ha/yr rate</b>	<b>Total</b>
 <b>Mangrove</b>	<b>8,160 ha</b>	<b>\$20,000</b>	<b>\$ 163,200,000</b>
 <b>Coral</b>	<b>34 ha</b>	<b>\$5,000</b>	<b>\$ 170,000</b>
 <b>Seagrass</b>	<b>ha</b>		
<b>Total value of ecosystem services</b>			<b>US\$ 163,370,000</b> <i>(does not include seagrass beds)</i>
 <b>Total - MPA Site</b> (mangroves/coral reefs/seagrass)	<b>86,068 ha</b>		

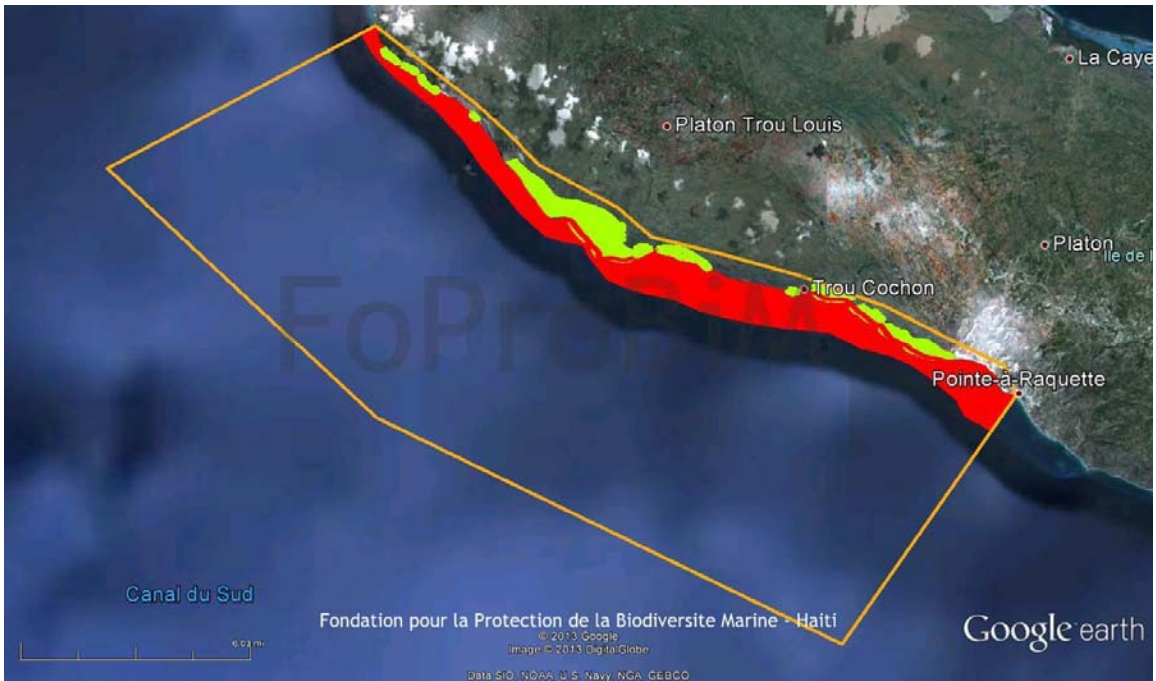








Arcadins			
Ecosystem	Total Area	\$/ha/yr rate	Total
Mangrove	475 ha	\$20,000	\$ 9,500,000
Coral	4,700 ha	\$5,000	\$ 23,500,000
Seagrass	ha		
<b>Total value of ecosystem services</b>		<b>US\$ 33,000,000</b> <i>(does not include seagrass beds)</i>	
<b>Total - MPA Site</b> (mangroves/coral reefs/seagrass)	<b>78,600 ha</b>		



<b>La Gonave East</b>				
<b>Ecosystem</b>	<b>Total Area</b>	<b>\$/ha/yr rate</b>	<b>Total</b>	
	<b>Mangrove</b>	<b>565 ha</b>	<b>\$20,000</b>	<b>\$ 11,300,000</b>
	<b>Coral</b>	<b>845 ha</b>	<b>\$5,000</b>	<b>\$ 4,225,000</b>
	<b>Seagrass</b>	<b>ha</b>		
<b>Total value of ecosystem services</b>			<b>US\$ 15,525,000</b>	<b>(does not include seagrass beds)</b>
	<b>Total - MPA Site</b> (mangroves/coral reefs/seagrass)	<b>37,380 ha</b>		



<b>La Gonave West</b>			
<b>Ecosystem</b>	<b>Total Area</b>	<b>\$/ha/yr rate</b>	<b>Total</b>
 <b>Mangrove</b>	<b>520 ha</b>	<b>\$20,000</b>	<b>\$ 10,400,000</b>
 <b>Coral</b>	<b>2,880 ha</b>	<b>\$5,000</b>	<b>\$ 14,400,000</b>
 <b>Seagrass</b>	<b>ha</b>		
<b>Total value of ecosystem services</b>		<b>US\$ 24,800,000</b> <i>(does not include seagrass beds)</i>	
 <b>Total - MPA Site</b> <i>(mangroves/coral reefs/seagrass)</i>	<b>37,830 ha</b>		



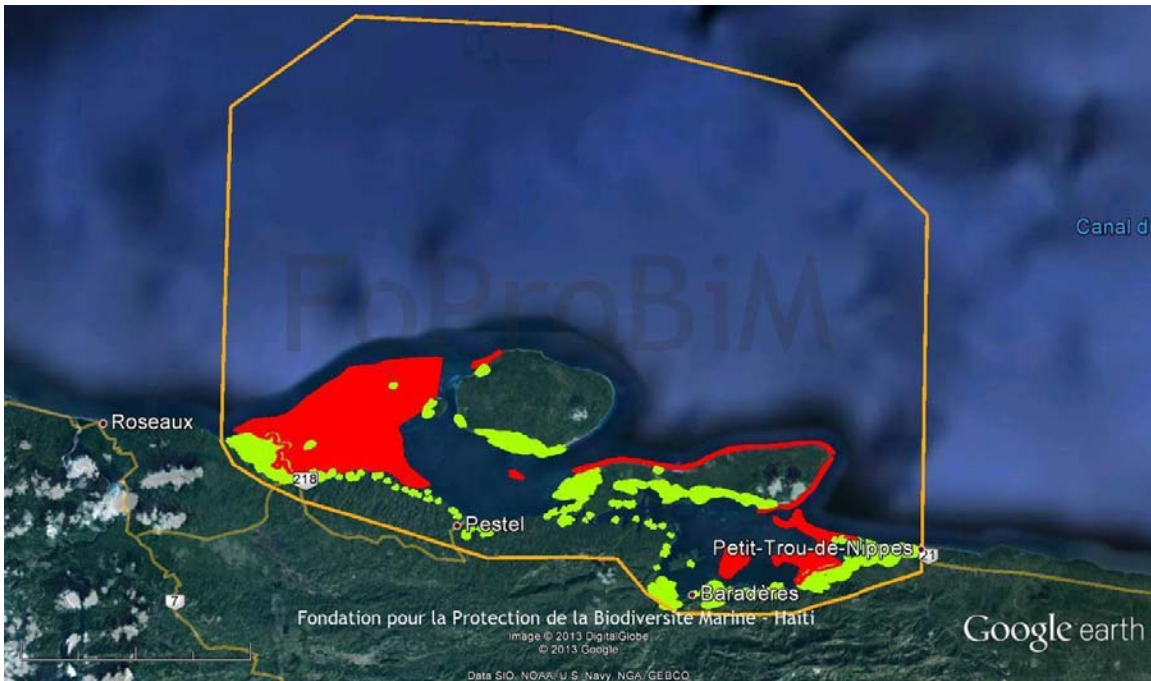
North border - N18<sup>0</sup>42'





East border - W73<sup>0</sup>06'

South border - N18<sup>0</sup>34'

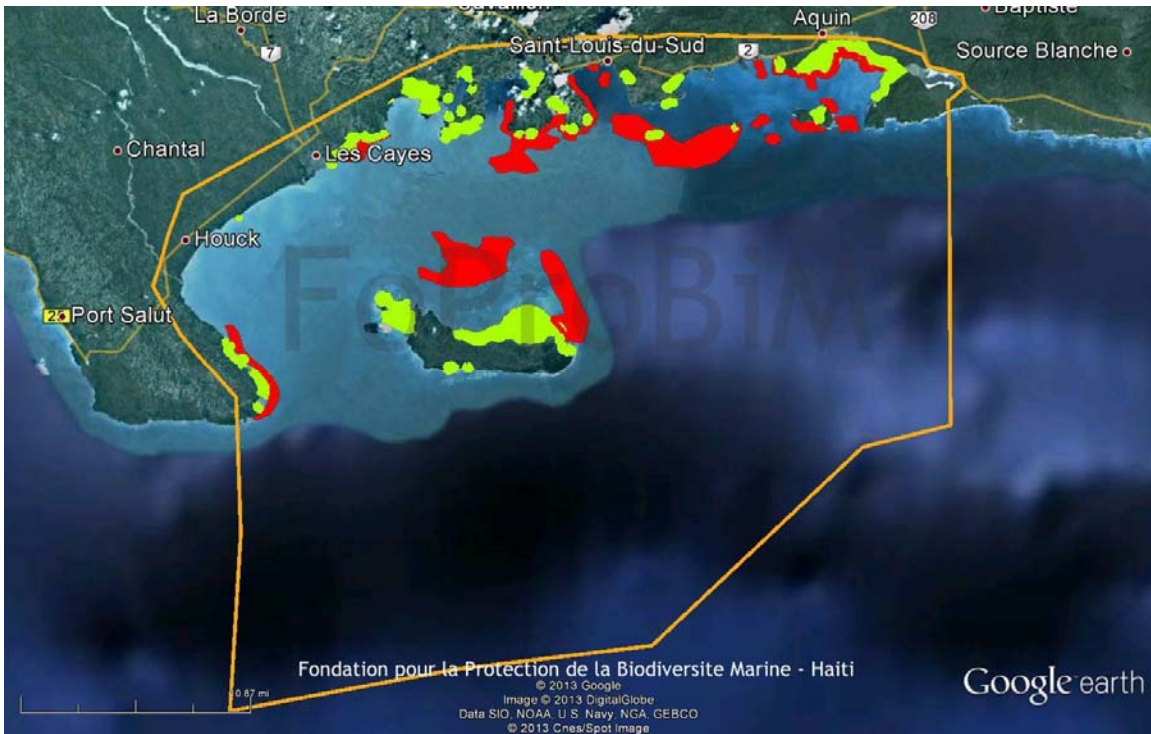
West border - W73<sup>0</sup>16'




Rochelois			
Ecosystem	Total Area	\$/ha/yr rate	Total
Mangrove	0 ha	\$20,000	\$ 0
Coral	5,720 ha	\$5,000	\$ 28,600,000
Seagrass			
Total value of ecosystem services			US\$ 28,600,000 <i>(does not include seagrass beds)</i>
<b>Total - MPA Site</b> <small>(mangroves/coral reefs/seagrass)</small>	<b>24,600 ha</b>		



<b>Baraderes/Cayemites</b>				
<b>Ecosystem</b>	<b>Total Area</b>	<b>\$/ha/yr rate</b>	<b>Total</b>	
	<b>Mangrove</b>	<b>2,050 ha</b>	<b>\$20,000</b>	<b>\$ 41,000,000</b>
	<b>Coral</b>	<b>7,285 ha</b>	<b>\$5,000</b>	<b>\$ 36,425,000</b>
	<b>Seagrass</b>			
<b>Total value of ecosystem services</b>			<b>US\$ 77,425,000</b>	
			<i>(does not include seagrass beds)</i>	
	<b>Total - MPA Site</b> (mangroves/coral reefs/seagrass)	<b>152,300 ha</b>		





<b>Ile-a-Vaches/Aquin</b>			
<b>Ecosystem</b>	<b>Total Area</b>	<b>\$/ha/yr rate</b>	<b>Total</b>
	<b>Mangrove</b>	<b>2,309 ha</b>	<b>\$ 20,000</b>
	<b>Coral</b>	<b>5,520 ha</b>	<b>\$ 5,000</b>
	<b>Seagrass</b>		
<b>Total value of ecosystem services</b>			<b>US\$ 73,780,000</b> <i>(does not include seagrass beds)</i>
<b>Total - MPA Site</b> <i>(mangroves/coral reefs/seagrass)</i>		<b>214,690 ha</b>	



Total recommended MPA site sizes

	<b>Site</b>	<b>Total Area (ha)</b>
<b>1</b>	Ile-a-Vaches/Aquin	214,690
<b>2</b>	Baraderes/Cayemites	152,300
<b>3</b>	Caracol*	96,790*
<b>4</b>	Ft. Liberté/Lagons aux Bœufs*	96,790*
<b>5</b>	Gonaives/Grande Saline	86,068
<b>6</b>	Arcadins	78,600
<b>7</b>	Baie de l'Acul	71,330
<b>8</b>	La Gonave West	37,830
<b>9</b>	La Gonave East	37,380
<b>10</b>	Rochelois	24,600
	<b>Total</b>	<b>799,588</b>

\*Caracol, Ft. Liberté, Lagons aux Boeufs are combined into potentially one MPA.

Total value of ecosystem services by site (mangroves and coral reefs):

	<b>Site</b>	<b>Total Area (ha)</b>	<b>Total (\$)</b>
<b>1</b>	Gonaives/Grande Saline	86,068	163,370,000
<b>2</b>	Caracol	96,790*	109,700,000
<b>3</b>	Baraderes/Cayemites	152,300	77,425,000
<b>4</b>	Ile-a-Vaches/Aquin	214,690	73,780,000
<b>5</b>	Arcadins	78,600	33,000,000
<b>6</b>	Baie de l'Acul	71,330	29,190,000
<b>7</b>	Rochelois	24,600	28,600,000
<b>8</b>	La Gonave West	37,830	24,800,000
<b>9</b>	La Gonave East	37,380	15,525,000
<b>10</b>	Ft. Liberté/Lagons aux Boeufs	96,790*	6,995,000
	<b>Total</b>		<b>\$ 562,385,000</b>



Social, Economic, Environmental – Non-Bio, Environmental Bio, Tragedy of the Commons, Climate Change eg turtles, Invasives, Google, Ocean planning, marine spatial planning, red list of ecosystems,

Tourism, mangroves, coral reefs, seagrasses, mud flats, habitation (cities, villages, shipping, rivers/streams sedimentation, fishing, pollution, endangered species,

Management: pollution, coral reefs, seagrasses, mud flats, sand flats, fishing, endangered species

Threats: coral harvesting, mangroves, shipping, Oil spills, overfishing, POPs,

Natural capital, ocean acidification, sea level rise, climate change,

Tourism within zone

Ecosystem sized approaches to management problems, connectivity, ocean planning, CCCCC, sound issues, sea level rise

Assessment of community needs

Leadership development

Stakeholder support and understanding

Financial viability

Community Sustainability

Infrastructure stability

Strategic business plan

Community engagement

## **Considerations for the Creation of a Marine Protected area at XXX, Haiti**

Many considerations must be addressed when deciding on the designation of a site or sites as Coastal and Marine Protected Areas (marine preserves/reserves or marine protected areas). Among these are:

- Where it should be located and why (e.g. beaches, biodiversity, tourism corals, or any combination of factors)
- Its size
- Its possible interlinking with other reserves (both terrestrial or marine)

Other aspects which must be taken into consideration include:

- Public sector support
- Private sector support
- What type of enforcement regime will be implemented
- What type of zoning will be implemented
- Who will benefit
- Who may lose
- Sustainability (financial)
- Stakeholder involvement
- Mechanisms for mediating potential conflicts
- Scientific

For the XXXX area the most directly concerned fishing communities are :

- 1
- 2
- 3
- Etc.

The most directly implicated Government entities are:

- Ministry of Environment
- Ministry of Agriculture – Fisheries and Forest Services
- Ministry of Planification and External Cooperation
- Ministry of Justice – (regular police and coast guard)
- Office of the Prime Minister
- Local government offices of the Department of XXX

The most directly concerned private sector entities are:

- Association Hôtelier et Touristique d’Haïti
- Association Hôtelier et Touristique d’Haïti
- Individual hotels
- Chambre de commerce

- Concerned fisher's associations
- Environmental/Developmental NGOs working in the area

Recommended steps towards the creation of MPAs in Haiti:

- 1) Determination of need (why)
- 2) Consultations with public and private sector to determine the support level for the creation of a marine reserve
- 3) Initial survey for the preliminary outline of the reserve
- 4) Consultations with public and private sector to determine approval for outline
- 5) Designation of site either through:
  - Presidential Decree (Arrêté), or
  - Parliamentary approved law (much more difficult and a much longer process)
- 6) Establish internal zoning as needed according to a classification system (e.g. IUCN)
- 7) Establish management regime and responsibilities

**Proposed Presidential Decree (Arrêté) for the creation of the**  
**« Parc de XXX »**

Vu les Articles 36, 36-1, 36-5, 52-1.h, 136, 138, 215, 253, 254, et 256 de la Constitution ;

Vu la Loi du 6 juin 1963 établissant les règles spéciales relatives à l'habitation et à l'aménagement des villes et des campagnes en vue de développer l'urbanisme ;

Vu le décret du 18 mars 1968 dénommant "Parcs Nationaux ou Sites Naturels " toutes étendues de terres boisées ou pas sur lesquelles sont établis des monuments historiques ou sites naturels" ;

Vu le décret du 27 Octobre 1978 sur la pêche ;

et toute autre loi, arrêté, ou décret qui pourrait être applicable ;

Considérant que l'Etat Haïtien exerce sa souveraineté sur les eaux nationales, sur le plateau continental, la zone contigüe, la zone économique exclusive, sur les sous-sols marins et fluviaux.

Considérant qu'il lui échoit l'obligation d'organiser et de réglementer la protection et l'exploitation de la faune et de la flore qui y croissent;

Considérant que la rationalisation de l'exploitation des ressources biologiques aquatiques exige la protection de la faune et de la flore maritimes et fluviales, le contrôle des méthodes de capture et des engins utilisés, ainsi que celui de la pression de pêche face au stock disponible.

Considérant que l'érosion de plus en plus accentuée du sol des régions montagneuses constitue un très grave danger pour l'avenir du pays;

Considérant que le site désormais dénommé Parc de Caracol est d'une importance majeure pour l'environnement naturel d'Haïti par ses richesses biologiques, historiques, culturelles, et scientifiques et qu'il incombe à l'Etat d'en assurer la protection et la préservation;

Considérant qu'il convient de déclarer le site désormais dénommé Parc de Caracol Zone Réservée;

Sur le rapport des Ministres de l'Environnement, du Tourisme, de l'Agriculture des Ressources Naturelles et le Développement Rural, et de la Planification et après délibération en Conseil des Ministres.

## Arrêté

### **Article 1.-**

Est déclarée Zone Réservée la zone désormais dénommée Parc de XXX délimitée par le littoral et haute mer suivant les coordonnées GPS : Pin (1) XXXN, XXXW; Pin (2) XXXN, XXXW; Pin (3) XXXN, XXXW; Pin (4) XXXN, XXXW.

Cette zone comprend :

tous les mangliers situés à l'intérieur ou adjacents à cette zone y compris une zone de tampon de 25 mètres autour des mangliers ;

tous les récifs ;

toutes les îles ou ilots ;

tous les herbiers ;

tous les étangs séparés de la mer par moins de 100 mètres de terre ;

toutes les épaves ;

toute forme biologique ;

le fonds marin ;

et toutes les formes et structures naturelles ou créées par l'homme.

Cette zone comprend toute zone décrite comme plage ou littoral et, le cas échéant, s'étant jusqu'au niveau de la marée haute de la mer.

Le Parc de XXX est déclaré Zone Réservée en vue de la mise en place de différentes zones de gestion visant 1) la protection de l'environnement 2) la protection de la biodiversité 3) le développement durable du tourisme 4) l'exploitation durable des ressources côtières, marines, et autres, spécifiquement les ressources de pêche 5) l'aménagement durable des villes et des campagnes.

### **Article 2.-**

Tous les droits de propriété dans cette zone seront respectés. Toute activité et tout développement dans cette zone ou dans les zones adjacentes ne devront en aucun cas aller à l'encontre des stipulations de l'Article 1 susmentionné.

**Article 3.-**

Un comité composé de membres du secteur publique et privé sera mis en place et sera chargé de la surveillance et de la gestion durable de cette zone.

**Article 4.-**

Le présent Arrêté sera publié et exécuté à la diligence des Ministres de l'Environnement, du Tourisme, de l'Agriculture des Ressources Naturelles et du Développement Rural, et de la Planification, chacun en ce qui le concerne.

Donné au Palais National, à Port-au-Prince, le \_\_\_\_\_ 20XX, An XXX de l'Indépendance.

Par le Président

Le Premier Ministre

Le Ministre de l'Environnement

Le Ministre du Tourisme

Le Ministre de l'Agriculture, des Ressources Naturelles et du Développement Rural

Le Ministre de la Planification