



**CARIBBEAN NATURAL RESOURCES INSTITUTE  
(CANARI)**

**CHARACTERIZATION OF CARIBBEAN MARINE  
PROTECTED AREAS: AN ANALYSIS OF ECOLOGICAL,  
ORGANIZATIONAL,  
AND SOCIO-ECONOMIC FACTORS**

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## **1. TERMS OF REFERENCE**

This characterization study of Caribbean marine protected areas (MPAs) forms one component of a larger study, *Institutional evaluation of Caribbean MPAs and opportunities for pro-poor management*, which is being carried out by MRAG Ltd. under the framework of the Natural Resources Systems Programme of the United Kingdom Department for International Development. The characterization study was carried out by the Caribbean Natural Resources Institute (CANARI) through a Memorandum of Understanding between CANARI and MRAG Ltd.

According to the Memorandum of Understanding, CANARI's responsibility was the review and characterisation of existing MPAs in the region, including degree of integration with wider coastal zone management, from literature and primary data collection. Based on that review, CANARI was to produce a report for the project team to review, and to finalize with the team's comments.

The geographic scope for the study was originally defined as All SIDS [small island developing states] and larger island states... from two biogeographic zones of the Wider Caribbean: the Central Caribbean and Lesser Antilles, as well as Belize (Kenward personal communication). At the request of MRAG Ltd., the study was subsequently expanded to include the Turks and Caicos Islands.

A total of 36 persondays were allocated in the MOU between CANARI and MRAG Ltd. for the study, which commenced in March 2001. According to the initial agreement, the study was to have been completed by the end of June 2001; however the schedule was twice amended. In response to a request from MRAG, CANARI submitted the preliminary results of its data collection at the end of May, in order to facilitate the selection of case studies to be used in subsequent phases of the larger project. Following the request to include the Turks and Caicos Islands in the study, the date of completion was extended by mutual agreement to 31 July 2001.

## **2. METHOD**

The basis of the study was detailed surveys of all protected areas within the geographic scope of the project that met the following criteria:

- at least a portion of the total area was marine
- they were legally established or were in the process of being legally established and had active, recognized management
- they had park-like management objectives (i.e., objectives that imply a variety of

human uses and benefits rather than a single limited purpose such as a wildlife refuge)

To prepare a working list of areas meeting these criteria, a review was undertaken of previous surveys, including OAS 1998, IUCN n.d., Kelleher *et al.* 1995, and ESI 1998.

A survey instrument was then developed to capture basic information on the ecological, institutional, socio-economic, and management aspects of individual MPAs. A small sample of MPAs was used to test and refine the survey form. The final version of the form is attached at Appendix A.

An extensive literature review was conducted to collect information for the survey forms. Both published and gray literature, much of it from CANARI's own library, was consulted, and internet searches were also carried out. Over eighty references were identified and reviewed. This search resulted in the identification of areas that had not been included during the initial phase of the study, as well as in the elimination of areas that did not meet the study's criteria.

The literature review rather than interviews with MPA managers and other informants was used as the initial source of data for several reasons. First, the literature contains a substantial body of information, some of which might not be immediately available to informants. Second, agencies responsible for the management of MPAs in the Caribbean tend to be short-staffed and overextended, and managers have little time to devote to assisting the work of others. Finally, for those MPAs with little or no management, appropriate informants were not always easily identified.

Following the literature review, the authors, with the assistance of colleagues, developed the data base further. Consultant Patricia Lamelas undertook the data collection for the Dominican Republic. The Centro Nacional de Areas Protegidas in Cuba very kindly provided the services of its Planner, Enrique Hernandez, to complete the survey forms for Cuban MPAs. CANARI staffperson Exinilda Castro coordinated the completion of the survey forms for the United States Virgin Islands, and Yves Renard assisted with the completion of the forms for the French Antilles. The authors divided responsibility for collecting the remaining data as follows: Geoghegan: Barbados, British Virgin Islands, French Antilles, Netherlands Antilles, Turks and Caicos

Smith: Antigua and Barbuda, Dominica, Grenada, St. Lucia, St. Vincent and the Grenadines, Trinidad and Tobago

Thacker: Belize, Cayman Islands, Jamaica

For each MPA in the survey, key informants, generally either the MPA manager or a staff person in the relevant management agency, were either sent the partially completed survey forms to review, correct, and complete, or were interviewed by telephone. In some cases, it was necessary to gather information from two or more informants. These informants are named in the Acknowledgements section of this paper. In several cases, these informants identified additional MPAs that had not been discovered through the literature reviews.

The survey forms, organized by country, form a supplement to this paper.

Once all available information had been collected through the literature review and key



informants, it was compiled into a series of tables summarizing the management status, resource characteristics, institutional and management characteristics, and user community characteristics of the MPAs surveyed. The data were then analysed and synthesized into draft findings, which were sent to the MRAG project team and its partners at the University of the West Indies for review. This final report incorporates the comments received.

### **3. FINDINGS**

Seventy-five MPAs were identified in seventeen insular countries and territories of the Lesser Antillean and Central Caribbean biographic zones, plus Belize and the Turks and Caicos (see Table 1). All countries and territories in the survey region have at least one MPA except the following:

- Anguilla (several proposed but not established)
- Haiti (one proposed in the 1990s but never established)
- Montserrat
- Puerto Rico (one proposed in the 1990s but not established).

#### **3.1 Biogeographic and resource characteristics**

The region 's MPAs include samples of most major marine and coastal ecosystem types represented in the Lesser Antilles and Central Caribbean biogeographic zones, with the three major coastal ecosystem types (coral reefs, mangroves, and seagrass beds) particularly well-represented (see Table 2). The great majority of MPAs are coastal or nearshore, reflecting objectives related to coastal zone management. Approximately 70% of MPAs also include a terrestrial component, though in some cases this consists only of small offshore islands or cays.

##### **3.1.1 Coral reefs**

Reef ecosystems of various types are found in at least 80% of the region 's MPAs. Often these systems are described as exceptionally extensive or pristine in national terms. They also often coincide with economically important recreational dive sites. The reefs in many MPAs (e.g., Buccoo Reef Marine Park in Tobago, Negril Marine Park in Jamaica, Soufriere Marine Management Area - SMMA - in St. Lucia) are considered to have been degraded by human impacts including overfishing, sedimentation from land-based development, land-based nutrient pollution, and anchoring. Zoning and regulations are often justified as a means to halt or reverse such degradation. In promotional literature, coral reefs are the most frequently cited attractions of the region 's MPAs.

##### **3.1.2 Mangroves**

Recognition of the need to conserve mangrove ecosystems is evident by the frequency in which they occur in MPAs (at least two-thirds of MPAs include mangrove areas, some of which are extensive).

**Table 1**  
**Marine Protected Areas of the Lesser Antilles and Central Caribbean,**  
**Including Belize**

Country	Protected Area	Year Established*	Active Management?
Antigua and Barbuda	Cades Bay Marine Park	1999	No**
	Diamond Reef Marine Park	1973	No
	Palaster Reef Marine Park	1973	No
Barbados	Folkestone Park and Marine Reserve	1981	Yes
Belize	Bacalar Chico Marine Reserve and National Park	1996	Yes
	Blue Hole Natural Monument	1996	Yes
	Caye Caulker Marine and Forest Reserve	1998	Yes
	Gladden Spit/Silk Cayes Marine Reserve	2000	Yes
	Glovers Reef Marine Reserve	1993	Yes
	Half Moon Cay Natural Monument	1982	Yes
	Hol Chan Marine Reserve	1987	Yes
	Laughing Bird Caye National Park	1996	Yes
	Port Honduras Marine Reserve	2000	Yes
	Sapodilla Cayes Marine Reserve	1996	Yes
South Water Caye Marine Reserve	1996	Yes	
British Virgin Islands	Wreck of RMS Rhone Marine Park	1980	Yes
Cayman Islands	National System of Marine Parks	1986	Yes
Cuba	Elemento Natural Destacado Ojo de Megano	Proposed	Yes
	Parque Nacional Caguanes	1966	Yes
	Parque Nacional Guanacabibes	2001	Yes
	Parque Nacional Jardines de la Reina	?	Yes
	Parque Nacional Los Caimanes	Proposed	Yes
	Parque Nacional Punta Frances	1996	Yes
	Parque Nacional San Felipe - Los Indios	Proposed	Yes
	Refugio de Fauna Cayos de Ana Maria	1992	No
	Refugio de Fauna Cayos Cantiles-Avalos-Rosario	1986	No
	Refugio de Fauna Las Picuas	2001	Yes
	Refugio de Fauna Lanzanillo	2001	Yes
	Refugio de Fauna de Río Maximo	1992	No
	Reserva Ecologico Cayo Largo	1998	No
	Reserva Ecologica Maternillo-Tortugilla	?	No
	Reserva Ecologico Varahicaco Galindo	?	Yes
Dominica	Cabrils National Park	1987	No
	Soufriere/Scotts Head Marine Reserve	2000/2001	Yes
Dominican Republic	Area Nacional de Recreo Cayo Levantado	1996	No
	Area Nacional de Recreo Playa de Andres de Boca Chica	1996	No
	Monumento Natural Isla Catalina	1995	No
	Parque Nacional Cabo Cabron	1996	No
	Parque Nacional del Este	1975	Yes
	Parque Nacional Jaragua	1986	Yes
	Parque Nacional Los Haitises	1976	Yes

Country	Protected Area	Year Established*	Active Management?
Dominican Republic (con't)	Parque Nacional Montecristi	1986	No
	Parque Nacional Submarino La Caleta	1986	Yes
	Reserva Biologica Humedales del Bajo Yuna, El Barracote y Gran Estero	1996	No
	Santuario de Mamiferos Marinos de la Republica Dominicana	1977	Yes
French Antilles	Reserve Naturelle du Grand Cul de Sac Marin	1987	Yes
	Reserve Ilets Pigeon	1989*	Yes
	St. Barths Marine Reserve	1996	Yes
	Reserve Naturelle de St. Martin	1998	No**
Grenada	Moliniere/Beausejour Marine Protected Area	1999	Yes
	Woburn/Clarks Court Bay Marine Protected Area	1999	Yes
Jamaica	Montego Bay Marine Park	1992	Yes
	Negril Marine Park	1995, 1998***	Yes
	Ocho Rios Marine Park	1999	No
	Portland Bight Protected Area	1999	No
Netherlands Antilles	Bonaire National Marine Park	1979	Yes
	Curacao Underwater Park	1983*	Yes
	Saba Natrional Marine Park	1987	Yes
	St. Eustatius Marine Park	1996	Yes
	St. Maarten Marine Park	1997*	Yes
St. Lucia	Canaries-Anse La Ray Marine Management Area	2000	Yes
	Maria Islands Nature Reserve	1982	Yes
	Soufriere Marine Management Area	1995	Yes
St. Vincent and the Grenadines	Tobago Cays Marine Park	1997	Yes
Trinidad and Tobago	Buccoo Reef Marine Park	1973	Yes
Turks and Caicos Islands	Admiral Cockburn Land and Sea Park	1992	Yes
	Chalk Sound National Park	1992	No
	Columbus Landfall Marine National Park	1992	Yes
	Fort George Land and Sea Park	1992	Yes
	Grand Turk Cays Land and Sea Park	1992	Yes
	Northwest Caicos Marine Park	1992	Yes
	Princess Alexandra National Park	1992	Yes
	West Caicos Marine Park	1992	Yes
U.S. Virgin Islands	Buck Island Reef National Monument	1961	Yes
	Virgin Islands National Park	1956	Yes

\* Not legally established, date indicates when active management began

\*\* Active management expected to begin shortly

\*\*\* Active management began three years before legal establishment

Table 2  
Resource Characteristics

Country	Protected Area	Reefs	Mangroves	Seagrass beds	Terrestrial Component	Soley Marine	Endangered species
Antigua and Barbuda	Cades Bay Marine Park	Shallow	X	X	X		
	Diamond Reef Marine Park	Shallow bank and patch				X	
	Palaster Reef Marine Park	Shallow patch				X	Nesting turtles
Barbados	Folkestone Park and Marine Reserve	Fringing patch and bank	X		X		
Belize	Bacalar Chico Marine Reserve and National Park	Barrier	X		X		Nesting turtles
	Blue Hole Natural Monument	Reef flat, blue hole				X	
	Caye Caulker Marine and Forest Reserve	X	X	X	X		
	Gladden Spit/Silk Cayes Marine Reserve	X				X	Grouper spawning
	Glovers Reef Marine Reserve	Atoll	X	X		X	Grouper spawning
	Half Moon Cay Natural Monument	Fringing			X	Cays	Red-footed boobies
	Hol Chan Marine Reserve	Barrier	X	X		X	
	Laughing Bird Caye National Park	Faroe				Cays	Seabirds
	Port Honduras Marine Reserve	X	X		X		Manatees, turtles
	Sapodilla Cayes Marine Reserve	Barrier				Cays	Hawksbill turtles
South Water Caye Marine Reserve	Barrier				Cays		
British Virgin Islands	Wreck of RMS Rhone Marine Park	Fringing		X	Cay		Seabird nesting
Cayman Islands	National System of Marine Parks	Extensive	X	X	X		
Cuba	Elemento Natural Destacado Ojo de Megano	Blue hole				X	
	Parque Nacional Caguanes				X		
	Parque Nacional Guanacabibes	Extensive	X		X		
	Parque Nacional Jardines de la Reina	Extensive			X		Manatees
	Parque Nacional Los Caimanes	Extensive			Cays		Nesting seabirds
	Parque Nacional Punta Frances				X		
	Parque Nacional San Felipe - Los Indios	X	X	X	Cays		Various
	Refugio de Fauna Cayos de Ana Maria		X		Cays		
	Refugio de Fauna Cayos Cantiles-Avalos-Rosario	X			Cays		
	Refugio de Fauna Las Picuas				X		Flamingos
	Refugio de Fauna Lanzanillo				Cays		Manatees
	Refugio de Fauna de Rio Maximo		X		X		Flamingos
	Reserva Ecologico Cayo Largo				X		
	Reserva Ecologica Maternillo-Tortugilla	X	X	X	X		Various
Reserva Ecologico Varahicaco Galindo				X		Turtles	
Dominica	Cabrits National Park	X			X		
	Soufriere/Scotts Head Marine Reserve	X				X	
Dominican Republic	Area Nacional de Recreo Cayo Levantado				X		Nesting seabirds
	Area Nacional de Recreo Playa de Andres de Boca Chica	X		X	X		
	Monumento Natural Isla Catalina	X	X	X	Offshore island		
	Parque Nacional Cabo Cabron				X		
	Parque Nacional del Este		X	X	X		Turtles, manatees

Country	Protected Area	Reefs	Mangroves	Seagrass beds	Terrestrial Component	Soley Marine	Endangered species
Dominican Republic	Parque Nacional Jaragua	X			X		Turtles, flamingos
	Parque Nacional Los Haitises		X		X		Turtles, seabirds
	Parque Nacional Montecristi	X	X	X	X		Turtles, manatees
	Parque Nacional Submarino La Caleta	X				X	
	Reserva Biologica Humedales del Bajo Yuna, El Barracote y Gran Estero		X		X		
	Santuario de Mamiferos Marinos de la Republica Dominicana	X		X		X	Humpback whales
French Antilles	Reserve Naturelle du Grand Cul de Sac Marin	X	Extensive	X	Cays		
	Reserve Ilets Pigeon	Diverse			Cays		
	St. Barths Marine Reserve	X				X	
	Reserve Naturelle de St. Martin	X	X	X	X		
Grenada	Moliniere/Beausejour Marine Protected Area	X			X		
	Woburn/Clarks Court Bay Marine Protected Area	X			X		
Jamaica	Montego Bay Marine Park	X	X	X		X	
	Negril Marine Park	X	X	X		X	
	Ocho Rios Marine Park	X	X			X	
	Portland Bight Protected Area	X	X	X	X		
Netherlands Antilles	Bonaire National Marine Park	X	X	X		X	
	Curacao Underwater Park	X				X	
	Saba National Marine Park	X				X	
	St. Eustatius Marine Park	X				X	
	St. Maarten Marine Park	X	X	X	X		
St. Lucia	Canaries-Anse la Ray Marine Management Area	X			X		
	Maria Islands Nature Reserve	X		X	Cays		Seabirds
	Soufriere Marine Management Area	X				X	
St. Vincent and the Grenadines	Tobago Cays Marine Park	X			Cays		
Trinidad and Tobago	Buccoo Reef Marine Park	Extensive	Extensive	X		X	
Turks and Caicos Islands	Admiral Cockburn Land and Sea Park	X			X		
	Chalk Sound National Park				X		
	Columbus Landfall Marine National Park	Fringing			X		
	Fort George Land and Sea Park	X			Cay		Seabirds
	Grand Turk Cays Land and Sea Park	X			X		Nesting seabirds
	Northwest Caicos Marine Park	X	X	X		X	
	Princess Alexandra National Park	X			X		
West Caicos Marine Park	X				X		
U.S. Virgin Islands	Buck Island Reef National Monument	X		X	Offshore island		Turtles
	Virgin Islands National Park	X	X	X	X		

### **3.1.3 Seagrass beds**

Seagrass beds are the least represented (or the least often mentioned) of the major coastal ecosystems. Unlike coral reefs and mangroves, they do not appear to be a factor in the decision to establish MPAs or in the determination of their boundaries.

### **3.1.4 Endangered species**

A few MPAs have been established for the express purpose of protecting endangered species (e.g., Refugio de Fauna Las Picuas in Cuba, Santuario de Mamiferos Marinos in the Dominican Republic). A number of other MPAs protect turtle and seabird nesting sites, or important fish spawning areas.

## **3.2 Institutional and management characteristics**

Information on the institutional and management characteristics of the MPAs surveyed, including that related to patterns of interaction, is summarized in Table 3.

### **3.2.1 Management objectives**

A broad regional consensus seems to have evolved over the years regarding the purpose of MPAs and the role that they can play in coastal management and local and national development. While explicit objectives and mission statements, which were identified for 44, or 59%, of the MPAs surveyed, overwhelmingly emphasize conservation, an analysis of management programmes reveals that most MPAs tend to have a three-fold purpose (though in most cases one or more aspect takes precedence):

1. Enhancement of the tourism product and recreational opportunities;
2. Conservation of critical ecosystems;
3. Sustainable and equitable use of coastal resources (including conflict management).

MPAs are therefore seen as being at once attractions, refuges, and sources of socio-economic development. This multi-dimensional vision may have developed in response to the failure of many early MPAs modeled along traditional conservation lines, which in some cases remain “paper parks” today. Although not examined in the survey, the role of donors, local NGOs, and MPA stakeholders such as dive operators in defining these broad-based objectives is worthy of further investigation.

### **3.2.2 Levels of management**

In those MPAs with active management, the following framework was used to describe management level:

**High:** management is by objectives, management plan or operations plan is in place, adequate human and other resources are available to address all stated objectives with actions and programmes, there is a high level of awareness of and adherence to management rules;

**Moderate:** there is active management addressing objectives, but not all elements of high level management are in place (may lack a management plan, have insufficient staff or enforcement capability, or not have programmes addressing all objectives);

**Table 3**  
**Institutional and Management Characteristics (Active MPAs Only)**

Country	Protected Area	Level of Management	Major Objectives	Management responsibility	Formal Mechanisms for stakeholder participation	Fisheries Management
Belize	Hol Chan Marine Reserve	High	Conservation, sustainable use	Govt agency and Trust	Yes	Zoned and regulated
British Virgin Islands	Wreck of RMS Rhone Marine Park	High	Conservation, use management	National Trust	Informal	Prohibited
Netherlands Antilles	Saba National Marine Park	High	Conservation, tourism development	NGO	Informal	Regulated and restricted
St. Lucia	Soufriere Marine Management Area	High	Conflict mgt, sustainable develop.	NGO Consortium	Yes	Zoned
U.S. Virgin Islands	Buck Island Reef National Monument	High	Visitor enjoyment, conservation	Government agency	Limited	Prohibited
	Virgin Islands National Park	High	Visitor enjoyment, conservation	Government agency	Limited	Regulated
Cayman Islands	Marine Park System	Mod-High	Conservation, tourism development	Government agency	Yes	Zoned and regulated
Dominican Republic	Santuario de Mamiferos Marinos de la Republica Dominicana	Mod-High	Wildlife protection, interpretation	Government agency	Yes	Seasonally prohibited
French Antilles	Reserve Naturelle du Grand Cul de Sac Marin	Mod-High	Conservation, local development	Government agency	Yes	Prohibited
Jamaica	Negril Marine Park	Mod-High	Conservation, use mgt, local dev.	NGO (de facto)	Yes	Zoned and regulated
Netherlands Antilles	Bonaire National Marine Park	Mod-High	Conservation and tourism	NGO	Yes	Regulated
Barbados	Folkestone Park and Marine Reserve	Moderate	Tourism, recreation, conservation	Government agency	Previously	Prohibited
Belize	Bacalar Chico Marine Reserve and National Park	Moderate	Conservation and local development	Govt agency and NGO	Yes	Zoned
	Blue Hole Natural Monument	Moderate	Not stated	NGO	Yes	Zoned
	Caye Caulker Marine and Forest Reserve	Moderate	No information	Govt agency and NGO	Yes	Zoned
	Glovers Reef Marine Reserve	Moderate	Conservation and sustainable use	Govt agency	Yes	Zoned and regulated
	Half Moon Caye Natural Monument	Moderate	Conservation and education	Govt agency and NGO	Yes	Prohibited
	Laughing Bird Caye National Park	Moderate	No information	Govt agency and NGO	Yes	Zoned
	Port Honduras Marine Reserve	Moderate	No information	Govt agency and NGO	Yes	Zoned
	Sapodilla Cayes Marine Reserve	Moderate	No information	Govt agency and NGO	Yes	Zoned
Cuba	Parque Nacional Guanacabibes	Moderate	Conservation	Government agencies	No	No information
	Parque Nacional Punta Frances	Moderate	Marine conservation	Government agencies	No	No information
	Reserva Ecologico Varahicaco Galindo	Moderate	Tourism use management	Government agencies	No	Regulated
	Parque Nacional del Este	Moderate	Conservation	Government agency	No	No restrictions
	Parque Nacional Jaragua	Moderate	Conservation	Govt agency and NGO	No	No restrictions
	Parque Nacional Los Haitises	Moderate	Use management	Government agency	No	No restrictions
	Parque Nacional Submarino La Caleta	Moderate	Marine preservation	Government agency	No	Prohibited
French Antilles	Reserve Ilets Pigeon	Moderate	Recreational use management	Government agency	No	Regulated
	St. Barths Marine Reserve	Moderate	Conservation and use management	NGO	Yes	Regulated

Country	Protected Area	Level of Management	Major Objectives	Management responsibility	Formal Mechanisms for stakeholder participation	Fisheries Management
Netherlands Antilles	St. Eustatius Marine Park	Moderate	Sustainable use	NGO	Planned	Zoned and regulated
	St. Maarten Marine Park	Moderate	Sustainable use	NGO	Yes	Zoned
Turks and Caicos Islands	Northwest Caicos Marine Park	Moderate	Conservation and use management	Government agency	Yes	Regulated
	Princess Alexandra National Park	Moderate	Conservation and use management	Government agency	Yes	Regulated
	West Caicos Marine Park	Moderate	Conservation and use management	Government agency	Yes	Regulated
Cuba	Parque Nacional Caguanes	Low-mod	Use management	Government agencies	No	Regulated
Belize	Gladden Spit/Silk Cayes Marine Reserve	Low	No information	Govt agency	Yes	Zoned
	South Water Caye Marine Reserve	Low	No information	Govt agency	Yes	Zoned
Cuba	Elemento Natural Destacado Ojo de Megano	Low	Conservation	Government	No	No information
	Parque Nacional Jardines de la Reina	Low	Fisheries management	Government agencies	No	Prohibited
	Parque Nacional Los Caimanes	Low	Conservation	Government agency	No	No information
	Parque Nacional San Felipe - Los Indios	Low	Conservation	Government agency	No	No information
	Refugio de Fauna Las Picuas	Low	Wildlife conservation, fisheries mgt	Government agencies	No	No information
	Refugio de Fauna Lanzanillo	Low	Fisheries mgt, wildlife conservation	Government agencies	No	No information
Dominica	Soufriere Sectts Head Marine Reserve	Low	Conservation and conflict mgt	Govt agency and local authority	No	Zoned
Grenada	Moliniere/Beausejour Marine Protected Area	Low	Conservation and education	Govt agency and mgt committee	Informal	None yet
	Wobern/Clarks Court Bay Marine Protected Area	Low	Conservation and education	Govt agency and mgt committee	Informal	None yet
Jamaica	Montego Bay Marine Park	Low	Conservation and use mgt	NGO (de facto)	Yes	Zoned and regulated
Netherlands Antilles	Curacao Underwater Park	Low	Conservation and tourism	NGO	No	Regulated
St. Lucia	Canaries-Anse la Ray Marine Management Area	Low	Not stated	NGO	No	Zoned and regulated
	Maria Islands Nature Reserve	Low	Conservation	National Trust	Yes	Prohibited
St. Vincent and the Grenadines	Tobago Cays Marine Park	Low	Conservation	NGO	Yes	None yet
Trinidad and Tobago	Buccoo Reef Marine Park	Low	Not stated	Government agency	Previously	Regulated (no spearfishing)
Turks and Caicos Islands	Admiral Cockburn Land and Sea Park	Low	Not stated	Government agency	No	Regulated
	Columbus Landfall Marine National Park	Low	Not stated	Government agency	Informal	Regulated
	Fort George Land and Sea Park	Low	Not stated	Government agency	No	Regulated
	Grand Turk Cays Land and Sea Park	Low	Conservation and recreation	Government agency	No	Regulated



Low: some management activities are in place, but objectives are unstated or not addressed, resources are insufficient, management rules are not widely adhered to, and management may not be evident to visitors.

Less than half of the region's MPAs have more than a low level of management; approximately 25% have no management at all. Of those with moderate or high levels of management, a disproportionate number are in territories of France, the Netherlands, the United Kingdom, and the United States. Level of management is in most cases directly related to availability of financial resources.

Where financial resources are available, they come from three major sources:

1. Government allocations (French and U.S. territories, Cuba)
2. Donor assistance
3. Visitor and user fees

With the exception of the MPAs in the U.S. Virgin Islands, those MPAs most often cited as having high levels of management all have functional user fee systems in place that cover all or most management costs (these include the SMMA, Saba and Bonaire Marine Parks in the Netherlands Antilles, Wreck of the Rhone Marine Park in the British Virgin Islands, Hol Chan Marine Reserve in Belize, and the Cayman Islands marine park system). It is important to note, however, that user fee systems are only appropriate or effective in areas where there is a high level of water-based tourism use. Given these findings, it appears that MPAs in areas with low levels of tourism use and in countries with limited financial resources or interest in marine conservation are unlikely to succeed unless they are able to attract external donor support.

### **3.2.3 Management arrangements**

The MPAs surveyed represent a remarkably wide range of institutional arrangements, with the trend over time being towards increasing complexity and involvement of non-governmental actors.

Most MPAs that have been in operation for twenty years or more are managed either by a government agency (usually a fisheries administration) or a National Trust established by government for the purpose of managing protected areas. Many MPAs established more recently have experimented with more complex forms of management, including delegation to NGOs (Netherlands Antilles and Jamaica), co-management with NGOs (Belize, Dominican Republic), and management consortia (SMMA, Santuario de Mamíferos Marinos in the Dominican Republic). These forms of management have had mixed results, and in several cases (including Bonaire and the SMMA) have been adjusted over time to improve effectiveness.

### **3.2.4 Stakeholder participation**

With the exception of Cuba, where processes of stakeholder consultation occur generally at the political rather than the management level, nearly all the region's functioning MPAs have used stakeholder consultation as a tool for management at one stage or another, and about 55% (not including Cuba) have active and formal mechanisms for stakeholder input, generally through advisory committees or representation of key stakeholder groups on Boards and other management bodies. This indicates a very high level of consensus on the role of participation in effective management. There is nonetheless a recognition that stakeholder processes can be

time-consuming and often frustrating and require specific skills not always available within MPA management agencies. There is no evidence from the survey regarding how effective existing mechanisms, such as the Advisory Committees established for each MPA in Belize, are in fully and equitably representing stakeholder interests.

### **3.2.5 Fisheries management**

The role of fishing in the livelihood strategies of Caribbean coastal communities has been taken into account to a greater or lesser degree in the development of virtually all MPAs in the region. In the very few MPAs in which fishing is completely prohibited (less than 15% of active MPAs), it is usually done in the context of meeting broader fisheries management objectives. Zoning is a common form of fishing regulation in the region. Of those active MPAs about which information was available, close to 40% employ zoning as a tool for fisheries management. Zoning appears to have two major purposes: to reduce conflicts, particularly between fishers and recreational users such as divers; and to protect critical stocks and nursery areas for the purpose of replenishing the surrounding areas. There is some evidence from recent research that zoning has been effective in meeting the second objective (Roberts and Hawkins 2000).

Fishing is also regulated by type and gear in order to reduce the harmful effects of certain forms of fishing, particularly spearfishing. Local and traditional forms of fishing, such as pot and seine fishing, are permitted in at least some parts of most MPAs. Nonetheless, fishing communities are generally initially suspicious of MPAs and concerned about potential loss of livelihood (Fiske 1992, Brown 1997). Some MPAs have invested considerable effort in winning the support of local fishing communities, with programmes addressing community needs in the Negril and Montego Bay Marine Parks in Jamaica, Sint Eustatius and Sint Maarten Marine Parks in the Netherlands Antilles, the SMMA in St. Lucia, and the Cayman Islands system.

## **3.3 User community characteristics**

Information on user community characteristics is summarized in Table 4.

### **3.3.1 Users of MPAs**

The most frequent use of MPAs is overwhelmingly water-based recreation, generally in support of the tourism industry, which is noted for over 80% of all MPAs surveyed. Scuba diving and snorkeling are especially frequently-cited activities. Only in Cuba and the Dominican Republic does fishing appear to be more or equally important. Fishing is however cited as a use in 70% of all MPAs, although in many it apparently occurs at quite low levels. Other uses were rarely mentioned in the survey.

### **3.3.2 Communities within and adjacent to MPAs**

Since most MPAs are located within the region's crowded coastal zone, it is not surprising that most have linkages with or impact in some way upon nearby communities. Linkages are greatest where tourism dependent on the MPA is an important source of local incomes. MPAs in which there is a high level of dependency by adjacent communities include Hol Chan, Cayman Islands, Parque de Este and Jaragua National Parks in the Dominican Republic, Ilets Pigeon Reserve in Guadeloupe, Negril, Bonaire, and the SMMA.

Table 4  
User Community Characteristics

Country	Protected Area	Uses*			Local Community Links / Impacts*	Conflicts/Management Issues	Poverty Issues
		Tourism/ Recreation	Fishing	Other			
Antigua and Barbuda	Cades Bay Marine Park	X	X		X	Users vs developers; fishers vs dive operators	Minor
	Diamond Reef Marine Reserve		X				No
	Palaster Reef Marine Park	X	X		X	Community vs developers	Minor
Barbados	Folkestone Park and Marine Reserve	X	x		X	Jet skiers vs other users; vendors vs other users; divers vs fishers	Minor
Belize	Bacalar Chico Marine Reserve and National Park	X	X		X	Illegal fishing	Yes
	Blue Hole Natural Monument	X					No
	Caye Caulker Marine and Forest Reserve	X	X		X	Fishing vs tourism	Minor
	Gladden Spit/Silk Cayes Marine Reserve	X	X			Fishers vs watersports operators and park management	Yes
	Glovers Reef Marine Reserve	X	X	Research	x	Fishers vs divers	No
	Half Moon Cay Natural Monument	X			x	Tourism developers vs managers; poaching of nesting birds	No
	Hol Chan Marine Reserve	X	X		X	Fishers vs divers	Yes
	Laughing Bird Caye National Park	X	X			Overfishing	Yes
	Port Honduras Marine Reserve	X	X		X	Fishers vs tourism	Yes
	Sapodilla Cayes Marine Reserve	X	X			Overuse, overfishing	Yes
South Water Caye Marine Reserve	X	X			Between user groups	Yes	
British Virgin Islands	Wreck of RMS Rhone Marine Park	X			x	Overvisitation	No
Cayman Islands	National System of Marine Parks	X	x		X	Fishers vs divers	No
Cuba	Elemento Natural Destacado Ojo de Megano						No
	Parque Nacional Caguanes	X			x	Pollution	No
	Parque Nacional Guanacabibes	X			x	Overuse	No
	Parque Nacional Jardines de la Reina						No
	Parque Nacional Los Caimanes						No
	Parque Nacional Punta Frances				x	Overuse	No
	Parque Nacional San Felipe - Los Indios						No
	Refugio de Fauna Cayos de Ana Maria		X			Poaching	No
	Refugio de Fauna Cayos Cantiles-Avalos-Rosario		X				No
	Refugio de Fauna Las Picuas	X	X				No
	Refugio de Fauna Lanzanillo		X				No
	Refugio de Fauna de Rio Maximo						No
	Reserva Ecologica Cayo Largo	X	X				No
	Reserva Ecologica Maternillo-Tortugilla						No
Reserva Ecologica Varahicacos-Galindo	X	X		X	Overvisitation	No	
Dominica	Cabrits National Park	X	X		X		Yes
	Soufriere/Scotts Head Marine Reserve	X	X	Research	X		Yes

Country	Protected Area	Tourism/ Recreation	Fishing	Other	Local Community Links / Impacts*	Conflicts/Management Issues	Poverty Issues
Dominican Republic	Area Nacional de Recreo Cayo Levantado	X			X		Yes
	Area Nacional de Recreo Playa de Andres de Boca Chica	X			X		Yes
	Monumento Natural Isla Catalina	X	X		x		Yes
	Parque Nacional Cabo Cabron		X	Agriculture	x		Yes
	Parque Nacional del Este	X	X	Research	X		Yes
	Parque Nacional Jaragua	X	X	Research	X	Tourism developers vs park managers	Yes
	Parque Nacional Los Haitises	X	X		X		Yes
	Parque Nacional Montecristi	X	X	Salt mining	X		Yes
	Parque Nacional Submarino La Caleta	X					No
	Reserva Biologica Humedales del Bajo Yuna, El Barracote y Gran Estero			X		x	
Santuario de Mamiferos Marinos de la Republica Dominicana	X	X			x	Fishers vs park managers	N/A
French Antilles	Reserve Naturelle du Grand Cul de Sac Marin	X				Illegal fishers and divers	No
	Reserve Ilets Pigeon	X			X	Overvisitation, fishers vs park managers	Yes
	St. Barths Marine Reserve	X	X		X		No
	Reserve Naturelle de St. Martin	X	x		X	Squatting	Minor
Grenada	Moliniere/Beausejour Marine Protected Area	X	X		X		Minor
	Woburn/Clarks Court Bay Marine Protected Area	X	X		X		Minor
Jamaica	Montego Bay Marine Park	X	x		X	Watersports operators vs fishers	Yes
	Negril Marine Park	X	x		X	Watersports operators vs fishers	Yes
	Ocho Rios Marine Park	X	x		X	Watersports operators vs fishers	Yes
	Portland Bight Protected Area		X	Industry, agriculture	X	Overharvesting for charcoal	Yes
Netherlands Antilles	Bonaire National Marine Park	X	x		X	Fishers vs dive operators	No
	Curacao Underwater Park	X				Overuse	No
	Saba National Marine Park	X	x		X	Park managers vs developers, fishers; crowding	No
	St. Eustatius Marine Park	X	x		X	Fishers vs dive operators	No
	St. Maarten Marine Park	X	x		X	Cruise ships vs park managers; divers vs fishers	No
St. Lucia	Canaries-Anse la Ray Marine Management Area	X	X		x	Fishers vs dive operators	Yes
	María Islands Nature Reserve	x	x		x		Yes
	Soufriere Marine Management Area	X	X		X	Fishers vs divers and yachtspersons	Yes
St. Vincent and the Grenadines	Tobago Cays Marine Reserve	X			X	Between tourism sectors	?
Trinidad and Tobago	Buccoo Reef Marine Park	X	x		X	Seine fishermen vs watersports operators, resorts	Minor

Country	Protected Area	Tourism/ Recreation	Fishing	Other	Local Community Links / Impacts*	Conflicts/Management Issues	Poverty Issues
Turks and Caicos Islands	Admiral Cockburn Land and Sea Park	X	X	Research	X	Fishers vs researchers	Yes
	Chalk Sound National Park	X	X		X		No
	Columbus Landfall Marine National Park	X			X	Illegal use	Yes
	Fort George Land and Sea Park	X				Conflicts among watersports operators, illegal use	No
	Grand Turk Cays Land and Sea Park	X		Egg harvesting		Illegal egg harvesting, landing	No
	Northwest Caicos Marine Park	X	X			Fishers vs dive operators, between watersports operators, illegal fishing	No
	Princess Alexandra National Park	X	X		X	Between watersports operators, beach access	Yes
	West Caicos Marine Park	X	X			Dive operators vs fishers	No
U.S. Virgin Islands	Buck Island Reef National Monument	X			x		No
	Virgin Islands National Park	X	x		X	Overvisitation, overfishing, development impacts	No

\* Where relative importance is known, it is indicated by a large (high) or small (low) X

### **3.3.3 Conflicts**

MPAs in the region have had a role both in mitigating and in creating conflicts between users. The prohibition of traditional uses and the exclusion of those users can and often does create resentment and resistance that can be felt both at a local and national level (Fiske 1992). The Folkestone Marine Park in Barbados may be an example of an MPA that has actually increased conflict by catering to “new” recreational users while shutting out traditional users. On the other hand, MPAs such as the SMMA, Negril and Montego Bay were established in large part in order to address existing conflicts; and these MPAs have tended to have decision-making structures that provide for substantial input from stakeholders.

Not surprisingly, the major conflicts occurring within MPAs are between the fisheries and tourism industries, and specifically between fishers and divers, who are interested in using the same resources for different purposes. This conflict was noted in 18 MPAs, or 39% of MPAs for which information on conflicts was obtained. Zoning and consultation are the most common management responses to these conflicts. The existence of such conflicts has actually been a stimulant to the establishment of MPAs, the SMMA in St. Lucia being the best-documented example (Renard and Koester 1995). In MPAs with high levels of management and mechanisms for stakeholder participation (e.g., SMMA, Hol Chan), it appears that these conflicts have been mitigated to a considerable degree.

Illegal exploitation of resources, mainly by fishers but also by poachers and others, results in conflicts between the park management and user groups. This issue was noted for 11 MPAs.

Other conflicts have to do with development within or adjacent to MPAs, which are often opposed by park management and other stakeholders because of the potential environmental impacts on the MPA. This issue was noted for six MPAs.

### **3.3.4 Poverty**

While it was not possible to collect extensive quantitative data on poverty for this study, the literature and informants provided evidence upon which to generally assess both absolute and relative levels of poverty. MPAs adjoin areas where poverty is significant, and therefore have the potential to improve the livelihoods of the poor through appropriate management, in the following countries:

- X Belize
- X Dominica
- X Dominican Republic
- X Jamaica
- X St. Lucia

In other locations, including Antigua, Barbados, Guadeloupe, Grenada, Tobago, and the Turks and Caicos, pockets of low-income or at-risk populations exist, which could also benefit from pro-poor MPA management strategies.

## **3.4 Outcomes**

### **3.4.1 Ecological**

While level of management in operational terms can be reasonably easily assessed (see section 3.2.2), there is little information available to correlate it with management effectiveness in

terms of achievement of objectives, particularly ecological ones. Information that is available indicates that where use levels or other impacts are high, for example in the Virgin Islands National Park, even high levels of management are inadequate to halt or reverse resource degradation (Rogers 1991, Smith *et al.* 1997). However, recent research gives evidence that enforcement of properly designed no-fishing areas can result in increased fish stocks, even over a fairly short period of time (e.g., Polunin and Roberts 1993, Goodridge *et al.* 1996, Hatcher 1997).

The establishment of marine reserves does however preclude other options, many of which could be highly destructive, for the use of critical resources. The high level of representation of key ecosystems and species within the region's MPAs (see section 3.1) is particularly important in this regard. Mangroves especially are probably assured a higher likelihood of protection within a protected area than under virtually any other management regime.

### **3.4.2 Socio-economic**

A number of studies have been done on the social and economic benefits of Caribbean MPAs. While the economic benefits from MPAs cited in studies by Dixon (1993), Dixon *et al.* (1993), and Post (1992 and 1994) are considerable, evidence from other studies, such as Fernandes (1995) and van 't Hof (1998), indicates that they are not always equitably shared, with the tourism industry receiving the lion's share of economic benefits, and other social benefits such as education being given insufficient importance in MPA management programmes. Roberts and Hawkins (2000), Roberts *et al.* (1995), and Roberts and Polunin (1994) examine the benefits accruing to the fisheries sector from marine reserves. While their findings from selected Caribbean MPAs show that fish stocks in areas adjacent to marine reserves appear to increase substantially to the benefit of local fishers, the research looks only at the ecological outcomes, not economic ones.

A few MPAs, including Bacalar Chico in Belize, the Cayman Islands system, Soufriere Scotts Head in Dominica, Jaragua National Park in the Dominican Republic, Negril and Montego Bay in Jamaica, and the SMMA, have programmes aimed at enhancing the livelihoods of, or mitigating the negative impacts of management on, disadvantaged stakeholders, particularly fishers. The impact of these programmes on livelihoods and poverty is not known, but there appears to be evidence that they have the effect of increasing the interest and involvement of the targeted user groups in the MPAs' management.

Perhaps the major socio-economic outcome identified through the survey of individual MPAs has been the role that effective zoning and ongoing consultation have played in mitigating conflicts between users of MPAs, particularly in the fisheries and tourism and recreation sectors. The survey also indicates that the marine-based tourism industry has benefitted economically substantially more than other sectors from MPAs. In several cases, it was noted that this sector is disproportionately expatriate owned. There are cases, however, such as that of the water taxi industry in Soufriere, St. Lucia, in which MPAs have had an important economic impact on members of the local community (Brown 1997).

### **3.4.3 Organizational**

Although there is no clear correlation between level of management and the type of agency having lead responsibility, the survey and other research (Geoghegan *et al.* 1999) seem to indicate that MPAs with some degree of shared management and stakeholder participation

tend to have higher levels of management. Furthermore, there is empirical evidence (and MPA managers appear to believe) that high levels of cooperation among relevant agencies and stakeholder groups result in more *efficient* management. Consortia such as that recently established for the SMMA are likely to provide a good test of this hypothesis.



## REFERENCES CITED

(Note: this list also includes citations from the survey sheets)

Advantage Information Management. 1998. Bacalar Chico Marine and Wildlife Reserve, Ambergris Caye, Belize Parks. <http://ambergriscaye.com/pages/town/bacalar.html>.

Agencia Española de Cooperación Internacional/Oficina Técnica de Cooperación de la República Dominicana. 1991. Plan de uso y gestión del Parque Nacional Los Haitises y áreas periféricas. Editora Corripio C x A, Santo Domingo, Dominican Republic. 381 pp.

Aussedat, N. 1995. User group attitudes toward the establishment of a marine reserve in St. Barthélemy. Caribbean Park and Protected Area Bulletin 5(2): 11. Caribbean Natural Resources Institute.

Belize Audubon Society. 1997. National Parks managed by the Belize Audubon Society. <http://www.belizeaudubon.org/html/parks.htm>.

Bonaire Marine Park. 1999. <http://www.bmp.org>

British Virgin Islands National Parks Trust. 2000. A Parks and Protected Areas System Plan for the British Virgin Islands. Revised draft. 178 pp.

Brown, K., N. Adger, E. Tompkins, P. Bacon, D. Shim, and K. Young. 1999. Evaluating the trade-offs between users of marine protected areas in the Caribbean. Final technical report to DFID NRSP Land-Water Interface Programme, June 1999. Overseas Development Group, University of East Anglia. 157 pp.

Brown, K., E. Tompkins, and W.N. Adger. 2001. Trade-off analysis for participatory coastal zone decision-making. Overseas Development Group, University of East Anglia. 109 pp.

Brown, N.A. 1997. Devolution of authority over the management of resources: the Soufriere Marine Management Area, St. Lucia. CARICAD and CANARI. CANARI Technical Report no. 243:21 pp.

Buchan, K., R. Framhein, and L. Fernandes. 1997. An economic and social sustainability study of the Saba Marine Park, Saba, Netherlands Antilles. Caribbean Natural Resources Institute. 37 pp.

Caye Caulker Branch of the Belize Tourism & Industry Association (CCBTIA). 2001. Marine Reserve. CCBTIA and Naturalight Productions. <http://www.gocayecaulker.com/marine.html>.

Caesar, E. 1994. Management of the Buccoo Reef/Bon Accord Lagoon Complex, Trinidad and Tobago. Pages 53-58 in T. van't Hof. Resolving common issues and problems of marine protected areas in the Caribbean. Caribbean Conservation Association.

Caribbean Coastal Area Management Foundation. 1999. Portland Bight Protected Area Jamaica Management Plan 1999-2004. Prepared for the Natural Resources Conservation

Authority.

Caribbean Coastal Area Management Foundation. n.d. The Portland Bight Protected Area.  
<http://www.portlandbight.com.jm/>

Cascado Internet Group. Belize national parks, natural reserves, & wildlife sanctuaries.  
<http://www.ambergriscaye.com/pages/town/parkintro.html>

Cayman Islands World Wide Web. Marine Conservation and Marine Park Laws.  
<http://www.caymans.com/Marine3.htm>

Cayman Online Limited. 1996-2000. Marine Conservation.  
<http://cayman.com.ky/visiting/consERVE.htm>.

Clinton, W.J. 2001. Boundary enlargement and modification of the Buck Island Reef National Monument. Proclamation 7392 of January 17, 2001.

Cumberbatch, J. 2000. Integrating stakeholders in participatory natural resource management case study: Folkestone Park and Marine Reserve. Caribbean Natural Resources Institute. 12 pp.

Dixon, J.A. 1993. Economic benefits of marine protected areas. *Oceanus* 36(3):35-40.

Dixon, J.A., L. F. Scura, and T. van't Hof. 1993. Meeting ecological and economic goals: marine parks in the Caribbean. *Ambio* 22 (2/3):117-125.

ESI (Environmental Solutions International). 1998. CAMPAM database. CD ROM.

Etienne Dupuch Jr. Publications Ltd. 1999. Eco-Bahamas: Parks of the Bahamas.  
<http://www.bahamasnet.com/w.ecoparks.html>

Fernandes, L. 1995. Integrating economic, environmental and social issues in an evaluation of Saba Marine Park, Netherlands Antilles, Caribbean Sea. Report to Saba Marine Park, Saba Conservation Foundation, and Saba Executive Council. 59 pp.

Fiske, S.J. 1992. Sociocultural aspects of establishing marine protected areas. *Ocean and Coastal Management* 18:25-46.

Ganem, C. and H. Sezanne. 1997. Etude sur les répercussions économiques et sociales du site naturel des AÎlets Pigeon@, rapport général. Caribbean Natural Resources Institute and Parc National de la Guadeloupe.

Garland, J.L. 1996. Turks and Caicos Islands National Parks. *Islander* 1:17-20.

Geoghegan, T. 1989. A management plan for the RMS Rhone Marine Park. Eastern Caribbean Natural Area Management Programme and the National Parks Trust, British Virgin Islands.

Geoghegan, T., Y. Renard, N. Brown and V. Krishnarayan. 1999. Evaluation of Caribbean experiences in participatory planning and management of marine and coastal resources. CANARI Technical Report no. 259:52 pp.

Goodridge, R. , H.A. Oxenford, B.G. Hatcher and F. Narcisse. 1996. Changes in the shallow reef fishery associated with implementation of a system of fishing priority and marine reserve areas in Soufriere, St. Lucia. Proceedings of the Forty-ninth Gulf and Caribbean Fisheries Institute.

Government of the United States. 1978. Code of Federal Regulations. Title 36 - Parks, Forests, and Public Property, Chapter 1 - National Park Service, Dept. Interior. July 1, 1978.

Hatcher, B.G. 1997. Can marine protected areas optimize fishery production and biodiversity preservation in the same ecosystem? Proc. Gulf. Caribb. Fish. Inst. 50.

HELVETAS *et al.* 1999. Legislación Ambiental de la Republica Dominicana, Inventario Análisis. HELVETAS-DED-DVS-Jardin Botánico-CASTA-CEBSE-Fundación Loma Quita Espuela-Grupo Jaragua-Progressio.

Hoppe, J. 1989. Los parques nacionales de la República Dominicana/The national parks of the Dominican Republic. Editora Corripo, C. por A. 137 pp.

interKnowledge Corp. 1998. Grand Bahama Island B Peterson Cay National Park. <http://www.interknowledge.com/grandbahama/peterson.htm>.

Internet Caribbean Unlimited. 1997. Curaçao Underwater Park. <http://iseeyou.com/curacao/geninfo/parks/undepark.html>.

Island Girls. n.d. Caye Caulker. <http://www.cayecaulker.org>.

IUCN. nd. Protected areas of the world, a review of national systems. Volume 4: Nearctic and Neotropical. Draft compiled by the World Conservation Monitoring Centre for the IVth World Congress on National Parks and Protected Areas, Caracas, Venezuela. 160 pp.

Kelleher, G., C. Bleakley, and S. Wells, eds. 1995. A global representative system of marine protected areas. Volume II: Wider Caribbean, West Africa and South Atlantic. Great Barrier Reef Marine Park Authority, The World Bank, and The World Conservation Union (IUCN). 93 pp.

Kennedy, J.F. 1962. Buck Island Reef National Monument. Proclamation No. 3443, January 4, 1962, 27 F.R. 31.

Laschever, A. 1997. Ecology options in the Turks and Caicos. Travel Agent, Nov. 17, 1997. Universal Media Inc.

Ley General Sobre Medio Ambiente y Recursos Naturales (64-00). Publicación Oficial.

Montego Bay Marine Park. 1992. The Natural Resources Conservation Authority Act with

special emphasis on the Natural Resources Conservation (Marine Parks) Regulations. 24 pp.

Montego Bay Marine Park. 1998. Montego Bay Marine Park Management Plan. Prepared by the Montego Bay Marine Park staff, under the guidance of the Montego Bay Marine Park Trust Board of Directors, facilitated by Stephen Jamison.

Montego Bay Marine Park Jamaica. <http://www.montego-bay-jamaica.com/mbmp/>

National Park Service. 1999. Half Moon Caye Natural Monument: a marine adventure, Belize. <http://www.nps.gov/centralamerica/belize>.

National Park Service. 1983a. Buck Island National Monument United States Virgin Islands General management plan, development concept plan, environmental assessment. Dept. of the Interior, National Park Service.

National Park Service. 1983b. Virgin Islands National Park United States Virgin Islands General management plan, development concept plan, environmental assessment. Dept. of the Interior, National Park Service.

Natural Resources Conservation Authority. 2000. Status of protected areas declared under the Natural Resources Conservation Authority Act, Sections 5 and 33. Preliminary draft for comments.

Naturalight Productions. 2001. Laughing Bird Caye. National Parks of Belize Series. <http://www.laughingbird.org/>.

Nature Foundation St. Maarten. n.d. Marine park. <http://www.naturefoundationsxm.org/>.

OAS. 1988. Inventory of Caribbean marine and coastal protected areas. Organization of American States and National Park Service. 146 pp.

Office National des Forêts. 1988. Les milieux humides de littoral guadeloupéen. 61 pp.

ONE. 1993. Censo nacional de población y vivienda. <http://www.estadistica.gov.do>.

Otuokon, S. 1997. Negril Marine Park Management Plan. Negril Coral Reef Preservation Society.

PACT. 2001. Protected Area Conservation Trust. Naturalight Productions. <http://www.pactbelize.org>.

Palacio, J. O. 2001. Past and current methods of community base coastal resource management in southern Belize. Paper prepared for the International Development Research Centre Community Based Coastal Resource Management Project.

Parc National de la Guadeloupe. 1992. The Grand Cul de Sac Marin Nature Reserve in Guadeloupe: a case study in the creation and management of a protected area. Caribbean Park and Protected Areas News 4(2):3. Caribbean Natural Resources Institute.

Parc National de la Guadeloupe. 1991. The National Park of Guadeloupe. 7 pp.

Polunin, N.V.C. and C.M. Roberts. 1993. Greater biomass and value of target coral-reef fishes in two small Caribbean marine reserves. *Marine Ecology Progress Series* 100:167-176.

Post, J.C. 1992. The economic feasibility and ecological sustainability of the Bonaire marine park. Paper prepared for the World Parks Congress Organised by the IUCN, Caracas, 10-21 February 1992. 7 pp.

Post, J.C. 1994. The economic feasibility and ecological sustainability of the Bonaire Marine Park, Dutch Antilles. Pages 333-338 in M. Munasinghe and J. McNeely (eds.) *Protected area economics and policy: linking conservation and sustainable development*. World Bank and World Conservation Union. Washington, D.C.

Renard, Y. and S. Koester. 1995. Resolving conflicts for integrated coastal management: the case of Soufriere, St. Lucia. *Caribbean Park and Protected Area Bulletin* 5(2):5-7.

Roberts, C.M. and J.P. Hawkins. 2000. *Fully-protected marine reserves: a guide*. WWF Endangered Seas Campaign and Environment Department, University of York. 131 pp.

Roberts, C.M., J.P. Hawkins and J.S. Nowlis. 1995. Economic and social benefits of marine resource management in the Caribbean. *Caribbean Perspectives* 2:3-8.

Roberts, C.M. and N.V.C. Polunin. 1994. Hol Chan: demonstrating that marine reserves can be remarkably effective. *Coral Reefs* 13:90.

Rogers, C.S. 1991. Balancing adverse effects of marine-based tourism with marine resource protection in Virgin Islands National Park, St. John, US. Virgin Islands. Pages 102-119 in *Proceedings of the Regional Symposium on Public and Private Cooperation in National Park Development*, Tortola, British Virgin Islands, 23-25 August 1991.

Saba Conservation Foundation. 2001. Saba Marine Park. <http://www.sabapark.com>.

St. Barths Online. 2001. Marine Reserve. <http://www.st-barths.com/marine-reserve/index.html>

St. Eustatius Tourist Office. 2000. Beneath the surface. <http://www.turq.com/statia/dive.html>

Schultz, E.G. S.F. McCool and D. Kooistra. 1999. *Management Plan: Saba Marine Park*. Saba Conservation Foundation. 46 pp.

Sectie Milieu en Natuur. 2001. St. Maarten Marine Park. <http://www.mina.vomil.an/Eilandinfo/SXM-MarinePark.html>

Smith, A.H., C.S. Rogers, and C. Bouchon. 1997. Status of western Atlantic coral reefs in the Lesser Antilles. *Proc 8th Int Coral Reef Symp* 1:351-356.

Soufriere Marine Management Association. 2001. Soufriere Marine Management Area. <http://www.smma.org>

Soufriere Regional Development Foundation. 1994a. Management plan for the Soufriere Marine Management Area. 9 pp.

Soufriere Regional Development Foundation. 1994b. Soufriere Marine Management Area: agreement on the use and management of marine and coastal resources in the Soufriere region, St. Lucia. Soufriere Regional Development Foundation in collaboration with the Caribbean Natural Resources Institute and Department of Fisheries, Government of St. Lucia. 25 pp.

STENAPA. 2000. St. Eustatius Marine Park. [http://www.statiapark.org/marine\\_park.htm](http://www.statiapark.org/marine_park.htm)

STINAPA. n.d. Bonaire Marine Park. (brochure)

UNEP/CEP. 1996. Status of protected area systems in the wider Caribbean Region. CEP Technical Report No. 36. United Nations Environment Programme, Caribbean Environment Programme, Regional Coordinating Unit. Kingston, Jamaica.  
<http://www.cep.unep.org/pubs/techreports/tr36en/>

Valdez Sierra, V. and J.M.I. Mateo Feliz. 1993. Compendio y resultados primer seminario nacional Áreas Protegidas de la Republica Dominicana.

van't Hof, T. 1998. Social and economic impacts of marine protected areas: a study and analysis of selected cases in the Caribbean. CANARI Technical Report no. 252.

van ' t Hof, T. and L.P.J.J. Pors. 1996. Statia Marine Park Management Plan. Prepared for the St. Eustatius National Parks Foundation by the CARMABI Foundation in cooperation with Marine & Coastal Resource Management, Saba. 40 pp.

Villers, Y. n.d. La Réserve de la Biosphere de l'Archipel de Guadeloupe. Insula.  
<http://www.insula.org>

Woodfield, N. 1997. The Wreck of the Rhone Marine Park, British Virgin Islands, a socio-economic impact study. Caribbean Natural Resources Institute. 18 pp.

World Conservation Monitoring Centre (WCMC). 1996. Protected Areas Programme, World Heritage Sites, Belize. [http://www.wcmc.org.uk/protected\\_areas/data/wh/reef.htm](http://www.wcmc.org.uk/protected_areas/data/wh/reef.htm).

## Appendix A

### MPA Characterization Data Form

Country:

Name of MPA:

<b>Basic Information</b>	
Management status:	
Size (marine and terrestrial):	
Biogeographic description:	
<b>Information on Legal Status</b>	
When was the MPA legally established?	
What legislative instruments created the MPA and govern its management?	
Do these legislative instruments include management regulations?	
<b>Information on Institutional Arrangements</b>	
What agency or organization is responsible for day-to-day management of the MPA? If more than one, note the role of each	
What other agencies or organizations have active roles in management? What are these roles?	
What Ministry or branch of government has overall authority over management?	
If management responsibility has been delegated to a non-governmental entity, what	

mechanisms or instruments were used to do so?	
Do any mechanisms exist for regular stakeholder consultation and input? If so, what are these?	
Do the existing management arrangements appear to be reasonably efficient?	
<b>Information on Management</b>	
Are there stated management objectives? What are they?	
Is there a management plan? Include citation if available	
What are the major activities carried out within the MPA?	
What, if any, conflicts exist between these activities?	
Does the MPA have active management? If not, skip the rest of the questions in this section	
How is the MPA funded?	
Briefly list existing management programmes	
What staff positions currently exist?	
If regulations are in place, are they actively enforced? If so, by whom?	
What are the major types of regulation?	
Is zoning used as a tool for management? If so, describe zones	
Do any management programmes address livelihood issues of local communities? If so, describe	



<b>Socio-economic information</b>	
Are there any communities within or adjacent to the MPA's boundaries? If so, name and give rough estimate of population size	
Are persons from these communities or elsewhere dependent on resources in the MPA for their livelihoods? If so, note the level of dependency and relative number of persons involved (e.g., a substantial portion of the population moderately dependent)	
What are the major socio-economic activities of the areas surrounding the MPA, in order of importance?	
How important are activities dependent on MPA resources relative to other activities, e.g. farming?	
Roughly what portion of the population of adjacent communities can be considered to be living in poverty or at risk?	