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Case study analysis of coastal resources co-management in the Caribbean

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Fisheries and coastal resources management in the Caribbean is relatively novel, stemming mainly from the centrally managed approaches instituted by the colonial governments, which ignored the role of resource users and informal systems in the management of coastal resources, like fisheries. Many fisheries are fully exploited or overexploited. The fishers, most of whom are small scale, are now finding their livelihoods threatened due to resource overexploitation and environmental and habitat degradation. In addition, tourism and coastal development have caused increased conflicts among various coastal and marine resource users. These circumstances have led to increasing interest in the region to improve fisheries and coastal resources management by getting the fishers and other resource users and stakeholders involved in management through co-management and community-based management (CBM).

This study analysed coastal resources co-management processes in the Caribbean using an institutional analysis approach, with specific focus on two case studies – the Portland Bight Protected Area (PBPA), Jamaica, and the Soufriere/Scotts Head Marine Reserve (SSMR), Dominica. The study determined the extent to which the coastal resources co-management approaches and processes in the case study sites have developed and succeeded.

Coastal resources co-management within these case studies focus on instructive co-management and consultative co-management processes. These are levels where government involves stakeholders in decision-making at an instructive level as in the case of SSMR, Dominica; or at a more consultative level as in the case of PBPA, Jamaica. There is a degree of responsibility and authority sharing where co-management has become institutionalised, and sustainable management structures are in place. User groups and other stakeholders (including government representatives and non-government organizations) are moving towards equal partnership, but it is too early to state definitively that co-management has succeeded. The findings that have emerged from these case studies indicate the need for further research into understanding the sociological, psychological, economic and ecological variables, which are involved in the development and proper functioning of sustainable co-management processes at the level of equal partnership in the Caribbean region.

Keywords: coastal resources co-management; Caribbean

CONTENTS

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1. INTRODUCTION

1.1 Background

The Caribbean, which includes the Gulf of Mexico, encompasses twenty-four island states and territories and twelve mainland nations (Figure 1.1). The countries of the Caribbean have a relatively poor record of fisheries management and thus, there is an urgent need to reform fisheries governance (Brown and Pomeroy, 1999). Many coastal fisheries are fully exploited or overexploited (Mahon and Almerigi, 1995). This is especially true for nearshore demersal and coral reef fish species, and conch and lobster on which many of the fishers in the region are dependent for their livelihoods (Aiken *et al.*, 1999; Salm and Clark, 2000).

The fishers, most of whom are small-scale, are now finding their livelihoods threatened due to resource overexploitation, and environmental and habitat degradation. In addition, tourism and coastal development have caused increased conflicts among various coastal and marine resource users. The typical form of government controlled, centralized natural resource management has been inadequate for addressing the issues and problems of fisheries management in the region. The need is for a form of fisheries resource management that would involve both government and other stakeholders of fisheries resources.

Figure 1.1 Wider Caribbean region showing location of case study sites (Jamaica and Dominica)

Fisheries co-management is in essence, the sharing of power and responsibility between the government and local resource users (and the other stakeholders) to manage a specified resource. It holds potential as an alternative fisheries management strategy and as a solution to the problems of the region (ICLARM, 1997; Pomeroy and Williams, 1994; and Berkes *et al.*, 1991). Fisheries co-management is being introduced in the region with varying degrees of success. It involves the establishment of new organizations, institutional arrangements, laws, and policies to support power sharing and integration of local and centralized government management systems. The aim is to foster fisher participation in the management of local fisheries resources in a formal, government-authorized regime as the means of ensuring sustainable resource management and utilisation.

1.2 Objectives

There are several co-management and community-based management (CBM) formal and informal systems and projects in the region, which can provide a great deal of useful information and lessons to improve the implementation of co-management (Renard, 1994). To date, there has been a significant lack of comprehensive evaluations of these projects (Brown and Pomeroy, 1999). Thus, the general objective of this research project is an analysis of coastal resources co-management in the Caribbean region in order to:

- provide information for the development of strategies and policies for fisheries and coastal resources governance reform in the region through co-management, and
- contribute to the case study analysis aspect of the Coastal Resources Co-management Project (CORECOMP) implemented from 2001 under the Caribbean Conservation Association (CCA), with continuation from 2003 under the Centre for Resource Management and Environmental Studies (CERMES) of the University of the West Indies (UWI).

The study makes an analytical assessment of two in-depth case studies of co-management of fisheries resources in the Caribbean region, using an institutional analysis approach. Specifically, it examines five major characteristics of fisheries co-management processes. These characteristics are:

1) Expected or actual sharing of responsibility and authority for fisheries management between the government and the resource users;
2) Dependence of the resource users on the fisheries resources;
3) Establishment of a fisheries management organization;
4) Existence of property rights and rules; and
5) Sustainability of fisheries management interventions after project completion and demonstration of tangible outcomes.

The sites for this research project are the Portland Bight Protected Area (PBPA), Jamaica, and the Soufriere/Scotts Head Marine Reserve (SSMR), Dominica. The selection of these sites for the examination of fisheries co-management in the Caribbean was based on site selection criteria, which are discussed in Section 3.1 on methodology.

1.3 Specific objective

This project made use of an institutional analysis research method. This institutional analysis research framework was developed as part of the International Centre for Living Aquatic Resources Management (ICLARM) Fisheries Co-management project (ICLARM and IFM, 1998). The framework provided for a structured and systematic approach to examining and

documenting the origin, current status, operation and performance of fisheries co-management systems in each case study.

The research was undertaken through two sequential components.

1. A descriptive, qualitative analysis of two co-management systems of fisheries in the region. This analysis made use of secondary data sources such as project reports, research reports, NGO reports, scientific journal articles and other published materials. Primary interviews, where possible, were undertaken with project participants and implementers to gain insights into approaches, processes, performance, results and impacts of fisheries co-management at both national and community levels.
2. A quantitative analysis of these two sites to evaluate the outcomes and impacts and to identify success factors.

1.4 Approach

This study makes a significant contribution as a model for the examination of coastal resources co-management in the Caribbean. Co-management in the region needs analysis and guidance based on a tested research framework. It is expected that the research will make a significant contribution to addressing these needs in the region, as well as being of much benefit to stakeholders by informing their progress and future decisions in the co-management of coastal resources.

1.5 Significance of study

The next chapter describes the analytical framework and relevant literature in more detail, followed by the methods used. The fourth chapter gives results for Jamaica and Dominica. Conclusions are drawn in the fifth and final chapter.

2. INSTITUTIONAL ANALYSIS AND THE RESEARCH FRAMEWORK

2.1 Common property theory

It is agreed by many authors that common property theory is fundamental to the analysis of co-management. It has been the thought for a long time that common property and open access are similar concepts. Common property is defined as natural resources, which by their physical nature are not owned by individuals but shared by a community or group of users, and open access is characterized by the absence of property rights, where access to the resource is unregulated, free and open to anyone (ICLARM and IFM, 1998).

The literature on common property regimes recognizes four basic categories of property regimes: 1) open access, where there is the absence of well defined property rights, and access to the resource is unregulated, free and open to anyone; 2) communal property or common property, where the resource is held by an identifiable community of users who can exclude others and regulate their own use; 3) state property, where state governance dictates that rights to the resource are controlled exclusively by government agencies on behalf of all the citizens; and 4) private property, where an individual or a corporate body has the right to exclude others and regulate resource use (Pomeroy and Berkes, 1997) .

In the search for successful methods of management, attempts have been made to take on the best aspects of various property regimes, taking from the management experiences gained in certain fisheries, and other common property resources. There is a move towards a partnership where the capacities and interests of local resource users and communities, are complemented by

the ability of the state to provide enabling policies and legislation as well as enforcement and other assistance. This partnership is termed co-management. Co-management arrangements can be analysed in terms of who holds what kind of property rights over a resource or who controls the resource (Katon, Pomeroy and Salamanca, 1997).

2.2 Institutional analysis

The International Centre for Living Aquatic Resources Management (ICLARM), and the Institute of Fisheries Management and Coastal Community Development (IFM) (1998) have developed an institutional analysis framework, which incorporates the roles of community and government stakeholders in the co-management of resources. This institutional analysis framework has informed the investigation of fisheries co-management in the case studies.

Institutional analysis focuses on the institutional arrangements which define the set of rights and rules by which resource users and government come together to organise resource governance, management and use in collective action situations. It examines how institutional arrangements (rules and regulations) affect user behaviour and incentives to coordinate, cooperate and contribute in the formulation, implementation, and enforcement of resource management regimes. Institutional analysis also provides a framework for the examination of organizations, and particularly the influence of organizational strategies on institutions.

There are three major elements, which are fundamental to institutional analysis of co-management. They are (a) institutions, (b) organizations and (c) rights and rules. It is necessary, therefore, to define these three elements and their importance to institutional analysis.

Institutions are the rules that control and order the functioning of a society, and are shaped by social, cultural, economic and political factors that enable human interactions. In describing institutions one needs to indicate whether the institutions constitute of formal, informal, or a combination of formal and informal rules. Formal rules are generally in written form and informal are unwritten. Whether the rules that constitute an institution are enforceable, the cost of enforcement and the severity of the punishment essentially determine the functioning of an institution.

Organizations are groups of individuals brought together by some common factors with the aim of achieving certain objectives. Although organizations originate from institutions, both institutions and organizations mutually influence one another in their evolutions. Organizations in the process of achieving their objectives are usually facilitated by existing institutions or may generate institutional changes. Various types of organizations are political organizations, such as a local council; economic organizations, such as a cooperative; social organizations, such as a church, and educational organizations, such as a school.

Culture is the ethos of the organization. It consists of the values, norms, and beliefs, which give meaning to the organization. Organizations are culture specific. Therefore, a study of a fisheries organization requires an examination or consideration of the culture that shapes and gives meaning to it.

Although with reference to the uses of natural resources the terms "rights" and "rules" are often used interchangeably, there are certain specific distinctions between the two terms. Rights refer to authorized actions, and define certain exclusive uses and the penalties for violating those rights (ICLARM and IFM, 1998). The specification of a right does not define how the right is to be exercised. Rules define how rights are to be exercised. Rules define specifically what acts are

required, permitted, and forbidden in exercising the authority provided by the right. For every right that an individual holds, rules exist that define how this particular right is to be exercised. For example, a right provides the authority for a fisher to operate on a specific fishing ground. How the fisher exercises that right through the fishing activity is specified by rules which may dictate the type of fishing gear used or the time of year when the fishing gear can be used. In the use of institutional analysis in this research rules help identify the distribution of rights and privileges among resource users. Therefore, the rules to some extent explain the basis for different incentives and cooperation among resource users. The more thorough a system of rights and rules are, the less the opportunity for disorder and abuse of the resources by users.

In the use of institutional analysis three levels of rules are identified (ICLARM and IFM, 1998):

- *Operational rules* govern and regulate resource use (e.g. fishing regulations). Operational rules directly affect the day-to-day decisions made by the users (e.g. fishers) concerning when, where and how to harvest (fish); who should monitor the actions of others and how; what information must be exchanged or withheld, and what rewards or sanctions will be assigned to different combinations of actions and outcomes. Operational rules can be formal (written, legitimised) or informal (unwritten, customary/ traditional). In both circumstances they are understood by those to whom they apply.

- *Collective choice rules* define the management of the resources. For example, collective choice rules would define how a resource should be used and exploited in a co-management institutional set-up. Such institutional arrangements are needed to adjudicate conflicts, enforce decisions, formulate and change operational rules, detect and sanction against rule violation, define who participate in management, and hold officials accountable.

- *Constitutional-choice rules* form the basis for the broad institutional arrangement that define the collective-choice rules and the operational rules. They determine who is eligible to participate in the system and establish the process by which collective-choice rules are created, enforced and modified. Constitutional-choice rules include, for example, the national legislation, which establishes the national administrative and management structure, and legitimise co-management arrangements. Operational or working rules are nested within collective choice rules, which are in turn nested within constitutional rules. In other words, the rules affecting operational choice are made within a set of constitutional choice rules.

A graphical representation of the institutional analysis framework is given in Figure 2.1. The institutional analysis approach has three major components:

1. Institutional Arrangements Analysis: This component links contextual variables characterizing key attributes of the resource (biological, physical) and the resource users (technology, market, social, cultural, economic, political) with the management institutional arrangements (rights and rules). This enables the examination of the incentives and disincentives, which affect how the resource users and authorities responsible for fisheries management coordinate and cooperate in resource governance, management and use.

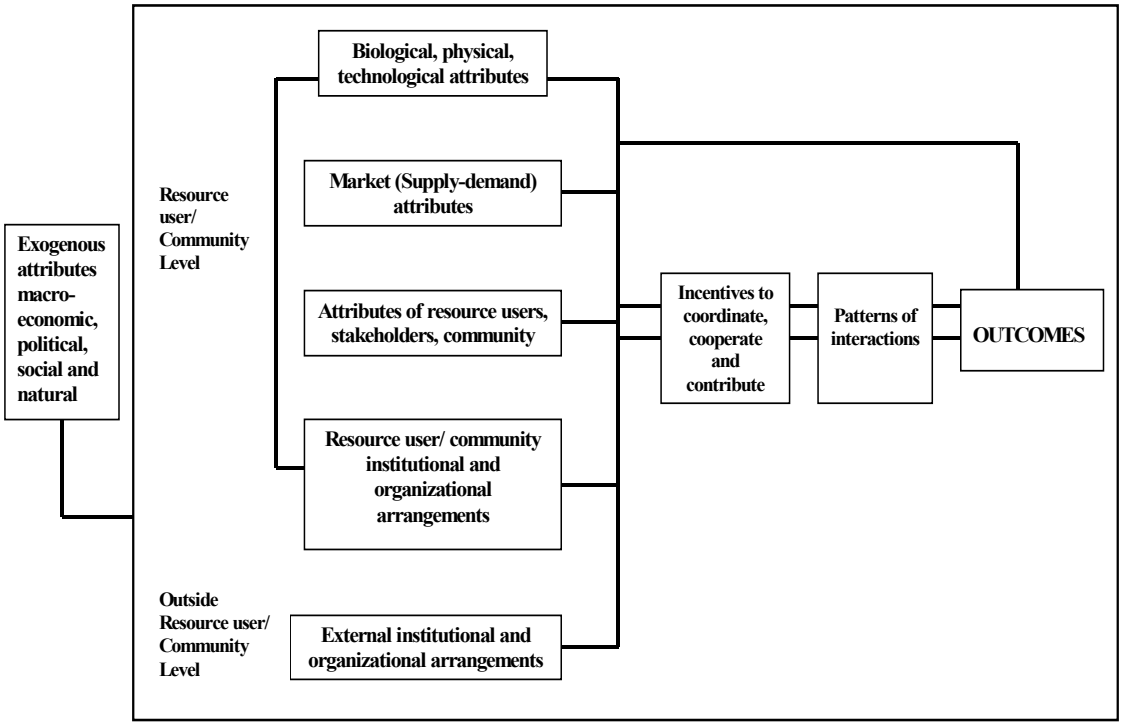

Figure 2.1 A Research Framework for Institutional Analysis (ICLARM and IFM, 1998)

2. Co-management Performance Analysis: The co-management arrangement results in outcomes. The co-management performance analysis provides a method for the evaluation of management efficiency, equity, and sustainability of fisheries resource utilisation in the case studies areas.
3. Characteristics of Successful Co-management Institutional Arrangements: The most important aspect of this analysis is the specification of what conditions and processes bring about successful long-enduring, fisheries co-management arrangements. From the analysis we can identify a list of principles and propositions about conditions and processes.

2.3 The research framework

The purpose of institutional analysis in this research is two-fold:

- It provides an analytical framework for identifying the underlying rules of the fisheries regimes and distinguishing them from the strategies of the players.
- It examines how institutional arrangements (rules and regulations) affect user behaviour and incentives to coordinate, cooperate and contribute in the formulation, implementation, and enforcement of fisheries regimes.

To achieve this two-fold purpose in the research the following steps were followed:

1. Identification of Contextual Variables: The contextual variables that represent the main attributes of the fisheries resources (biological, physical) and the resource users

(technology, market, social, cultural, economic, and political) in the case studies were identified.

2. Linkage between contextual variables and management institutional arrangements: These contextual variables were linked with the management institutional arrangements (rights and rules), which governed the fisheries. This linkage between contextual variables and management institutional arrangements, which characterized the fisheries in the study areas, enabled the examination of the incentives and disincentives, which foster co-management.
3. Performance Measurements: The performance of fisheries co-management in the case studies was measured using the following three main criteria: sustainability, efficiency, and equity. The performance measurements were used to assess the impact of co-management on the human and non-human elements of the fisheries resources.
4. Recommendations: Finally, specific conditions necessary for successful long-term fisheries co-management in each case study site were identified and analysed.

Figure 2.2 gives a graphical representation of the above steps and is a slight modification and adaptation for this research of the institutional analysis framework in Figure 2.1.

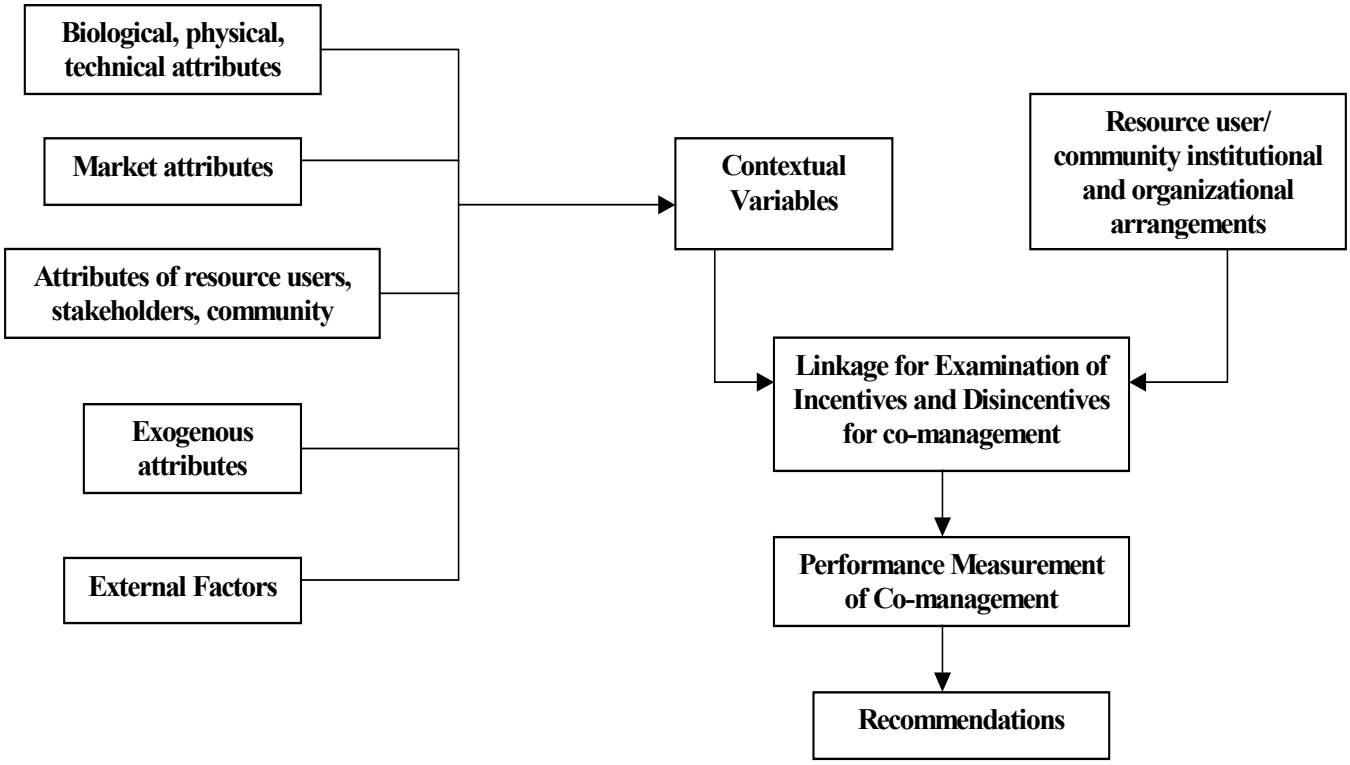

Figure 2.2 Research Framework for the case study analysis of fisheries co-management in the Caribbean region

3. METHODOLOGY

3.1 Site selection criteria

Two fisheries co-management cases were selected for this study. They were the Portland Bight Fisheries Management Council (PBFMC) of the Portland Bight Protected Area (PBPA), Jamaica, and the Local Area Management Authority (LAMA) of the Soufriere/Scotts Head Marine Reserve (SSMR), Dominica.

One of the criteria for selecting these case study sites was geographic. Jamaica lies in the Greater Antilles, and Dominica in the Lesser Antilles. The case study sites were selected as examples of coastal resources co-management in the Caribbean region from large and small islands. They illustrate different scales but are not claimed to be representative. The other main selection criteria were practical feasibility and logistics of the research requirements.

3.1.1 Location of study sites

The following are the geographic locations of the study sites (Figure 1):

- Jamaica lies between 17º 30′ – 17º 45′ N and 76º – 78º 30′ W. It is one of the islands of the Greater Antilles of the Caribbean, lying southeast of Cuba, and covers a total area of 10,990 km^2. The Portland Bight Protected Area (PBPA) is located on Jamaica's south coast (Figure 3.1).

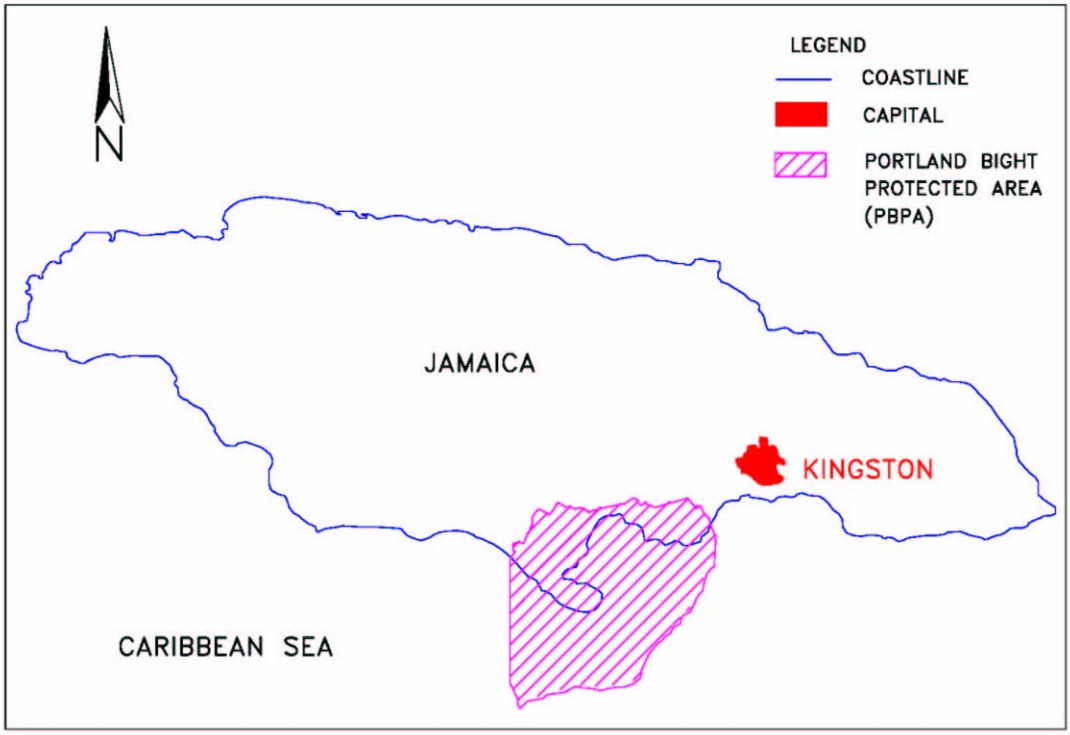

Figure 3.1 The location of the Portland Bight Protected Area (PBPA), Jamaica

- Dominica, one of the Windward Islands of the Lesser Antilles, lies between 15º 10′ – 15º 45′ N and 61º 10′– 61º 30′ W, and has a total area of 790 km^2. It lies between Guadeloupe to the north and Martinique to the south, almost in the centre of the arc of

islands known as the Lesser Antilles. This arc extends from the Trinidad-Grenada Passage in the south up to the Anegada Passage between the Virgin Islands and Anguilla (Honychurch, 1995). The Soufriere/Scotts Head Marine Reserve (SSMR) study site is located on the south coast of Dominica (Figure 5).

3.2 Data collection and analysis

Data were collected from July to November 2001. The data collection process involved two major activities:

1) The use of secondary data sources,
2) Interviews and observation in the field to collect primary data.

Field data were collected within one- to three-week periods during visits to study sites as follows:

- The PBPA, Jamaica: from 23 to 31 August 2001, and
- The SSMR, Dominica: from 08 to 27 October 2001.

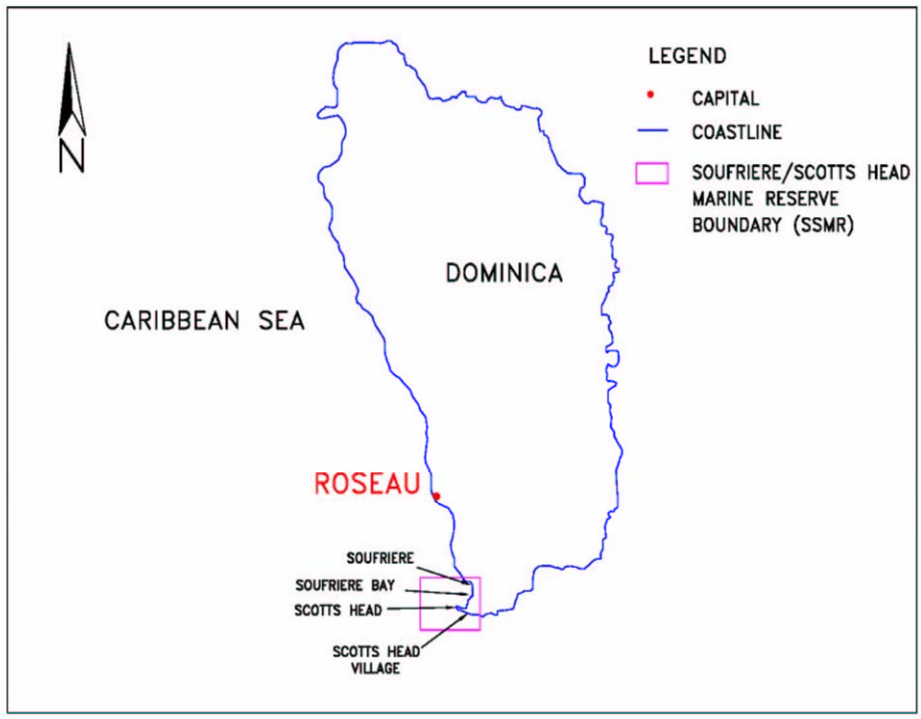

Figure 3.2 The location of the Soufriere/Scotts Head Marine Reserve (SSMR), Dominica

At each case study site the researcher investigated the creation of a co-management regime taking into account data on contextual variables such as biophysical and technical attributes, market, fisher/community attributes, institutional arrangements, and exogenous variables, and comparing them over time.

3.2.1 Secondary data collection

Over the five-month period secondary data were collected from various sources (Appendix 1 gives some of these sources). These included documents such as project reports, research reports,

NGO reports scientific journal articles, local legislation/ordinances, and other published materials which possessed information on the practices and activities within the coastal resources co-management systems for the two stated case studies. These documents were found in private and public libraries, on the Internet, and, in some instances, obtained from the authors. Newspaper articles, unpublished notes, unpublished research, workshop material, and meeting minutes were collected. This literature was acquired mainly during field visits, especially from organizations associated with the case studies, where there was better and easier access to these materials. The relevant published and unpublished secondary data sources were easily accessible and useful in providing guidance for primary data collection.

3.2.2 Primary data collection

In the case of primary data collection three main methods were used:

- Direct observation,
- Focused interviews with key informants, and
- A questionnaire survey of fishers in Dominica

Direct observation was used during field visits to the three sites in order to collect primary data on co-management processes and arrangements, and in most cases complement the other data collection methods used. The method was useful in understanding and collecting data on the biophysical characteristics of case study sites, community structures, fishing methods, marketing methods and stakeholder relationships. It was used during field visits to fishing landing sites, communities, beaches, and community and stakeholder meetings (see Appendix 2). Photographs were taken in many instances to record such observations.

Focused interviews were used to collect data from key informants on the co-management processes for each case study. The focused interview is a type of personal interview data collection method (Frankfort-Nachmias and Nachmias, 1996). The focused interview has three characteristics, which made it relevant to this study. It facilitated gathering information from respondents who were known to be involved in the particular co-management processes (key informants). It enabled reference to be made to situations that were analysed prior to the interview in the direction of specific topics related to the research hypothesis. It focused on the subjects' experiences regarding the situations under study.

In using the focused interview method, the encounter between the interviewer and respondents (key informants) was structured in that a flexible interview guide (see Appendix 3) with open-ended questions was prepared, and the major aspects of the study were explained. Also, the respondents were allowed considerable liberty in expressing their perceptions and viewpoints. Key informants were principal stakeholders, directly and actively involved in their respective co-management arrangement, and had substantial knowledge of the process (Appendix 4).

A questionnaire survey of a random sample of fishers at the SSMR in Dominica was conducted. A copy of the questionnaire is provided in Appendix 5. The survey gathered data on socio-economic, bio-technical, and market variables, as well as on institutional arrangements such as property rights and rules, enforcement, and attitudes toward collective action and decision-making. The survey also aimed to capture changes over time in various performance measures of the management regime. To measure the performance of co-management over time, the perceptions of the fishers were used. This technique was proven to be useful in previous evaluations of co-management cases (Katon *et al*., 1997). The technique involved a visual, self-anchoring, ladder-like scale, which allowed for making ordinal judgments. The fishers were

shown a ladder-like diagram with 10 steps, where 10 represented the best possible scenario and 1 the worst possible scenario in term of the perceived status of the indicators. The fishers were asked to indicate the appropriate step on the ladder that corresponded to their perceptions of status in various time periods: before the SSMR (before 1987), and today. Section M (under Performance Indicators of Co-management) of the questionnaire in Appendix 5 gives the scenarios used for each indicator. The list of performance indicators, divided into major categories, is as follows:

- **Equity**
  - Participation:
    - Participation in community affairs in general
    - Participation in marine reserve management
  - Influence:
    - Influence over community affairs in general
    - Influence over marine reserve management
  - Control over fishery resources
  - Fair allocation of access rights to resources of the marine reserve
  - Satisfaction with marine reserve management arrangements
  - Benefits from the marine reserve
  - Overall well-being of the household
  - Household income
- **Efficiency**
  - Ease of collective decision-making on rules governing the use of marine reserve resources
  - Quickness of resolving community conflicts on issues related to the marine reserve
- **Sustainability**
  - Overall well-being of fisheries resources
  - Compliance with rules of the marine reserve
  - Knowledge of marine reserve management
  - Exchange of information on marine reserve management

This survey of fishers complemented the secondary data and information obtained on the SSMR co-management process. A sample size of 25 fishers (N=25) was decided on for statistical significance and analysis, and was based on a simple random sampling method (Frankfort-Nachmias and Nachmias, 1996). An updated list of fishers in the SSMR was acquired from the Fisheries Division, Dominica, and 25 fishers (or 10% of the population of fishers in the SSMR) were randomly selected from the list and interviewed.

3.2.3 Data analysis

Microsoft Excel 2000 and SPSS (10) were used to handle and analyse questionnaire data. Descriptive and inferential statistics were used to summarize and analyse primary data. Most of the data were categorical, and therefore descriptive data analysis covering frequency counts, percentages, means and standard deviation provided information on the distribution of respondents across contextual variables.

4. RESULTS AND DISCUSSION

The specific objective of this study was to assess and evaluate fisheries co-management in the Portland Bight Protected Area (PBPA), Jamaica, and the Soufriere/Scotts Head Marine Reserve (SSMR), Dominica, using an institutional analysis approach. Therefore, we focussed on the following three main areas: institutional arrangements analysis, co-management performance analysis, and characteristics of successful co-management institutional arrangements.

4.1 Portland Bight Protected Area (PBPA), Jamaica

This section deals with the analysis of the co-management of fisheries resources in the PBPA. Following the research framework as described in Section 2.3, the analysis has proceeded in four main sequences. It commences with an overview of the fisheries co-management experience of the PBPA. This is followed by the identification of the contextual variables for the PBPA resource area. Then, there is an examination of the actual fisheries co-management experience for the PBPA. The contextual variables are linked with the institutional arrangements or rights and rules that govern fisheries management in the PBPA, and the incentives and disincentives which foster co-management are analysed. Also, the impact of co-management on the human and non-human elements of the PBPA's fisheries resources is assessed using the three performance measurements (sustainability, efficiency, and equity). Finally, the specific conditions needed for successful long-term fisheries co-management in the PBPA is identified. This includes a discussion on the extent to which the plans governing fisheries co-management for the PBPA have been realised.

4.1.1 An overview of the fisheries co-management experience of the PBPA

In the late 1980's efforts were initiated for the conservation of Jamaica's fisheries resources. Local authorities and non-governmental organizations realised the need to preserve the ecological resources, especially that of their coastal areas. Thus, 10 natural areas were earmarked for protection and the PBPA was one such area of special concern.

In the case of the PBPA, it has become imperative to avert the overexploitation of its resources, including the rapid depletion of its fisheries resources, through formal interventions. The government adopted a programme of conservation in the PBPA through a non-government organization (NGO) called the Caribbean Coastal Area Management Foundation (CCAM). An immediate objective was the redefining of access to PBPA's marine area to accommodate the resource conservation and preservation intentions, and the establishment of formal property rights and rules. As a result the Portland Bight Fisheries Management Council (PBFMC) was formed as the main co-management body to implement the conservation programme of fisheries resources in the PBPA.

4.1.2 Contextual variables of the PBPA

The contextual variables of the PBPA refer to the key attributes of the protected area and its fisheries resources, the fishers and other stakeholders of the PBPA, its market characteristics as they relate to fisheries in the PBPA, and an outline of the principal institutional arrangements and organizations governing the co-management of fisheries resources in the PBPA.

4.1.2.1 Physical attributes of the PBPA

The PBPA covers a total area of 1,876 km^2 (Espeut, 1999) (Figure 4.1). The area constitutes of 72% marine region (1,356 km^2) and 28% land area (520 km^2). The land area is 4.7% of Jamaica's total land mass (Cesar, Öhman, Espeut and Honkanen, 2000). It is larger than several independent Caribbean states.

The PBPA's land area spreads across the most southerly two parishes in Jamaica (Figure 4.1). These parishes are Clarendon and St. Catherine. The PBPA consists of at least nineteen communities located directly on the coast and about thirty towns and settlements further inland (Espeut, 1999). A network of paved roads connects these communities and towns to each other and to Kingston, the capital of Jamaica, which lies 50 km east of the PBPA.

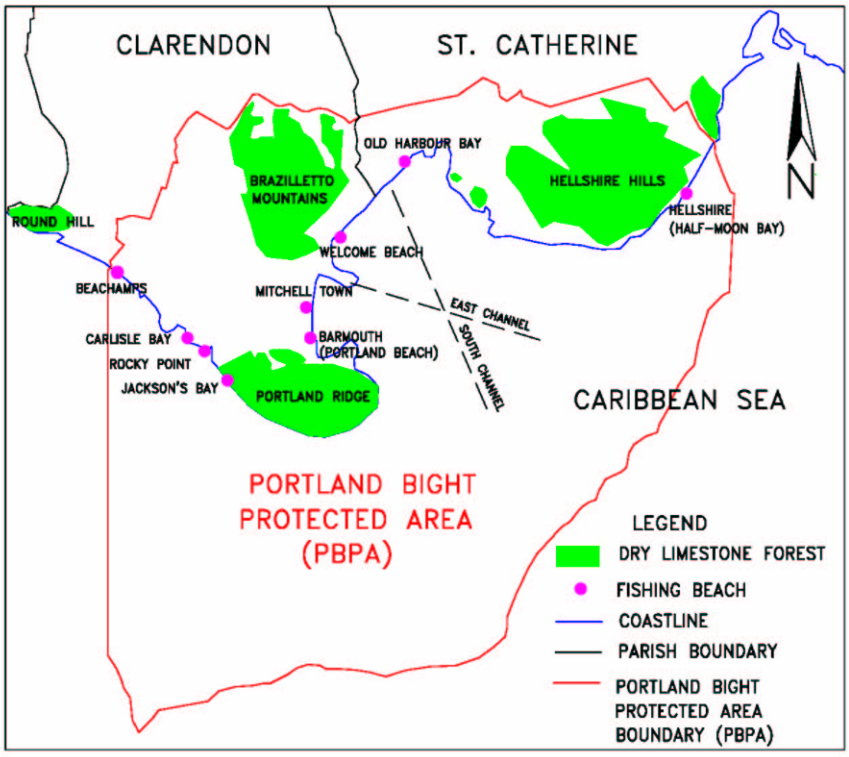

Figure 4.1 Map of the PBPA showing its various features
Adapted from Espeut, 1999

Forty-one percent (41%) of the land area of the PBPA contains four tropical limestone forests. These are the Hellshire Hills, Braziletto Mountains, Portland Ridge and Kemps Hill. These limestone forests consist of soft and porous limestone with deep gorges and steep ridges. This gives the land surface a pitted appearance with frequent sinkholes resulting from networks of underground caves (Cesar *et al.,* 2000).

Most of the coastline of the PBPA, in particular the western coast of the Hellshire Hills and along the northern coast of Portland Ridge, is mangrove wetland, with small salt marsh areas. These mangrove colonies constitute 16% of the PBPA's land area. The marine space of the PBPA possesses a sporadic collection of coral cays and reefs, which exist at the edge of the island shelf. The physical features and general geography of the PBPA, in itself, is diverse and complex, and thus accounts for the rich biodiversity of the area.

Fishing in the waters of Jamaica have been characterised historically by open access. The setting up of legal and technical boundaries for the Portland Bight area is recent. These boundaries followed the establishment of fishing regulations in the 1970s and later came out of the declaration of Portland Bight as a protected area in 1999.

Portland Bight has no customary boundaries. Its fisheries are traditionally open-access. Existent fisheries laws, for example, the Beach Control Act of 1955, accommodated an open-access regime. Changes occurred over time in the fisheries resources and the extraction mechanisms. The open-access regime and apparent growth of the fishing industry led to uncontrolled resource extraction for economic gain, and the introduction and use of destructive fishing methods.

The continental shelf, territorial sea, and the exclusive economic zone (EEZ) define political boundaries for Jamaica waters. The continental shelf of Jamaica extends from the shoreline until a depth of 200 metres. Jamaica's territorial waters extend up to 12 nautical miles from the shoreline and its EEZ is 200 nm, under the EEZ Act (1991). The Jamaican government through its maritime legislation exercises jurisdiction over its waters within these three classifications.

Portland Bight was declared a Protected Area on Earth Day (April 22) 1999 under Section 6 of the NRCA Act (1990). Under Section 6 of this Act management authority is to be vested in the Caribbean Coastal Area Management (CCAM) Foundation, a non-governmental organization (NGO) involved in developing the co-management of natural resources in Jamaica. However, CCAM encountered delays in the obtaining official delegation of management authority from the NRCA. CCAM will create zones of special protection within marine region of the PBPA to avert the fisheries resource depletion. The marine region moves from the high water mark Hellshire (Half-Moon Bay) to the point of origin at the high water mark at the Macarry Bay Fishing Beach (Beauchamps) (Figure 4.6).

According to the PBPA management plan created by CCAM, the marine region of the PBPA is divided into three types of zones: Shipping Lanes, No Fishing Areas (Species Management Areas), and No-Fishing Area (National Nature Reserve) (Espeut, 1999). Two shipping lanes exist in the PBPA marine region; the East Channel from the direction of Kingston, and the South Channel from the direction of the open sea (Figure 4.6). No fishing is allowed in official shipping lanes. (There is some confusion concerning its official definition of the East Channel and efforts are being made to have this channel fully defined to run south-and-west of Pigeon Island.)

The management plan also proposes the establishment of seven "no fishing" areas or fish sanctuaries in the marine region to be enacted under the "Species Management Area" of the NRCA Act of 1990 (Espeut, 1999). No fishing at all will be allowed in these reserves except for lines from the shore. An additional "no fishing" area proposed under the "National Nature Reserve" of the NRCA Act of 1990 will allow absolutely no fishing, including lines, nets, spearguns and setting of traps.

Legislation exists for the enforcement of fisheries rules in the PBPA. For instance, the main existing legislation governing specifically fisheries in Jamaica is the Fishing Industry Act, 1975. This law provides for the licensing of all fishermen and vessels operating in Jamaican waters; protection of the fishery by the establishment of closed seasons; creation of fish sanctuaries; and penalties for the landing and sale of illegally caught fish. It deals directly with fisheries control unlike past laws. More recently, the NRCA Act (1990), which supersedes former laws relating to the environment and conservation, and the laws under the EEZ Act (1991), provides for more

stringent fines to be meted out to individuals in contravention of the Fishing Industry Act (1975). However, the lack of enforcement of these laws has resulted in no restrictions on which, where, how and by whom fish are taken in the PBPA (Espeut, 1999).

4.1.2.2 Technical attributes of the PBPA

Portland Bight is historically an important harbour and coastal area, which nurtures several fisheries and fishing ports. Old Harbour Bay, the largest inlet on the south coast and located within the Portland Bight coastal area, was one of Jamaica's most important harbours during the colonial era (Spanish rule) four hundred years ago. Today it is the largest fishing port in the PBPA and on the south coast.

Currently there are nine (9) fish landing sites in the PBPA (Figure 4.1). There are about 4,200 fishers and 519 fishing vessels operating from these landing sites. These numbers have not changed significantly from a 1998 survey done by Halcrow (1998). The fishing industry in this area is primarily artisanal and small-scale, but highly diverse and complex in nature.

Basically three types of vessels operate in the marine area of the PBPA: unmechanised wooden canoes, mechanised wooden vessels, and fibreglass canoes (regular and large). The unmechanised wooden canoes are usually 3-5 m long dugouts from cotton trees. They are rowboats used for near shore fishing with nets, pots and lines or spearguns. Mechanised wooden vessels are built with transoms, and are powered by single outboard engines. They are about 4-7 m long and are built from dugouts and wooden planks. Mechanised wooden vessels are used for fishing on the island shelf and closer banks. Regular size fibreglass canoes are 8-12 m long, and are powered by outboard engines. They fish on the island shelf and the offshore banks including the Pedro Bank. A few large fibreglass boats (12-18 m long) are in use mainly for fishing on the Pedro Bank.

In the PBPA, regular size fibreglass canoes are prevalent among the landing sites (Figure 4.2), comprising 82% of the total number of vessels fishing in the area. Unmechanised wooden canoes comprise 15%, mechanised wooden vessels comprise 2%, and large fibreglass canoes, 1% (Table 4.1). However, unmechanised wooden canoes dominate a few sites such as Welcome Beach and Mitchell Town. Fishers interviewed claimed that 5 decades ago most vessels used in the Portland Bight area were unmechanised wooden canoes. For instance, in the 1960s the total number of vessels at Barmouth was 12 unmechanised wooden canoes and three mechanised wooden canoes.

Figure 4.2 Mechanised fibreglass canoes at Rocky Point

Table 4.1 Characteristics of fishing landing sites in the PBPA

Landing Site	Number of vessels				
	Wood unmech	Wood mech	Fibreglass reglr	Fibreglass large	Total
Hellshire			24		24
Old Harbour Bay	30		140		170
Welcome Beach	12		6		18
Mitchell Town	23		8		31
Barmouth	9	2	36	5	52
Jackson's Bay			3		3
Rocky Point	5	5	192		202
Carlisle Bay			2		2
Beauchamps		2	15		17
Total	79	9	426	5	519

Adapted from Halcrow (1998).

Fishermen in the PBPA have witnessed over the past 5 decades a tremendous increase in the number of vessels fishing from landing sites in the PBPA. For instance, in the 1970s there were about 100 vessels at Rocky Point; today there are about 202 vessels representing nearly 200% increase in vessels at Rocky Point. Also, at Barmouth there were 15 vessels in the 1960s. Today there are about 52, an increase of over 350%. The decline of the sugar industry during the 1960's and 1970's led to a movement of labourers from the cane fields to the sea. This contributed to a significant increase of fishers in the industry in terms of both part-time fishers shifting to full-time fishing and the entrance of new fishers.

Chinese nets and fish pots are the main fishing gear used by fishers in the PBPA. Fishers interviewed claim that Chinese nets and fish pots are traditional fishing gear for Portland Bight fishers and have been used for decades. However, at some landing sites fishers specialise in one gear type. Portland Bight is one such landing site where fishers' main fishing gear is Chinese nets (Figure 4.3). The increase in the competition for fisheries resources brought about the use of destructive fishing methods such as dynamites and poisons, small mesh in nets and pots, and spear guns. In addition, the entrance of mechanised canoes and the introduction of modern fishing methods such as the use of spear guns have increased the accessibility to the fisheries resources of the PBPA.

Figure 4.3 The main gear type at Barmouth is Chinese nets

There is a broad variation among the landing sites in the PBPA in terms of size, physical characteristics and facilities. Old Harbour Bay and Rocky Point are larger by far than the other sites, each having more than 150 boats and together accounting for 72% of the boats in the PBPA (Table 4.1). Table 4.2 shows that Old Harbour Bay and Rocky Point are not only the largest

landing site, but the sites with nearly all the facilities available to them (Figure 4.4) while other sites have at most five of these facilities. In addition, sanitary conditions vary from site to site; some would have considerable amounts of litter and garbage (Figure 4.5), while some are kept clean by the fishers.

Table 4.2 Facilities at the fishing landing sites in the PBPA

Landing Site	Types of facilities present													
	Storage shed	Toilet	Water	Fuel	Instructor	Ice	Light	Electricity	Coop	Coop office	Artisans	Vendors	Parking	Official
Hellshire			♦				♦	♦					♦	♦
Old Harbour Bay	♦	♦		♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
Welcome Beach	♦								♦				♦	♦
Mitchell Town														♦
Barmouth	♦												♦	♦
Jackson's Bay													♦	♦
Rocky Point	♦	♦	♦	♦	♦		♦	♦	♦			♦		♦
Carlisle Bay														
Beauchamps	♦												♦	♦

Adapted from Halcrow (1998).

Figure 4.4 The Old Harbour Bay facilities

Figure 4.5 The unsanitary conditions of two landing sites in the PBPA

4.1.2.3 Biological attributes of the PBPA

The PBPA represents Jamaica's largest embayment, which hosts a complex and diverse ecosystem. Terrestrial systems like the Hellshire Hills provide habitat for a number of endemic, and a few rare reptile and mammal species. However, the research focuses on the biological attributes of the coastal and marine areas of the PBPA, which support the fisheries resources.

There is a healthy coastal ecosystem of mangroves, sea-grass beds and coral reefs in the PBPA, which supports the fisheries resources of the area (Cesar, Öhman, Espeut and Honkanen, 2000). The largest remaining mangrove system in Jamaica is on the coastline of Portland Bight. The benthic regions on the shoreline consist primarily of mudflats, which provide a vital food source to fish species in neighbouring cays and reefs.

Seaward beyond the mudflats are communities of sea-grass beds predominated by turtle grass, manatee grass and midrib sea-grass. These sea-grass beds function as habitats for shellfish, finfish, turtles, sea birds and the endangered West Indian Manatee. Coral reefs beyond these sea-grass beds are very diverse and contain 60 species of reef-building coral and an extensive variety of fish and crustaceans (Cesar *et al.* 2000).

Reef fishes are the main catch for fishers in the PBPA. Fishers interviewed explained that reef fish has been the main catch for Portland Bight fishers as far back as they could remember. A most recent study on the marine resources of the south coast of Jamaica shows that 89% of the fish landed at sites in the PBPA were reef fishes, although there are some lobster, coastal pelagics, shrimp and conch (Halcrow, 1998). This recent study reported 96 species of fishes in the catch from reefs off the south coast. The target species from this demersal stock of reef fishes for fishers in the PBPA are snappers, groupers, jacks, goatfishes, parrotfishes, grunts, triggerfishes, doctorfishes, squirrelfishes, and angelfishes.

The Pedro Bank and the South Shelf are the largest areas for demersal fishing in Jamaica. Traditionally, Portland Bight fishers harvest fish from the shelf areas. About 80% of the landings at sites in the PBPA come from the shelf areas of Portland Bight (Table 4.3). Fishers from Barmouth and Beauchamps, however, fish mainly on Pedro Bank.

Table 4.3 Estimated fishery landings at landing sites in the PBPA

	Landings (mt)						
Landing Site	Reef Fishes		Lobster	Coastal pelagic	Shrimp	Conch	Total
	Shelf	Pedro					
Hellshire	26.0	0.0	1.0		0.0	0.1	27.1
Old Harbour Bay	160.0	5.0	12.9	20	4.3	1.3	203.5
Welcome Beach	11.0	1.0	0.5				11.5
Mitchell Town	17.0	0.0	0.6				17.6
Barmouth	27.0	74.0	4.1			0.1	104.2
Jackson's Bay	3.0	1.0	0.2				4.2
Rocky Point	198.0	48.0	29			1.5	275.5
Carlisle Bay	2.0	0.0	0.1				3.1
Beauchamps	13.0	16.0	1.2				30.2
Total		600.0	49.6	20	4.3	3	676.9

Adapted from Halcrow (1998).

One of the earliest assessments of the marine fisheries in Jamaica conducted in 1945 summarised the situation as "… too many men trying to catch too few fish" (Halcrow, 1998). Recent studies have confirmed that the fisheries resources of the PBPA are currently under threat from overfishing and the use of destructive fishing methods (Cesar *et al.,* 2000; Espeut, 1999;

Halcrow, 1998). Annual catches from the shelf areas and inshore banks of Portland Bight are decreasing. Between 1981 and 1991 there appears to have been considerable drop (82%) in catch or landings on the south shelf, and a substantial drop in catch per canoe per year to less than half its 1981 value (Table 4.4). Since 1991 there seems to be a significant recovery in fish stock with landings increasing in 2001to two times its 1991 value. However, there remains a serious problem in terms of fish stock depletion on the south shelf and consequently in the PBPA. The projected catch in 2001 is just 36% of landings 20 years earlier.

Table 4.4 Trends in landings on the south shelf from 1968 to 2001

Year	Landings (mt)	Catch/canoe/yr (mt)
1968	4,683	4.6
1981	5,475	3.1
1991	994	1.0
1997	1,877	1.4
Projected 2001	1,990	1.4

Adapted from Halcrow (1998) and data from interviews.

Fishers interviewed recalled the times when it took half an hour for a fish pot to fill after setting. A 46-year old fisher, who said he has been fishing for most of his life, recalls vividly, ***"There was once a time when fishermen set their pots on mornings and by evening reaped about 120 lbs of fish. Now, a week set would yield about 5 lbs of fish."***

Other indications of changes in the fisheries resources of Portland Bight are seen in the recorded changes in species composition of the catch. Smaller, less valuable species are replacing larger, valuable ones. This skew in the fish community toward lower-value species is demonstrated in current catch composition being dominated by less valuable species like herring and sprat (28.6%), followed by snappers (14.5%), parrot fish (12.0%), grunts (8.1%) and jacks (4.8%) (Cesar *et a*l., 2000). Interviews and observations at landing sites confirm that these changes continue.

The pressure on the fish stocks of the PBPA is attributed to the rapid increase in the use of mechanised canoes and the use of destructive fishing methods (as discussed in the previous section). These problems not only reduce the stock of fish through over-harvesting but through damage to the reef systems, which support the fish stock. The use of dynamite to harvest fish practiced by a significant minority of fishers, and fishers dragging their nets over reefs or suspending or leaving wire traps suspended near reefs, cause severe damage to reefs in the PBPA.

The Natural Resources Conservation Authority (NRCA) of Jamaica designated the PBPA for protection to preserve the health of its natural resources. The fishers interviewed felt that the fisheries resources of the PBPA are in critical need of proper management. They believed that the PBPA is important, not only for the preservation of the fisheries resources, but also for the security of their livelihood as fishers.

4.1.2.4 Stakeholders of the PBPA

In the PBPA, the stakeholders, particularly pertaining to the fisheries resources, consist of the fishers, fishers associations, the government (the Natural Resources Conservation Association and the Fisheries Division), and non-governmental organizations (the Caribbean Coastal Area Management Foundation and its subsidiary body, the Portland Bight Fisheries Management Council).

Fishers

Fishing is an intergenerational means of livelihood for most fishers in the PBPA. Their parents, grandparents, and great grandparents were fishers. Interviews with the fishers showed that fishers at about 50 years old possess 30 or more years of fishing experience.

During the 1950's and 1960's when sugar-cane production still held economic significance in Jamaica, fishing in Portland Bight was a seasonal occupation. A significant number of fishers began operated part-time. For the first six months of the year (January to June) they fished full-time. Subsequently, during "crop season" (July to December) these fishers would engage in cane cutting. With the decline in the sugar-cane industry most of these part-time fishers have become full-time. Also, fishers with no family tradition of fishing have entered the industry.

Table 4.5 Estimated number of fishers by landing site
Source: Espeut (1999)

Landing Sites	No. of Fishers
Hellshire	200
Old Harbour Bay	1,400
Welcome Beach	100
Mitchell Town	200
Barmouth	800
Jackson's Bay	10
Rocky Point	1,200
Carlisle Bay	200
Beauchamps	100
Total	**4,200**

There are over 50,000 persons residing in the PBPA, and many of them make their living, directly or indirectly, by extracting its natural resources. A member of the Caribbean Coastal Area Management Foundation (CCAM) explains, ***"about 4,000 fishers and possibly about 3000 other persons who are employed in ancillary occupations like vending, fish-scraping, engine and fibreglass repair, net-mending, and pot-making, reside within the boundaries of the PBPA. If you multiply these persons by 4 or 5 (the family size), then you would find about 20,000 people depend on fishing as a direct or indirect source of income and means of earning their living."***

There are about 4,200 fishers among the landing sites in the PBPA (Table 4.5). The majority of fishers are located at Old Harbour Bay and Rocky Point. These two sites together hold 62% of the fishers in the PBPA. An important point to note is that all fishers in the PBPA may not be accounted for since some may operate without a licence. In 1998, 24% of the total fishers in the PBPA were unlicensed fishers (Halcrow, 1998). Information from interviews suggests that this problem is just as serious today.

Another, interesting socio-economic characteristic of the fishers of the PBPA is the gender balance. Women play an important role in the fisheries. For the most part they are vendors. A member of CCAM stated that based on research he has conducted, women own about 50% of the vessels in the PBPA. They do not go out to sea, but manage the maintenance of the boats and the revenue generated from fish sales.

Fisheries Division of Jamaica

The Fisheries Division of Jamaica represents government interest in the PBPA. The government of Jamaica in 1975 established the Fisheries Division. It is the government body whose mandate is to control the catching of fish in the country, under the Fishing Industry Act, 1975. This body acts through the enforcement of rules and regulations.

Under the Fishing Industry Act, 1975 a licence is required to catch fish utilizing one of the prescribed methods under the Act. Fisheries Division is responsible for the dissemination of these licences within the rules of the Act. Thus, the Fisheries Division is the watchdog for illegal fishing (fishing without permission or without a licence) in the PBPA.

Fisheries Division is also responsible for the protection of fish from overexploitation through the designation of fish sanctuaries. Thus, this government body plays an important role in the enforcement of rules that protect fish and the designation of fish sanctuaries in the PBPA. According to Espeut (1999) Fisheries Division are "foundation members" of the Portland Bight Fisheries Management Council (which would be described later in this section), and they played a significant part in the process of drafting fisheries regulations for the PBPA. A Bill, which includes the protection of fish in the Pedro Cays, has already been drafted and is under review. This Bill addresses factors, which are pertinent to the PBPA including fishery management, plans, the declaration of fishery management areas, provisions for conservation and management measures and licensing of all fishing activities, and provisions to ensure enforcement of the controls (NRCA, 2001).

Natural Resources Conservation Authority (NRCA)

The Jamaican government, in an effort to stem the degradation of Jamaica's marine and terrestrial environment, earmarked a number of natural areas for special protection under the NRCA Act (1990). Of the 10 areas, Portland Bight and the Hellshire Hills was one. The NRCA is the government authority that, by law, has the responsibility to manage and protect all these natural areas, and to formulate and implement a plan for parks and protected areas in Jamaica (Espeut, 1999). The NRCA, as one of its strategies for the preservation of its natural resources, decided not to develop a national park service to manage its designated protected areas. They decided on a system to delegate management of these protected areas to non-governmental organizations (NGOs).

Caribbean Coastal Area Management Foundation (CCAM)

The CCAM is a non-profit environment and development NGO formally incorporated on August 18, 1998 as a company limited by guarantee not having a share capital (Espeut, 1999). In 1992 CCAM emerged as one of the first NGOs with keen interest in the management of Portland Bight and the Hellshire Hills and thus taking up the challenge put forward by the NRCA. They conducted intensive lobbying in this vein and on Earth Day (April 22) of 1999, CCAM was successful in getting the area declared a protected area, or rather the Portland Bight Protected Area.

CCAM has demonstrated its dedication to the effective management of natural resources of the PBPA through stakeholder participation, and promotes resources management through a joint effort of the resource users and the government of Jamaica. It holds to its co-management concept, which is defined as management by the stakeholders through their representatives.

CCAM believes that users, the government or other stakeholders, as separate autonomous bodies, cannot successfully manage the environment. Therefore, acting as a catalyst, CCAM has made attempts to foster co-management through the formation and strengthening of community-based resource-user groups. They believe that these groups, in turn can work with the relevant government agencies and stakeholders in designing and implementing sustainable use strategies through various resource management councils. CCAM believes that these resource management councils are the loci of co-management, and it is on the basis of this belief or philosophy that the Portland Bight Fisheries Management Council (PBFMC) was developed.

Portland Bight Fisheries Management Council (PBFMC)

The PBFMC is the most active co-management council in the PBPA.

Prior to the formation of the PBFMC, CCAM undertook the task of forming fishing associations at the nine (9) fishing beaches or landing sites in the PBPA and this is discussed in more detail later on in dealing with the tradition of collective action and attitudes of fishers. CCAM has been working in Portland Bight since 1993, performing the arduous task of getting fishers involved in the management of their fisheries resources. In the beginning there were only 2 functioning fishers' associations or groups. Now there are eight such groups united under a single umbrella - the PBFMC.

In 1995 at most two representatives from the executive of each association, together with representative members of governmental organizations (Natural Resources Conservation Authority, Fisheries Division, Coast Guard and Port Authority), and private organizations (Urban Development Corporation, Jamaica Co-operative Union and anglers' clubs) joined to form the PBFMC. The PBFMC comprise of 32 members. The following is the breakdown of the membership in the PBFMC:

- two representatives from each fishers' association;
- one representative, respectively, from Rocky Point and Old Harbour Bay Fishermen's Co-operative Societies;
- one representative each from the two recreational fishing clubs in the area;
- one representative each from government agencies (Fisheries Division, NRCA, Port Authority, Police of St. Catherine and Clarendon, and the Coast Guard);
- one representative each from private organizations (the Urban Development Corporation, the Co-operative Department) and two from the Jamaica Fishermen's Co-op Union; and
- two representatives from CCAM.

The PBFMC was created to foster co-management of fisheries resources in the PBPA. It was formed on CCAM's foundational principle for co-management: "co-management through stakeholder representation." The understanding ruling PBFMC's formation is that co-management is very practical. According to a member of CCAM, ***"You cannot have every stakeholder involved in a process present in the same room. It has to be delegates of the stakeholders. So, stakeholders have to be organized into groups and democratically select their representatives. The assumption is these persons who take part in the process represent a group of people. They attend the meetings bringing the concerns of their respective groups, and they return to the group afterwards to convey what happened at the meeting and to acquire feedback for the next meeting"***. Thus, it is upon this premise that the operations of the PBFMC are based. Later discussions will give more detail on the operations of the PBFMC, or rather the patterns of interaction for the co-management of fisheries resources in the PBPA.

4.1.2.5 Market characteristics

Catch is sold on both the international and local market. However, the distinction is made between finfish, and lobster and conch. Lobster and conch is usually sold for export. Finfish is sold on the local market. Halcrow (1998) describes the marketing and distribution of finfish catch landed at sites on the south coast as a well-developed system. Catch at these landing sites are distributed along four main pathways within a simple market system. Catch is either:

a) Sold to consumers on the beach;
b) Taken by fishers to sell in the nearby community;
c) Sold to vendors on the beach who transport the fish to other communities for sale;

d) Sold to middlemen on the beach who transport the fish to other communities for sale by vendors.

It was observed and even mentioned by fishers and other key informants that pathways most common at small landing sites are (a) and (b). However, at medium and large landing sites like Rocky Point and Old Harbour Bay pathways (c) and (d) are most common. It was also observed that women play an integral role in the marketing situation as fish vendors (Figure 4.6).

(a)  **(b)** 

Figure 4.6 A glimpse at the marketing situation at (a) Rocky Point and (b) Old Habour Bay

Fish transported from these medium and large sites are said to reach "virtually every other part of the island", especially the north coast where demand for fish is high (Halcrow, 1998). A member of CCAM explains that, ***"There is a marked surplus of demand over supply for fish on the local market, and Jamaica imports Ja$100s of millions worth of fish each year because of high per capita consumption."***

The fish market system of the PBPA, therefore, involves the distribution of area's fisheries resources on local, national and international levels. Demand for the fisheries resources of the PBPA is not confined to the demands of the local market. The external (or international) demand for these resources coupled with local demand has undoubtedly contributed to the marked depletion of the PBPA's fisheries resources.

4.1.2.6 Fisheries institutional and organizational arrangements for the PBPA

In this section the focus is on the tradition of collective action among fishers and other stakeholders in the PBPA, their attitudes towards collective action and responsibilities for fisheries management, and decision-making. In addition, changes in property rights and rules over time are examined along with attitudes towards rules and rule breaking. This is followed by an assessment of monitoring and enforcement of fishery-related rules and regulations in the PBPA.

Tradition of collective action and attitudes of fishers

In general, the Portland Bight fisheries do not have a long tradition of collective action.Actually, until recently, there has been a lack of organization among fisherfolk in the PBPA with few functioning fisherfolk organizations. This is one of the main reasons for the lack of facilities at landing sites in the area (see Section 4.1.2 on Technical Attributes and Table 4.2). The only longstanding and functioning fisherfolk organization in the PBPA is the Old Harbour Bay Fishers Association. Also, there were active organizations at Rocky Point and Hellshire Beach.

However, the main focus of these active associations was the acquisition of gear at discounted prices and of other subsidies, rather than collective action towards management of fisheries resources.

In 1995 CCAM launched a challenging initiative and provided assistance in the organization of these fisherfolk in the PBPA. CCAM's first efforts were in assisting fishers on the beaches in the PBPA to form associations where none was existent and to strengthen existing associations. In one year associations were formed and strengthened at Hellshire Beach, Old Harbour Bay, Rocky Point, Welcome Beach, Mitchell Town, and Barmouth. CCAM, despite great efforts, was unable to organize the fishers at Beauchamps and Carlisle Bay into associations. Nevertheless, the PBFMC reserves four spaces for them. These fishers' associations are managed and controlled by the fishers belonging to the respective beaches.

These associations are now playing an essential role in the management of the fisheries of the PBPA. CCAM has assisted in organizing these associations under one umbrella group known as the PBFMC (see Section 4.1.2). The PBFMC is said to have provided the fisherfolk with a collective voice in the management of the PBPA, and it forms an integral part of the management strategy for the Portland Bight fishery.

One problem, however, with the fishers' association and consequently the PBFMC is their composition. Interviews with fishers have revealed that not all fishers at these landing sites are aware of these associations, and some do not support them. This problem is mainly due to the traditional hierarchical system that exists among fishers. A member of CCAM explained that a "Marxian type" hierarchical two-class social system exists among the fishers, where the boat owners are the ones who basically run the fishery operations and form the membership of fishing associations on the beaches and the other fishers are mere workers. In other words, the small population of bourgeoisies (boat owners) dominate the large population of proletariats (other fishers). CCAM has made efforts to integrate these other fishers (captain and crew of the vessels) into the fishers' associations and consequently the PBFMC, but these efforts have proven to be futile.

Collective action is the catalyst of the PBFMC. One good example of this is the way in which the organization developed fishing regulations. One of the first goals of fishers' associations is the establishment of fishing regulations. Each association discussed the fisheries regulations it would like to see implemented. These ideas were used to formulate fishing regulations for Portland Bight on a whole. The PBFMC finalized regulations for the area, and support the implementation, monitoring and enforcement of them. Consensus among stakeholder representatives must be attained before a regulation can go forward to the Minister of Agriculture for approval. Currently, the PBFMC is awaiting the approval of these regulations.

Members seem to have a positive regard for the leaders of the PBFMC. The leadership may be described as legitimate, having been elected by the members themselves. However, these leaders are not the sole decisions-makers of the PBFMC. Their responsibilities surround giving guidance on the various fisheries management issues involving the PBFMC and keeping the order of meetings' proceedings. For the PBFMC, decisions are made by majority consensus. The PBFMC is the principal decision making arrangement formulated for the co-management of fisheries within the PBPA. However, its function in this stead has been restricted due to the absence of management authority.

The government through the NRCA has full management authority of the PBPA and its resources. So, decisions on the PBPA's fisheries resources are made at government levels and then are filtered down to the fishers (Figure 4.7). The PBFMC represents a process for fisheries co-management where all the players are brought together to manage the fisheries resources of the PBPA. However, for this process to move from planning and development to implementation and operation there is need for the impartation of management authority from government to the PBFMC, which is all represented stakeholders including government. In other words, for the process of fisheries co-management to reach its operational stage, there is need for a lateral movement of management authority and decision-making, rather than the existent vertical or top-bottom approach (Figure 4.7).

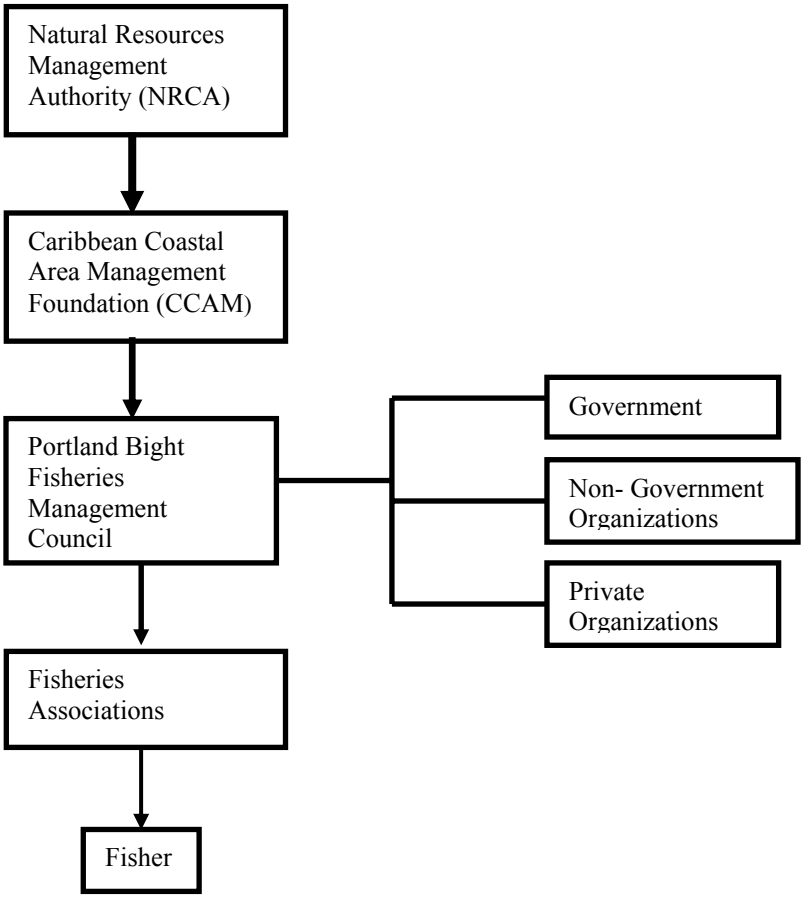

Figure 4.7 The flow of decision-making and management authority for the management of fisheries resources in the PBPA

Although the PBPA has been declared a protected area, CCAM has not yet been delegated with management authority. CCAM, as facilitators of the PBPA's fisheries co-management process, believed that the 9 years of preparation resulting in the declaration of the PBPA and the development of the PBFMC (the most active council among others) brought the process to the stage at which the government, or rather the NRCA, should be willing to share responsibility in

the management of the PBPA's fisheries resources. This faith has remained steadfast, despite current signs of waning.

Sharing of responsibility is problematic at the government level since the PBFMC (the fisheries co-management body) through CCAM has not received management authority from the NRCA (the government). This situation highlights the importance of legal authority in fisheries co-management for the PBPA. Unless the PBFMC has legal authority to manage, or rather co-manage, the process will remain fixated at the level of planning and consultation. In addition, the government will remain the sole decision-maker on the management of the PBPA's fisheries resources, rather than facilitating a more participatory approach to fisheries management.

The members of the PBFMC have expressed their willingness to support fisheries co-management in the PBPA. The members of the PBFMC who were interviewed indicated that there is a dire need to conserve the fisheries resources of the area. The fishers indicated that fishing is their sole means of livelihood, and this fact is the main contributor to the maintenance of their support of the co-management process.

These fishers believe that fisher folk in the PBPA need to be made aware about the damage that ***"we are doing to the sea"***. They believe that education is the key tool to solving this problem, and are very involved in the development and implementation of programmes geared towards fisheries co-management education. One fisher explains that, ***"what keeps me going is the fact that life is still there and it is just for us to implement the plan"***. The plan he speaks about is the management plan developed by CCAM for fisheries co-management in the PBPA.

Fundamentally, the members of the PBFMC, especially the fishers, believe that the council plays an integral part in the proper management of the PBPA's fisheries resources. They believe that this proper management can be achieved through the empowerment of the resource users and the operationalization of co-management. However, this is frustrated by government's delay in the delegation of management authority to CCAM.

Fishery-related property rights and rules in Jamaica

Traditional or customary rights and tenure do not exist in Portland Bight. The fisheries resources of Portland Bight were, for a long time, open access. Fishers could fish anywhere they pleased without fear of being apprehended by formal government authorities. In the mid 1970s initial steps were made to manage this open access regime. The government, mainly through the Fisheries Division, Jamaica managed and controlled access to fisheries resources through the allocation of fishing licences or permits. However, this fisheries management measure did not create any major changes in access to fisheries resources for fishers. Fishers claimed that it was easy to obtain a fishing licence, and this licence allowed them to fish anywhere in the Jamaica's territorial waters. Today, there are attempts made by government, through the NRCA, move from state dominated management of fisheries resources to fisheries co-management.

These attempts have brought about the declaration of Portland Bight as a protected area, namely the PBPA, potentially leading to changes in property rights. Draft fisheries regulations have designated 8 no-fishing areas in the PBPA, comprising 7 Species Management Areas and one National Nature Reserve (see Section 4.1.2 in subsection dealing with "Technical Boundaries"). Though these draft regulations are yet to be enacted rights of access (entry rights) and withdrawal (harvesting) exist. Management rights are not yet existent for all fishers in the PBPA. Beyond these restricted boundaries, open access remains predominant.

The movement towards managed open access of the PBPA's fisheries resources was accompanied by the formulation and enforcement (in some cases) of various rules over time. These rules fall into three main categories: operational, collective choice, and constitutional rules (see Section 2.2 for definitions).

Formal operational rules in the PBPA are largely embodied in the Fishing Industry Act, 1975, which is superseded by the NRCA Act, 1990 (see Section 4.1.2.1 in subsection dealing with "Technical Boundaries"). For instance, the Fishing Industry Act requires fishers to secure permits before they can fish in the territorial waters. This represents a boundary rule (who can enter the fishery). Acquiring a permit was quite easy in the past, but fishers claim that it has become more difficult in recent times. Now, an application for a fishing permit must be accompanied by a valid recommendation. Formal allocation rules (actions or procedures for fish harvesting) prohibit the use of destructive gear and practices, especially fishing methods suing fry nets, any shove nets or fine mesh gillnets. The recent use of destructive methods such as dynamie fishing and using poisons have led to the formulation of draft rules banning these methods. In addition, the depletion of fish stock in the PBPA led to the development of legislation like the Morant and Pedro Cays Act (1980), which establish licensing conditions in the Morant and Pedro Cays, and prohibit unauthorised fishing.

Scope rules (specification of characteristic of fish that can be harvested) pertain to the ban on harvesting immature conch or lobster, and lobsters with eggs (berried lobsters). Penalty rules also exist. In the PBPA, violations of the Fishing Industry Act, 1975 call for a fine not exceeding five hundred dollars, or imprisonment of a term not exceeding six months. This Act was later updated, calling for harsher penalties- a fine not exceeding one thousand dollars, or imprisonment for a term not exceeding 12 months.

Collective Choice Rules in the PBPA show that monitoring and enforcing compliance with operational rules are the responsibility of government agencies. The Fishing Industry Act, 1975 and the NRCA Act, 1990 state the following government agencies as enforcers of fishing regulations: the Fisheries Division, the NRCA Enforcement Unit, Honorary Game Wardens (approved under the Wild Life Protection Act), the Jamaica Defence Force (JDF) Coast Guard, the Jamaica Constabulary Force, and the Environmental Wardens Service. Contravention of fishing regulations is dealt with, by law, through appeals to the Minister in charge of Fisheries Division, Jamaica.

At the national level, constitutional rules, which apply to the PBPA, include national legislation on the devolution of powers and authority to local units, the establishment of protected areas as embodied in the NRCA Act, 1990, and other related legislation enacted by the government. Thus, the NRCA has exercised its powers when declaring Portland Bight a protected area. However, they are yet to devolve management authority to CCAM.

Operational rules are widely known by fishers in the PBPA. However, key stakeholders interviewed indicated that there has been considerable violation of these rules. Members of the PBFMC claim that there are fishers in the PBPA who do not own fishing licences. There are fishers who will harvest juvenile conch or lobsters, and berried lobsters. In addition, there is the current problem of destructive fishing methods such as dynamite fishing and the use of poisons.

4.1.2.7 Monitoring and enforcement

The management of fisheries resources in the PBPA, as in other regions, has long suffered from the lack of consistent monitoring and enforcement of fishing regulations. Fisheries Division, and other government agencies responsible for enforcement lack the manpower and other resources needed for steady monitoring and enforcement focussed on fisheries. A member of CCAM spoke of instances where fishery records on landing sites were not updated in decades.

In addition, there has been a lack of cooperation on the part of fishers. One fisher interviewed claimed that some fishers fail to understand the need for proper management of the PBPA's fisheries resources. They feel that the role of the PBFMC (and CCAM) is futile. Thus, the need is seen for stakeholder management or co-management to foster better monitoring and enforcement strategies. The point has been raised at PBFMC meetings that there is need for fishers' associations and the PBFMC to share management power with the government in order to deal with rule-breakers. The lack of enforcement by Fisheries Division is seen as a serious problem.

4.1.3 Incentives to cooperate and patterns of interaction

Regardless of the fact that the fisheries of the PBPA are still under a government management, there is movement towards fisheries co-management. This gradual movement towards co-management has fostered incentives to cooperate at various levels: among fishers; between government organizations (GOs) and non-government organizations (NGOs); and among fishers, GOs and NGOs.

4.1.3.1 Among fishers

At the level of fishers of the PBPA, the motivating factors behind collaborative efforts are largely rooted in their dependence on the resource base and their realization of the need to decisively act on declining fish yields. Through the tireless efforts of CCAM, fishers' associations were formed at fishing beaches in the PBPA, and through the PBFMC these associations are involved in the process of fisheries co-management in the PBPA. These associations have also provided fishers with a forum where they can effectively and holistically deal with issues of better fishing beach facilities, subsidies on fishing gear and fuel, and proper insurance policies for fishers.

The journey towards fisheries co-management in the PBPA is not problem-free. There are many fishers who still believe that the efforts of the PBFMC and CCAM are futile and insignificant. However, the council has been actively involved in awareness and education programmes among fishers concerning the need for fisheries conservation and proper fisheries management through co-management.

4.1.3.2 Between Government Organizations (GOs) and Non-Government Organizations (NGOs)

At the level of GOs and NGOs, the desire to stem the degradation of Jamaica's marine (and terrestrial) environment served as an incentive to collaborate. The NRCA, under the NRCA Act, has the responsibility to manage and protect all areas of special protection, and to put in place and to implement a plan for parks and protected areas in Jamaica. This is a mammoth task, and thus the NRCA chose to execute this task in collaboration with suitable NGOs. CCAM, with vested interest in the proper management of the PBPA's natural resources, arose to the challenge of developing a natural resources co-management regime for the PBPA. However, there exist the

problem of sharing of management authority by GOs, and thus, the long delay in the delegation of management authority to CCAM by the NRCA.

4.1.3.3 Among fishers, Government Organizations (GOs) and Non-Government Organizations (NGOs)

The PBFMC represents the fundamental motivating force for collaboration among fishers, GOs and NGOs. This fisheries co-management body gives proper representation of all the stakeholders of the fisheries resources of the PBPA. The driving force of the PBFMC is the integral role it plays in the development of fisheries co-management in the PBPA. The efforts of CCAM in the formulation of this council remain a foundational motivating factor. Members of the PBFMC have been noted to claim that it is the unfailing efforts of CCAM (the parent body) that pushes the council forward. Another incentive for the PBFMC is its potential to become one of the first dynamic and successfully functioning fisheries co-management bodies in the Caribbean region.

4.1.4 Outcomes and Performance Indicators of Co-Management

Fisheries co-management in the PBPA has not yet been fully realised. The process is still in its embryonic stages. At this stage the PBFMC represents "consultative" co-management. This is a level of co-management where mechanisms exist by which the government consults with resource users; but government takes all decisions (Sen and Raakjaer Nielsen, 1996). This co-management process is yet to reach the level of full sharing of responsibility and authority between government and other stakeholders in the management of the fisheries resources of the PBPA. However, the performance of the PBFMC has indicated a progressive move towards co-management.

The PBFMC has been holding monthly meetings from its inception. The first meeting of the PBFMC was held on FAO International Fisherman's Day (June 29) 1995, a Thursday. It has met on the last Thursday of every month ever since (Figure 4.8). It was reported that in October 2001, the PBFMC held its 70th meeting at Hellshire Beach.

The PBFMC has played an integral role in the drafting of management policies for the PBPA, especially those concerning fisheries. The council has also been actively involved in the formulation of regulations for the PBPA. These regulations are in draft form awaiting parliamentary approval. In addition, the PBFMC has reviewed the Wildlife Protection Act and regulations, the NRCA Act and regulations, and the members have familiarized themselves with their provisions.

Figure 4.8 The PBFMC meeting at Old Harbour Bay on Thursday 30 August 2001

The PBFMC has been actively involved in the education of hundreds of fishers on the fishing beaches in the PBPA concerning fisheries management and good fishing practices. By moving the PBFMC meetings from beach to beach and welcoming observers, the council has built up support among fishers of the PBPA for fisheries management. The council has also developed good

working relations with government departments and agencies such as the NRCA, the Fisheries Division, the Port Authority, the Police and the JDF Coast guard, and has assisted in the enforcement of existing fisheries and wildlife laws by supporting the Honorary Game Warden/ Fisheries Inspector programme.

Members of the PBFMC see the council as playing an integral role in the fisheries co-management process of the PBPA, with CCAM as the parent body of the council. They claim that the council has managed to build up a strong local and international reputation for seriousness and effectiveness in its approach to co-management. However, the long delay in delegation of management authority to CCAM has proven to be a discouragement to the council.

4.1.5 Conclusion and Discussion on the PBPA's Management Regime

The fishery of the PBPA has been traditionally under an open access regime. The government through the Fisheries Division, Jamaica has held management authority for fisheries resources since the mid 1970's. Later on other government agencies, specifically the NRCA in the 1990s, were given the authority to conserve and protect the natural resources of Jamaica, including its fisheries resources. However, these efforts by government authority to manage the traditional open access regime, did not deal with the problem of improper management and overexploitation of common property- the PBPA's fisheries resources.

The government, in its efforts to stem the degradation of the existing natural resources of Jamaica, embarked on a programme of co-management. The NRCA felt that to achieve better management of the use of their natural resources, management responsibility and authority should be shared with other stakeholders, in this case non-governmental organizations (NGOs). Thus, CCAM became the NGO with vested interest in the co-management of the PBPA's natural resources. In this vein, CCAM facilitated the development of the PBFMC, which is the body responsible for fisheries co-management in the PBPA.

However, for the PBPA, fisheries co-management is still in its embryonic stages. The state's efforts to share management authority with the other stakeholders of the PBPA have not yet materialised. The government (NRCA and Fisheries Division, Jamaica) still hold management authority and responsibility for the fisheries resources of the PBPA, with a commitment to work towards a state of full sharing of management authority and responsibility among stakeholders. For now, the fisheries resources of the PBPA remain open access, and managed by government.

4.2 Soufriere/Scotts Head Marine Reserve (SSMR), Dominica

This section deals with the analysis of the co-management of fisheries resources in the SSMR. Following the research framework as described in Section 2.3, the analysis has proceeded in four main stages. It commences with an overview of the co-management experience of the SSMR. This is followed by the identification of the contextual variables for the SSMR resource area. Subsequently, there is an examination of the actual fisheries co-management experience for the SSMR. The contextual variables are linked with the institutional arrangements or rights and rules that govern fisheries management in the SSMR, and the incentives and disincentives which foster co-management are analysed. Also, the impact of co-management on the human and non-human elements of the SSMR's fisheries resources is assessed using the three performance measurements (sustainability, efficiency, and equity). Finally, the specific conditions needed for successful long-term fisheries co-management in the SSMR is identified. This includes a

discussion on the extent to which the plans governing fisheries co-management for the SSMR have been realised.

4.2.1 An overview of the fisheries co-management experience of the SSMR

In Dominica there has been increasing demands on marine and coastal regions, especially the fisheries resources of these regions. Due to the increasing demands placed upon these limited resources by various users, different parts of the marine environment were designated for protection and allocated to specific uses (Lawrence, Magloire and Guiste, 1997). The SSMR was one such marine area.

The idea and concept of the SSMR was initially formulated in 1987. Since then the SSMR has been established under the Fisheries Act No. 11 of 1987, and a management plan was developed for the reserve. The reserve was ratified for the following reasons: (1) to ensure that there is a minimum of user conflicts; (2) to preserve the tradition of fishing in the area and avoid the possible threats of employment displacement; (3) to cater for some compatible trends in development without sacrificing the livelihood of the people; and (4) to ensure the conservation of a resource which is unique to that area.

An immediate objective was the redefining of access to SSMR's marine area to accommodate the resource conservation and preservation intentions, and the establishment of formal property rights and rules. Therefore, the Local Area Management Authority (LAMA) was established in 1998 as the main co-management body to implement the conservation programme for marine resources, including fisheries resources in the SSMR.

4.2.2 Contextual variables of the SSMR

The contextual variables refer to the key attributes of the marine reserve and its fisheries resources, the fishers, recreational users and other stakeholders of the SSMR, its market characteristics as they relate to fisheries in the SSMR, and an outline of the principal institutional arrangements and organizations governing the co-management of fisheries resources in the SSMR.

4.2.2.1 Physical, technical and biological attributes of the SSMR

Physical attributes of the SSMR

The SSMR is located in the Soufriere/Scotts Head Bay on the southwestern tip of the island of Dominica (Figure 3.2). The reserve is mainly marine space and adjacent coastline. It extends from Point Cacharou in the south to Anse Bateux in the north, and includes all the coastal area in between (Figure 4.9).

The SSMR encompasses the coastline of two small coastal communities (Figure 4.9). These communities are Soufriere, with a population of about 800 persons, and Scotts Head, with a larger population of about 1,200 persons. There is one main coastal road connecting the two villages.

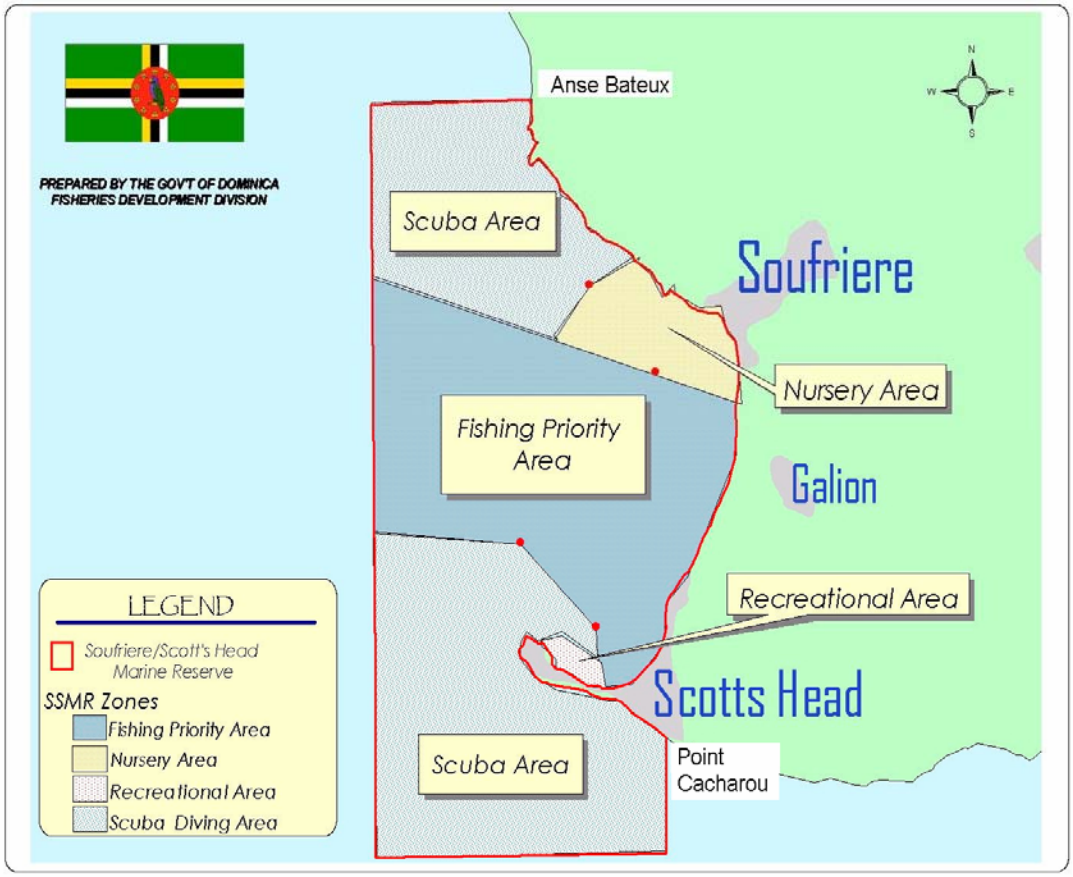

Figure 4.9 Zonation of the SSMR and other

The main physical attributes of the SSMR are its coral communities. Dominica is characterized by steep topography, which limits the area available for reef development along the island coasts. Thus, one of the most significant areas of coral community growth on volcanic rock is in the SSMR.

A characteristic physical feature for the bay is that it is an extinct volcanic crater that plummets to indeterminate depths as a lava chute, making the area renowned for its unique dive sites. In the northern area of the SSMR, or Scuba Area (Figure 14), there are numerous hot gas bubbles produced from volcanic activity escaping from the ocean floor through the water column and to the surface. These volcanic features of the SSMR are also responsible for its clear waters and warm vents.

Boundaries of the SSMR

Fishing in the waters of Dominica have been characterised historically by open access. The designation of legal and technical boundaries for the SSMR is a recent effort. These boundaries emerged with the formulation and implementation of the SSMR.

There are no customary boundaries for the Soufriere/Scotts Head bay. Its fisheries are traditionally open access, and any fisher could fish anywhere in Dominica. Changes occurred

over time in the fisheries resources, with increased competition for use and uncontrolled extraction for economic gain.

The territorial sea, contiguous zone, and the EEZ define political boundaries for Dominica waters. Dominica's territorial waters extend up to 12 nautical miles from Dominica's shoreline. The contiguous zone extends up to 24 nm from the shoreline and its EEZ is 200 nm. The Dominican government through legislation exercises jurisdiction over its waters within these 3 classifications.

The Soufriere/Scotts Head marine area was designated a marine reserve under the Fisheries Act No. 11 of 1987, with the overall objective to manage recreational activity while also providing for the maintenance of fisheries activity in the reserve (Lawrence, Magloire and Guiste, 1997). A Local Area Management Authority (LAMA) has been designated through the Fisheries Management Authority (Soufriere Scotts Head Marine Reserve) Notice 1998 Statutory Rules and Orders (S.R.O.) No. 17 to manage the SSMR.

According to the SSMR management plan created by the Fisheries Division, the marine region of the SSMR is divided into four zones: Fishing Priority Area, Fish Nursery Area, Recreation Area, and Scuba Diving (Figure 14). The Fishing Priority Area is set aside for fishing purposes only, so that the competitive activities are not permitted in the area. The Fish Nursery Area is an expanse of marine space set aside for juvenile fish species to grow undisturbed, so no activities except that for fisheries research and education are allowed in the area.

The Recreation Area is located in the south of the SSMR (Figure 4.9) at the beach called "Tous sable" and is designated as a recreational area for swimming and snorkelling from the shore. There are two Scuba Diving zones in the SSMR, one at the north end and the other at the south end of the SSMR. There are several areas set aside for scuba diving activities in these zones. These areas are demarcated by a buoy, which is placed there for use by dive boats only. The main users of these areas are the members of the Dominica Water-sports Association (DWA). They are required under fisheries regulations to pay user fees allowances to LAMA once they enter the designated areas.

Technical attributes of the SSMR

There has not been any drastic change in the structure of fisheries in the SSMR area. There are two fishing landing sites in the SSMR, one at Soufriere bay area, and the other at Scotts Head Bay area. The Scotts Head landing site is the larger of the two landing sites. Most (90%) of the fishers in the SSMR area are located in Scotts Head.

From pre-colonialism to present day, the fishers of the Soufriere/Scotts Head area used traditional artisanal fishing methods, such as nets, fish pots, hook and line, and spear gun. Generally, individual fishers do not specialize in one type of fishing method, but use multiple fishing gears. Based on the random sample survey conducted, about 70% of the fishers interviewed use more than one fishing method. The most common gear used is gillnets (used by 76% of the fishers) (Figure 4.10). Following are fish pot (used by 48%), hook and line (used by 48%), spear gun fishing (by 24%) and troll nets (used by 8%).

The survey results also indicated that the fishers in the SSMR have two main sources of information on gear. They are most dependent on other fishers (76% of fishers), and fisheries officers (56% of fishers); 28% also use the radio for information, while a few (1%) use fishing books, the television, and pamphlets. Most (76%) of these fishers owned their gear. Others

borrowed or rented their gear, or used the gear owned by their employees. During the fishers' survey one fisher indicated that he owns a Fish Aggregating Device (FAD) that he shares at times with other fishers.

Rowboats were the main type of vessel at one time, but now most of the fishermen own fibreglass boats with engines (Figure 4.11). The majority (84%) of the fishers interviewed during the fishers' survey used vessels for fishing. Most (62%) used mechanised fibreglass vessels, while the remainder used either mechanized wooden vessels or rowboats (Figure 4.11). Therefore, application of technology to harvest the fisheries resources has increased. Most of these fishers owned their vessels. Others borrowed or rented their vessels, or used the vessels owned by their employees.

(a)

(b)

Figure 4.10 The two most common fishing gear used by fishers in the SSMR: (a) gillnets, and (b) fish pots

Figure 4.11 The types of fishing vessels in the SSMR

Prior to the 1970s, the main activity in the Soufriere/Scotts Head Bay was fishing. Gradually, tourism activities such as snorkelling and scuba diving were introduced to the area. Up until the early 1980s there were no major water sports or tourism activities in the bay. Today, these recreational tourism activities have significantly increased and are now frequent in the SSMR. There is one well-established dive shop in the area. In addition, divers and other recreational users from other shops outside of the area use the SSMR.

Biological attributes of the SSMR

The SSMR represents one of the few marine areas in Dominica with significant coral reef growth and coral communities. In different sections of the near shore areas of the SSMR, there are coral reefs and scattered coral heads. Sea grass bed communities precede these reefs from the shoreline, and act as a buffer zone between the coral reefs and the shoreline. These coral reefs have experienced significant impacts from human activities. However, interviews with key informants on the SSMR revealed that the coral communities are in good condition. There is just

greater exploitation with more fishers in the area and the introduction of water sporting activities like scuba diving for tourism purposes.

The fishers of the SSMR harvest various types of fish, both pelagic and demersal. The most recent research on the fisheries of the SSMR explained that visual studies in the SSMR indicated that there is a reduction in the size and quantities of demersal species landed (Guiste and Gobert, 1996). However, to date no further research has been conducted to support these visual studies. Information from a study conducted by Guiste and Gobert in 1996 and even more recently, from the fishers' survey in 2001 suggest that the most common species harvested in the SSMR depends on the type of gear used.

Mackerel is the most abundant species harvested by beach seines, comprising one-third of the catch followed by ballyhoo and then bonito. Other species harvested by beach seines are sprats, jacks and cavallies. Octopus and parrotfishes along with several other reef fishes and coastal pelagic species are most commonly caught with spear guns. For fish pots, the most common species are reef fishes such as morays, coney, squirrelfishes and graysby. The most common species harvested by gillnets, and hook and line are pespine (white grunt) and snappers. These two gear types are said to be species selective since only a small proportion of snappers are caught by gillnets, and hook and lines do not catch pespine. Most of the fish caught from trolling are bonito and skipjack.

There is insufficient scientific data available on the fisheries resources in the SSMR to indicate trends over time or, more importantly, whether the fisheries resources are under serious threat due to overexploitation. However, the fishers who participated in the fishers' survey were asked to describe the condition of fisheries resources in the SSMR before it was considered a marine reserve (15 years ago) and today. The majority (84%) of the fishers interviewed indicated that 15 years ago (1986), the fisheries resources were in good or very good condition, while the remainder felt they were in slightly good condition. The reasons were linked to the abundance of fishes, fewer fishers, and larger catches generating more income in the earlier period.

In terms of the perceived condition of fisheries resources today, about half (52%) of the fishers interviewed felt that the resources were in good or very good shape. These fishers explained that this was their opinion with no particular reason, while some attributed the good condition of the resources today to better fishing equipment and methods for harvesting fish. Twelve percent indicated that fisheries resources in the SSMR today are in slightly good condition, 20% said it was slightly bad and 12 percent said it was in bad condition. These fishers felt that the fish stock has decreased, yachts' anchors have damaged reefs, and fishes have moved away causing them to go further offshore to harvest. Key informants indicated that there has been some degradation of seabed and coral reefs due to anchor damage, but the situation is not a serious one. They felt that the development of the SSMR as a conservation measure was more a precautionary approach, or preventative action.

Based on the fishers' survey, 36 percent of the fishers interviewed expressed that the SSMR is essential to fisheries management. These fishers felt that the marine reserve would assist in the preservation of the fisheries resources and degradation of coral reefs especially through anchor damage. However, most of the fishers interviewed felt that the SSMR was either not essential (44%) or did not know whether it was essential (20%). Multiple responses on fishers' observations since the establishment of the marine reserve indicated that the reserve did not reduce user conflicts (52%), did not improve fish catch (80%), but protects the coastal resources

such as the coral reefs (64%). These fishers indicated that divers and tourists interfere with their fishing gear, especially their fish pots. Their catch has remained the same in most cases since the establishment of the reserve. However, they are happy that the reserve prevents the destruction of coral reefs especially by yachts' anchors, since most of them felt that the coral reefs and volcanic features of area sustains the fish stock in the SSMR.

4.2.2.2 Stakeholders of the SSMR

In the SSMR, the stakeholders, particularly pertaining to fisheries resources, consist of the fishers, fisher community, recreational users, the government (Fisheries Division, the Ministry of Finance, and the Ministry of Legal Affairs), and the Local Area Management Authority (LAMA).

Fisher community

Fishing as a socio-economic activity has a rich traditional and historical background in the villages of Scotts Head and Soufriere. During the period of colonialism, Dominica was the British Empire's main source of lime and lime products for the manufacture of cordial (sold as a popular chaser for alcoholic beverages). The lime industry declined during the 1970s, leading to the closure of the lime factory in Soufriere (the main lime factory in Dominica). This decline caused two reactions, one was the emigration of villagers to seek employment elsewhere and the other was influx of villagers into the fishing industry in the area.

Fishing is now the main activity in the villages of Scotts Head and Soufriere, which are considered fishing villages. For many years, the villagers have been the traditional users of the fisheries resources of the bay. They have depended heavily on these resources for their livelihood, since the terrain and soil type of the area is not conducive to agriculture. Key informants have indicated that the entire community thrives around the fishing activity, and the fishermen are meshed into the socio-economic life style of the villages. All of the fishers interviewed during the fishers' survey lived in either Scotts Head or Soufriere.

Characteristics of sample fishers and their households

Most of the fishers in the SSMR are mature adult men. On the average, fishers interviewed were 37 years of age, and had or belonged to a household size of almost 5 persons. All of them have lived in their respective villages for all of their lives. In terms of fishing experience, most (64%) of them reported that they have been fishing for more than 10 years, while 20 percent fished for 6 – 10 years, and 16 percent for 1 – 5 years. None of them had less than a year of fishing experience.

Overall, fishing is the primary occupation for the majority of fishers in the SSMR. In terms of income, 84 percent of the fishers interviewed ranked fishing as their most important source, providing more than half of their household earnings. In terms of food, fishing provided more than half of the food requirements for 40 percent of the fishers' households, and half the food requirement for another 28 percent. Outside of fishing just about 24% of these fishers engaged in other occupations such as masonry, carpentry, and huckstering.

Fishers in the SSMR are quite satisfied with their occupation. Given the chance to live their lives over, 80 percent of the sample fishers would still choose fishing. They would choose to become fishers for the simple reason that they love fishing and it gives them independence.

In terms of supporting the idea of the marine reserve when it was proposed, slightly more than half (52%) of the fishers interviewed indicated that they did not support the idea. Twenty-eight percent supported the proposal for the SSMR, while the remaining 20 percent did not know whether they supported the idea or not. However, there is more support for the SSMR now (40% of the fishers interviewed). Some stated their support on the condition that the SSMR does not affect the livelihood of fishers. Nevertheless, the remaining 60 percent do not support the SSMR.

Government organisations

Fisheries Division currently falls under the Ministry of Agriculture and the Environment. It is the main government authority responsible for the fishing industry in Dominica. The Fisheries Division was formed in the 1970s after the independence of the island from colonial rule. At that time the division comprised two officials and was mainly concerned with the management of the commercial processes around fishing, like inspecting scales and weights.

The Fisheries Division plays an integral and active role in the planning, implementation and management of the SSMR. The former chief fisheries officer indicated that the Fisheries Division was very instrumental in the conceptualisation and designation of the reserve, and the formation of the Local Area Management Authority (LAMA) (described later).

Two other government agencies play an integral role in the co-management of the SSMR. These are the Ministry of Legal Affairs and the Ministry of Finance. These two government bodies perform separate but fundamental functions in the co-management of the SSMR. The Ministry of Finance holds the responsibility for the financial aspects such as the establishment of a financial management plan that provides for the financial sustainability of the LAMA and the activities it undertakes in the co-management of the SSMR. While, the Ministry of Legal Affairs is responsible for the passing of regulations concerning the SSMR and the LAMA. However, the co-management process has encountered delays in the establishment of proper financial and legal frameworks for the functioning of LAMA as the co-management body. One key informant indicated that it took a period of 7 years for LAMA to obtain its legal framework.

The local area management authority (LAMA)

LAMA, under the Fisheries Management Authority (SSMR) Notice 1998 – SRO 17, is the Fisheries Management Authority of the SSMR. It was developed in 1994, and acts as the co-management body for the SSMR's marine resources. The objective of LAMA is to manage the various users, the recreational users and fishers, by involving all stakeholders.

In accordance with Fisheries regulations, LAMA is comprised of local fishermen, councils from three adjacent villages, community groups, local hospitality industry representatives, and the Dominica Water Sports Association (DWSA). The DWSA represents the other key stakeholders of the marine resources of the SSMR, the diving and snorkelling industry. The government agencies, which are the Fisheries Division of the Ministry of Agriculture and Environment, and the Dominica Police Force – Coast Guard Section, are the ex-oficio members of LAMA.

The functions of LAMA are delivered through four sector committees: Education, Operations and Development, Scientific and Research, and Finance. Activities are coordinated through a Management Board, officers of which are elected by the Board itself. The president of LAMA is also a part of the Water Sports Association (WSA). Under the Fisheries Management Authority

(SSMR) Notice 1998 – SRO 16, LAMA is vested with the responsibility of identifying wardens with the authority to ensure compliance with the management uses of the SSMR.

According to key informants, including the president of LAMA, there has been initial operationalization of LAMA, where wardens have been identified and received training, a vessel for patrolling the SSMR has been obtained, public awareness and education activities undertaken, and LAMA meeting held once every three months. However, LAMA has encountered delays in the identification and implementation of a financial management plan for its financial sustainability, and the implementation of a compliance programme to ensure over the long term that the activities undertaken within the SSMR are consistent with regulations. In addition, the main stakeholders of the SSMR fisheries resources, the fishers, are not involved in the co-management process, and consequently LAMA. Thus, LAMA is not fully operational.

4.2.2.3 Market characteristics

Fish catch from the SSMR is sold on the local market only. Based on the results from the fishers' survey, the majority (96%) of the fishers interviewed sold half or more than half of their catch to locals directly or indirectly. These fishers (68%) sell their catch primarily to fishmongers. Occasionally, they would sell directly to villagers in Scotts Head and Soufriere, or to locals at the town (Roseau) market.

Women play an important role in the fish marketing process for the SSMR. A fisher for over 10 years explained that fishmongers are women from the village who are fish vendors (Figure 4.12). Most, if not all, of them are the wives of fishermen. The fishermen sell the fish to these women (their wives) who in turn sell the fish for a profit in the town market. This marketing process is a traditional practice existing for generations. This fisher is about 50 years old and started fishing in his teens. He says that since he started fishing women were the main agents controlling the sale of fish from the Soufriere/Scotts Head area.

Figure 4.12 Fishmonger purchasing a fisher's catch at Scotts Head landing site

4.2.2.4 Fisheries institutional and organizational arrangements for the SSMR

In this section the focus is on the tradition of collective action among fishers and other stakeholders in the SSMR, their attitudes towards collective action and responsibilities for fisheries management, and decision-making. In addition, changes in property rights and rules over time are examined along with attitudes towards rules and rule breaking. This is followed by an assessment of monitoring and enforcement of fishery-related rules and regulations in the SSMR.

4.2.2.5 Tradition of Collective Action and Attitudes of Fishers

In general, the Soufriere/Scotts Head area does not have a tradition of collective action. According to the past chief fisheries officer, the two villages, Scotts Head and Soufriere, only mix for economic reasons, but socially were (and still are to some extent) rivals although they lie 1½ miles apart. He said, ***"This tribal characteristic is typical of Dominican villages."***

Fishers' associations and village organizations

The fishers in the SSMR do not have a tradition of organization. According to one fisher, five years ago fishers attempted to formulate an association known as the Scotts Head Fishing Cooperative. This association struggled for its five years of existence, and is no longer operational now. The objective of the association was to get fishers in an organized group. However, the fishers refused to work together. Almost all (96%) of the fishers interviewed indicated that they were never and presently are not members of any associations.

In general the fishers of Soufriere and Scotts Head did not know the objectives of the SSMR, and whether these objectives had been met. This was indicated by 96 percent of the fishers interviewed. In addition, these fishers felt that they were not considered in the planning of the SSMR. One fisher explained that fishers were not fully involved in LAMA meetings. He said that, ***"decisions are made and then fishermen are just told afterwards."*** This was the feeling expressed by many of the fishers. Only 28 percent of the fishers attended LAMA meetings, but just about 2 or 3 meetings. None of the fishers received training associated with the SSMR.

Only one interviewee, an experienced fisher, knew the objectives of the SSMR, and felt that he had an influence on the planning of the SSMR. He had been a member of LAMA for 11 years and attended LAMA meetings every 3 months since 1986. He felt that the objectives of the SSMR had not been met, since the fishers were not involved in the process. He expressed that in order for LAMA to become a fully operational co-management body for the fisheries resources of the SSMR, fishers and villagers should be properly educated on the significance of the marine reserve.

Attitudes toward association leadership and decision-making

According to key informants, all of whom are members of LAMA, the activities of LAMA are coordinated through a management board, officers of which are elected by the board itself. The sole fisher involved in LAMA, expressed that he found the leadership of LAMA to be democratic. He finds that the leader is credible, and that decisions are made based on a majority. However, most of the fishers feel that there is a conflict of interest with the present leadership of LAMA, since the president is also a member of DWSA. These fishers believe that the SSMR and LAMA are more beneficial to the recreational users.

Attitudes toward collective action

Based on the fishers' survey, the attitudes toward collective action were fairly balanced between positive and negative. Forty-eight percent of the fishers interviewed expressed that the people in their villages can work together to solve community problems. The remaining 52 percent felt otherwise. Similarly, 52 percent felt that fishers could work together to solve fishery problems, while the others felt otherwise. This indicates that there is some movement towards an attitude of collective action, which goes against the cultural norms and traditional values of the fishers, and by extension the villagers.

Attitudes toward the distribution and sharing of responsibility for fisheries management and the flow of management authority

When the fishers were asked about the extent of sharing responsibility for fisheries management, the majority (64%) expressed that the government has most of the responsibility. Sixteen percent felt that there was equal sharing between the government and the fishing community, while a similar amount felt that the government has less responsibility. Only one fisher felt that

the fishers had all the responsibility. This general feeling represented the flow of decision-making and management authority for the management of fisheries resources in the SSMR (Figure 4.13).

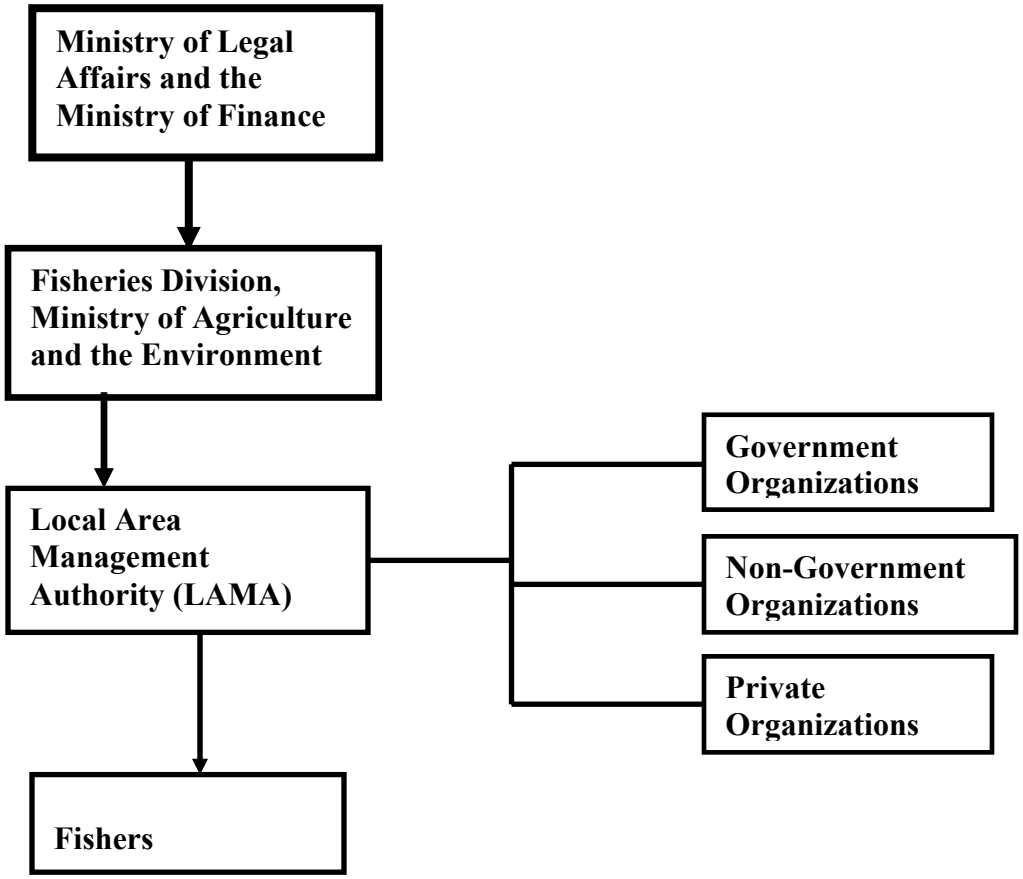

Figure 4.13 The flow of decision-making and management authority for the management of fisheries resources in the SSMR

LAMA has management authority and represents a process of fisheries co-management where the players are brought together to manage the fisheries resources of the SSMR. However, decision-making and management authority on legal and financial issues pertaining to the SSMR are vested in the relevant government agencies (Figure 4.13). More importantly, the fishers are not part of the co-management process, and are not involved in the management decision-making. Therefore, for LAMA to become fully operational as a co-management body involving representing all stakeholders, which is its main objective, the fishers must become part of the process.

For LAMA to move to the stage of complete co-management there is need to involve the fishers in the process. Eighty-eight percent of the fishers and the key informants interviewed felt that managing fisheries should involve those who will be affected by the decision. Also, in terms of legal and financial decision-making for the SSMR, there should be more involvement of the other stakeholders.

4.2.2.6 Fishery-Related Property Rights and Rules in Dominica

Property rights

Traditional or customary rights and tenure do not exist in the Soufriere/Scotts Head area. Fishers could fish anywhere they pleased without fear of being apprehended by formal government authorities. With the designation of the SSMR in 1987, legal boundaries prevail and open access has diminished (see Section 4.2.2 under "Boundaries of the SSMR").

Types of rules prevailing in the SSMR

The movement from open access of the SSMR's fisheries resources to managed open access in a restricted reserve was accompanied by the formulation and enforcement (in some cases) of various rules over time. These rules fall into three main categories: operational, collective choice, and constitutional rules (see Section 2.2 for definitions).

Informal operational rules exist among the fishers and pertain to the gillnet fishery. Fishers explained that there is an understanding among fishers known as "casting nets by turns". This allocation rule among the fishers ensure, according the gillnet fishers, that ***"everyone has a fair chance at a catch"*** and conflict among fishers is prevented.

Formal operational rules for the SSMR are embodied in the fisheries regulations. For instance, boundary rules exist where persons are not allowed to scuba dive, snorkel, or undertake any other authorised aquatic activity in the marine reserve unless he pays the Schedule fees. In addition, a special permit issued by the Chief Fisheries Officer is needed to undertake fishing and scuba diving in the marine reserve. Formal allocation rules, for example, prohibit the use of spear guns for fishing in the SSMR.

Collective choice rules in the SSMR show that monitoring and enforcing compliance with operational rules are the responsibility of LAMA. The Fisheries (Authorised Officers) (SSMR) SRO No. 16 of 1998 states that every warden of the LAMA of the SSMR is designated an authorised officer for the purpose of upholding the laws and special measures applicable to the SSMR. However, these wardens are not yet in operation.

At the national level, constitutional rules, which apply to the SSMR, include national legislation on the devolution of powers and authority to local units, the establishment of protected areas as embodied in the Fisheries Regulations, Statutory Rules and Orders (as discussed in Section 4.2.2 under "Boundaries of the SSMR" and Section 4.2.2 under "LAMA"), and other related legislation enacted by the government.

Knowledge of rules

The fishers' survey revealed that generally, fishers are not aware of the fishery-related rules for the SSMR. Sixty-four percent of the fishers interviewed indicated that they did not know these rules and the reasons for them. Those who were aware spoke of the fishing zones and non-fishing areas to avoid user conflicts, the fact that anchoring of boats in bay is not allowed to prevent destruction of coral reefs, the fact that there are seasons for harvesting of certain species and the prohibition of harvesting juvenile fishes.

Attitudes toward rules

Fishers generally felt that rule breaking is not acceptable (68%). These fishers found that rule breaking is unacceptable, because rules should be obeyed. A significant proportion (40%) of the

fishers interviewed were neutral when asked if the rules on fish harvesting should be changed. This is mainly due to the fact that most fishers do not know the rules. Some (32%) believed that they should not be changed, but enforced. While others (28%) felt that the SSMR rules are not working or not necessary.

Monitoring and enforcement

The majority (76%) of the fishers interviewed indicated that they did not know whether the SSMR rules and regulations were often violated. Rules broken include fishing in non-fishing zones, catching juvenile fish, and spear fishing. Violators came from the villages within the reserve area, from neighbouring villages such as Pointe Michel, and from Mahaut further north. Normally, nothing was done with these violators, and occasionally warning was given. Overall, 72% of fishers interviewed perceived that only the government was responsible for enforcing fisheries rules and regulations.

Exogenous events

The most notable exogenous event, which affected fisheries management in the Soufriere/Scotts Head area, was the introduction of water sporting and tourism activities in the 1980s. The increase of these activities led to an increase in the demand for use of marine space within the bay. Increases occurred in dive tourism, the number of dive operators, the incidence of yachts anchoring on the coral reef, and the number of swimmers and visitors seeking leisure and recreation (Guiste and Gobert, 1996). Consequently, the problem of user conflict within the bay arose. For this reason, the marine area was declared the SSMR.

The area was also affected by several tropical storms and hurricanes. There were cases where hurricanes demolished buildings and homes, especially those on the coast, destroyed fishing vessels, and caused major landslides which damaged the main access road connecting the villages (Soufriere and Scotts Head) to the rest of Dominica, and made it impassable for some time. However, the fishers and other stakeholders interviewed did not mention these hurricanes and tropical storms as events, which they found affected the SSMR's fisheries resources. The few fishers who made mention of hurricanes and tropical storms affecting the area, considered these events to be natural and normal occurrences.

4.2.3 Incentives to cooperate and patterns of interaction

The fisheries of the SSMR are currently under government management with minimal involvement of one of the key stakeholders, the fishers. The incentives to cooperate are found at various levels: among fishers; and among fishers, GOs and NGOs.

4.2.3.1 Among fishers

For the fishers of the SSMR, the motivating factors behind collaborative efforts are largely rooted in their dependence on the fisheries resources. Despite, the existence of a culture of non-collective action, fishers work together in the harvesting of fish. For instance, fishers and villagers take part in the beach seine fishery and assist in hauling vessels onto shoreline (Figure 4.14). So on the level of economic benefit there is togetherness. Thus, there is evidence of collective action.

The fishers felt that they were not made part of the co-management process for the SSMR. Plans for the SSMR, for example the formulation of boundaries in the SSMR, were developed and implemented, and then passed down to them. However, they believe that it is possible for them

to work together with LAMA, but they need to be involved at all stages (planning, implementation and monitoring stages) of the co-management process.

(a)  **(b)** 

Figure 4.14 Villagers and fishers working together in (a) beach seine fishery, and (b) assisting in hauling a vessel onto shoreline

4.2.3.2 Among stakeholders, government organizations and non-government organizations

The government, through the Fisheries Division, saw the need for managing various users of the Soufriere/Scotts Head bay and alleviating user conflict. There was also the awareness that conservation and preservation measures need to be put in place since the coral reefs in the area are scarce fisheries resources in Dominica. The SSMR was, therefore, developed as precautionary measure of conservation, since it was the feeling that the fisheries resources were in fairly good condition. The main thrust behind the development of the SSMR was the alleviation of user conflict, which existed over the marine resources of the SSMR.

The LAMA was created and established to foster fisheries co-management for the SSMR. It has full management authority. However, to date, it has proven quite difficult to get the key stakeholders of the SSMR's marine resources, the fishers, to unite, and work together with other stakeholders in this co-management process.

4.2.4 Outcomes and performance indicators of co-management

In this case study, to measure the performance of co-management over time, the perceptions of the fishers interviewed and the views of the key informants were used. Section 3.2.2 on Primary Data Collection explains, in detail, the technique used to measure the performance of fisheries co-management in the SSMR. Table 4.6 below summarizes these results.

A general comparison of perceived pre-SSMR and post-SSMR changes in performance of co-management shows that the fishers of Scotts Head and Soufriere perceived small and insignificant changes (whether positive or negative) in all the performance indicators of co-management: equity, efficiency and sustainability. Relatively larger positive changes were perceived in knowledge of SSMR management and information exchange on fisheries management, while relatively larger negative changes were perceived in control over fisheries.

During the time when the fishers' survey for this study was conducted, the CARICOM Fisheries Unit (CFU) in collaboration with the International Agricultural Centre (IAC, the Netherlands) held a Fisheries Management Training Workshop in Dominica. The participants of this workshop too part in a Participatory Rural Appraisal (PRA) exercise where the objective was to

investigate the apparent conflict between fishing and tourism in the SSMR. The PRA involved interviews with villagers and fishers, and the results of the PRA were presented to the community and discussed at a meeting held in Scotts Head.

Table 4.6 Perceived pre-SSMR and post-SSMR changes in performance indicators for all fishers: before the SSMR and now

Indicator	Before	Today
Equity		
a. Participation in community affairs in general	6	7
Participation in SSMR management	5	5
b. Influence over community affairs in general	5	6
Influence over SSMR management	4	5
c. Control over fisheries	8	5
d. Fair allocation of access rights to fisheries resources	8	8
e. Satisfaction with SSMR management arrangements	6	5
f. Benefits from the SSMR	7	6
g. Overall well-being of household	7	7
h. Household income	7	6
Efficiency		
a. Ease of collective decision making on SSMR rules	6	6
b. Quickness of conflict resolution on SSMR issues	5	5
Sustainability		
a. Overall well-being of fisheries resources	7	7
b. Compliance with rules of the SSMR	6	6
c. Knowledge of SSMR management	4	6
d. Information exchange on SSMR management	4	6

Most of the attendees at this meeting were fishers. They claimed that they attended this meeting, unlike other meetings, because the visit from the workshop team doing the PRA aroused their interest. The participatory activities of the workshop team encouraged the fishers to increase their knowledge of LAMA and the SSMR, and contributed to the positive changes perceived by fishers on their knowledge of SSMR management and on their acquisition of information on the management of fisheries resources in the SSMR.

However, there were no perceived changes in their participation in LAMA meetings, or their influence over the SSMR management. For them, their participation and involvement in the management of the SSMR's fisheries resources remained minimal. The fishers felt that access rights to the fisheries resources in the SSMR were allocated fairly and remained constant over the time period. The fisheries were open access and everyone had the same rights to access the fisheries resources. They perceived slightly less benefits in terms of fish caught since the establishment of the SSMR. However, the overall well-being of their households remained fairly constant and substantial.

Fishers felt that their involvement in the decision-making process, or LAMA, remained at a moderate level over the time period of the establishment of the SSMR. According to their

perceptions, the slow paste of conflict resolution has not changed. For them, the fisheries resources have remained healthy, and compliance to the rules is still moderate.

The fishers need to become integrated into the co-management process of the SSMR. The fishers' perceived performance of co-management show that there is need for significant improvements in terms of equity, efficiency and sustainability. It is necessary for the government to become more participatory in involving the fishers in the planning, implementation and monitoring stages of the fisheries co-management process. In addition, the fishers need to become more organized; their dormant fisher groups and co-operatives need to be revived. In this way, the fishers would become empowered as stakeholders in the decision-making process, and more involved in LAMA meetings. The process of co-management would therefore move forward.

4.2.5 Conclusion and discussion on the SSMR's management regime

The co-management process for the SSMR fisheries resources has full support under legislation. Under Fisheries regulations, LAMA has full management authority. However, LAMA has encountered lengthy delays from Legal Affairs and the Ministry of Finance concerning specific aspects of LAMA's operations. Nevertheless, the main problem is the lack of involvement of one of the main stakeholder groups in the SSMR, the fishers. There is a serious need to integrate fishers into the entire co-management process for fisheries co-management in the SSMR to become viable.

Fisheries co-management in the SSMR has not yet been realised. The process is still in its formative stages. At this stage LAMA represents "instructive" co-management. This is a level of co-management where there is only minimal collaboration between government and resource users (Sen and Raakjaer Nielsen, 1996). In this case mechanisms exist for dialogue among stakeholders, but the process itself tends to be one of government informing resource users about decisions they plan to take. This co-management process is yet to reach the level of full sharing of responsibility and authority between government and other stakeholders in the management of the fisheries resources of the SSMR.

5. CONCLUSIONS

In neither case are the objectives of the co-management arrangements for the PBPA and the SSMR fully realised. The PBPA's fisheries co-management arrangement (consultative co-management) has moved further along the co-management spectrum than that of the SSMR.

In the PBPA, government regularly involves stakeholders in decision-making and there is a degree of responsibility and authority sharing where co-management is institutionalised. Sustainable management structures are in place and user groups/stakeholders and government representatives/ NGOs are moving towards equal partnership.

For the SSMR's fisheries co-management arrangement, there still remains the problem of the lack of full involvement of all stakeholders, especially key stakeholders like the fishers. All stakeholders were not involved from the planning stage to the implementation and monitoring stages. The SSMR's co-management arrangement is at a level of instructive co-management, where fisheries co-management structures are in place, but there is minimal sharing of management responsibility and authority among stakeholders. Unlike the PBPA's co-management arrangement, full management authority has been vested in LAMA (the SSMR's

fisheries co-management body). However, without the involvement of the fishers there is little, if any, effective fisheries co-management.

The fishing communities, or rather fishers, in both case studies suffered from a lack of collective action in dealing with fisheries management. However, in the case of the PBPA, the PBFMC (the PBPA's fisheries co-management body) gives a good example of the development of organization among fishers and the integration of fishers into the co-management process. In the case of the SSMR, LAMA needs to make stronger efforts for the development of proper and consistent programmes for fisher organization. In this way fishers would become empowered, since they would have an avenue for representation in the co-management process. This is a lesson that can be learnt from the case of the PBPA and the development of the PBFMC.

The stakeholders of each case study are faced with different challenges. In the case of the PBPA, there is an overexploitation of fisheries resources, and for the SSMR there is the problem of resource user conflict due to the significant growth of the water sports tourism industry in the area. Thus, in the case of the PBPA, the fishers were more susceptible to becoming organized and involved in the co-management process. The fishers interviewed expressed that they realised the drastic depletion in the PBPA's fisheries resources over the past two decades. However, the fishers of the SSMR felt that the fisheries resources were still healthy. Although to them, it is still difficult to resolve user conflicts over the marine resources of the SSMR, they do not feel that they are part of the process of conflict resolution. Therefore, there is the need for adjustments in fishers' attitudes and beliefs towards the need for collective action in the management of fisheries resources, for them to become part of the fisheries co-management process.

In both case studies, there were established fisheries regulations, and formal and informal rules. However, there was the problem of compliance of fishers with these rules and regulations, and the enforcement of these rules and regulations by the relevant authorities. The fisheries resources in both case studies were open access and managed by fisheries government agencies. However, the lack of enforcement efforts in both cases contributed to the lack of fishers' compliance to rules and regulations restricting their access to the fisheries resources. Therefore, the willingness of fishers to comply with rules should be complemented with consistent enforcement efforts in order to strengthen the institutional arrangements of co-management in both case studies.

The role of government agencies in the co-management process is significant. The establishment of LAMA for the co-management of the SSMR's fisheries resources is a good example of government's willingness to share management authority with other fisheries stakeholders. However, in the case of the PBPA and the PBFMC, there is the need for government to share management responsibility and authority with the other stakeholders of the PBPA's fisheries resources for co-management to be realised.

The Caribbean region has made efforts towards fisheries co-management. However, there are cultural and political barriers that need to be broken down for the full operation of co-management processes to be realised. The two case studies illustrate this observation. This analysis has assisted in demonstrating the need for the development of strategies and programmes targeting the removal of these barriers, and the construction of cultural and political norms, values and belief systems geared towards more successful co-management of our fisheries resources.

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APPENDIX 1: List of organizations from which secondary data sources for each case study were obtained

1. The University of the West Indies (UWI), Cave Hill campus, Barbados
2. The Caribbean Conservation Association (CCA), Barbados
3. The Caribbean Natural Resources Institute (CANARI), Trinidad
4. The CARICOM Fisheries Unit (CFU)/ the International Agricultural Centre (IAC, the Netherlands) Fisheries Management Training Workshop, Roseau, Dominica
5. The Caribbean Coastal Area Management Foundation (CCAM), PBPA, Jamaica
6. Fisheries Division, Jamaica
7. Fisheries Division, Ministry of Agriculture and the Environment, Dominica

APPENDIX 2: Activities and sites visited in each case study where observation was used

CASE STUDY	ACTIVITIES AND SITES
The PBFMC, PBPA, Jamaica	1. Fishing landing sites: Rocky Point, Barmouth (Portland Beach), Half Moon Bay, and Old Harbour Bay (OHB). 2. The PBFMC monthly meeting, OHB on the 30 August 2001. 3. The operations of CCAM.
The SSMR Project, Dominica	1. Fishing landing sites: Scotts Head and Soufrière Bay. 2. Communities: Scotts Head Village and Soufrière. 3. Workshop Meeting with Community at Scotts Head on 18 October 2001.

APPENDIX 3: Flexible interview guide

Questions for Stakeholders:

What was the Area like before it was considered for protection?

i. You can go as far back as possible (maybe the 1940s).
ii. What was the area like (physical features and status)?
iii. What were the main activities in the area (social, economic, cultural, political, religious, etc.)?
iv. Was fishing the traditional means of livelihood? What type of fishery (commercial, recreational, subsistence)? What type of fishing techniques and gear used (artisanal vs industrial)?
v. Was cane cutting the main source employment? Was it supplemented by fishing or vice-versa?
vi. Was fishing in the area accessible to anyone from anywhere that wished to fish?
vii. Who was the main body managing the fishery? Did government play an active role?

What situations led to the Area being considered for conservation and protection?

i. Was it the establishment of government policies and regulations?
ii. Overexploitation and/or depletion of the fish stock?
iii. The adoption/need for more sustainable practices?
iv. Uncontrolled development in the area?

Who would you say are the main stakeholders of the PBPA (or SSMR) and its management?

PBPA:

i. How will you describe your role? C-CAM's role?
ii. The role of government? Are they the main authority figures?
iii. The role of the Portland Bight Fisheries Management Council (PBFMC)?
iv. The role of other agencies and stakeholders?
v. What are the relationships between/among stakeholders? (e.g your relationship with the PBFMC/ government/ other stakeholders)
vi. Who has the main control and responsibility for management of the PBPA?

SSMR:

i. How will you describe your role?
ii. The role of government? The role of the Fisheries Division? Are they the main authority figures?
iii. The role of the Local Area Management Authority (LAMA)?
iv. The role of other agencies and stakeholders?
v. What are the relationships between/among stakeholders? (e.g your relationship with the LAMA/ government/ Fisheries Division/ other stakeholders)
vi. Who has the main control and responsibility for management of the SSMR?

Describe the formulation and development of the PBFMC (or LAMA)? How and why was it formed?

PBFMC:

i. What brought about the need for this council? Did the fishermen realize the need for representation as a body to deal with their problems and needs (e.g need for proper public transport and telephone)?
ii. Who are the leaders of the organization and their roles? (Means of contact)
iii. What seems to keep council going? Problems? Successes?

LAMA:

i. What brought about the need for this organization? Did the users of the SS marine area (e.g. fishers) realize the need for representation?
ii. Who are the leaders of the organization and their roles? (Means of contact)
iii. What seems to keep LAMA going? Problems? Successes?

What are the main forms of legislature, policies or regulations dealing with the management and use of resources at the PBPA? (*Documentation*)

i. For instance, are there rules for fishermen concerning type of fishing methods used/ fishing gear/ periods for harvesting?
ii. Are there rules for any forms of development in the area?
iii. Zones for certain activities? (a map of reserve and zonation, if possible)

What are some of the current problems in the PBPA (or SSMR) and surrounding area?

What are some of the opportunities for the PBPA (or SSMR) and surrounding area?

Where do you see the PBPA (or SSMR) in the future?

i. What are some of the future plans for the area?

ii. Are there any development plans for the area?

Questions Specifically for Users:

What type of activity or activities do you conduct in the S/SHMR?

i. How long have you been doing this/ these?
ii. From where do you do this/ these?
iii. Who do you work for?
iv. Is this your main occupation? If not, what other types of employment do you engage in?

Do you feel like you were/ are involved in the management of the S/SHMR?

i. Do you belong to any associations like the PBFMC (or LAMA)?
ii. How much are you involved in the management of the PBPA (or SSMR)?

APPENDIX 4: Key informants interviewed for respective case studies

CASE STUDY	ACTIVITIES AND SITES
The PBFMC, PBPA, Jamaica	➢ 2 members of the Caribbean Coastal Area Management Foundation (CCAM) ➢ 4 members of the Portland Bight Fisheries Management Council (PBFMC) ➢ 2 fishers from two different landing sites in the Portland Bight Protected Area (PBPA)
The SSMR Project, Dominica	➢ 2 members of the Local Area Management Authority (LAMA) ➢ 1 member of the Fisheries Division, Ministry of Agriculture and the Environment ➢ 1 member of the Dominica Water Sports Association (DWSA)

APPENDIX 5: Questionnaire for fishers

Respondent # _____. Date of Interview _____.
Name of Interviewer _____.
Community/ Country _____.
Time Started _____. Time Ended _____.
Optional: Respondent's Name _____ and Age _____.

Interviewer:
Good day! I am conducting a survey of fishers at this landing site (Soufriere/Scotts Head). I would be very grateful if you could spare some time to answer some questions and share your valuable opinion. I would like to assure you that your responses would be treated confidentially.

A. Demographic Information

1) Do you live in the Soufriere/ Scotts Head area?
□ Yes (**go to question 2**)
□ No (**go to question 3**)

2) If, Yes, which of these villages?
□ Pointe Michel
□ Soufrière
□ Scotts Head

3) If, No, where do you live? _____.

B. Household Data

4) How many people are in your household? _____ persons.

5) What is your household's main source of income? _____.
Second most important source? _____.
Third most important source? _____.

6) What percentage of your household income comes from fishing?
□ Less than half
□ Half
□ More than half
□ All

7) In terms of food, what percentage comes from fishing?
□ None
□ Less than half
□ Half
□ More than half
□ All

8) Does your household receive money from anyone living outside the household?
□ Yes (How often? _____)

□ No

9) Do you recall an event that had a negative impact on your income from fishing?
□ Yes (**go to table below and state)**
□ No

Event	**Year**

C. Characteristics and Attitudes of Fishers

10) How many years have you been fishing at this point?
□ less than 1 year
□ 1 – 5 years
□ 6 – 10 years
□ more than 10 years

11) Have you done any other work in the past?
□ Yes (**go to table below and state**)
□ No

1. Type of Work	**2. No. of Years**

12) Why did you change your occupation? _____.

13) If you were to live your life over, would you still choose fishing?
□ Yes
□ No
Why?_____.

14) If you could change your occupation now from fishing to something else, would you?
□ Yes
□ No
Why?_____.

15) What are your sources of information on fishing?
□ radio
□ government technician
□ pamphlet/leaflet
□ other fishers
□ non-governmental organization
□ international agency

☐ internet
☐ others (specify_____)

D. Cultural Values

16) Do you think that the people in your village can work together to solve community problems (e.g. clearing a road, digging a well, etc.)?
☐ Yes
☐ No

17) Do you think that the fishers in your community/landing site can work together to solve a problem in the fishery (e.g. competition for use of marine area, spear fishing, fishing outside the designated fishing zones, etc)?
☐ Yes
☐ No

E. Fishing Gear Used and Related Information

3. Vessel & Gear Type	**4. Ownership of Vessel & Gear** 1=owned; 2=rented; 3=loaned 4=others (specify)	**5. Frequently Caught Species**

F. Other Bio-technical Attributes

18) How would you describe the condition of your fisheries resources 15 years ago?
☐ very bad
☐ bad
☐ slightly bad
☐ neither good nor bad
☐ slightly good
☐ good
☐ very good
Why? _____.
_____.

19) How would you describe the condition of your fisheries resources today?
☐ very bad
☐ bad
☐ slightly bad
☐ neither good nor bad
☐ slightly good
☐ good
☐ very good

Why? _____.
_____.

20) What are the characteristics of the sea and coast that help the fish to be healthy?
_____.
_____.

G. Project Variables

21) Do you feel that the marine reserve is essential to fisheries management?
☐ Yes
☐ No
Why?_____.
_____.

22) Has the marine reserve reduced conflicts among the different users of the area?
☐ Yes
☐ No
Why? _____.
_____.

23) Has the marine reserve improved fish catch?
☐ Yes
☐ No
Why?_____.
_____.

24) Has the reserve protected coastal resources such as coral?
☐ Yes
☐ No
Why? _____.
_____.

25) Did you support the marine reserve when it was proposed?
☐ Yes
☐ No

26) Do you now support the marine reserve?
☐ Yes
☐ No
(**if change in response to question 25**) Why?_____.
_____.

27) What are the objectives of the Soufriere/ Scotts Head Marine Reserve project?
_____.
_____.

28) Do you feel that these objectives are being met?
□ Yes
□ No
If no, Why? _____.

29) Do you feel that you had any influence on planning the said project?
□ Yes
□ No

30) Did you attend any meetings where the project was discussed?
□ Yes
□ No
If yes, how many meetings? _____.

31) Did you complete any training given by the project?
□ Yes
□ No
If yes, what types of training? How long? Who provided the training? (**specify in table below**)

6. Topic	**7. # of Days**	**8. Provided by Whom**

H. Marketing Arrangements

32) In general what percentage of your catch is sold?
□ Less than half
□ Half
□ More than half
□ All

33) Where do you sell your fish catch?
□ in this village
□ at the town market
□ to fish processors
□ for export overseas (**go to questions 34 and 35**)
□ other (**specify**:_____.)

34) What percentage of your catch is exported overseas?
□ Less than half
□ Half
□ More than half
□ All

35) What type of fish is sold for export overseas? Type of fish:_____.

I. Organisational Aspects

36) At present, are you a member of any association?

□ Yes

□ No (**go to question 37**)

If **yes**: What association/s? What are the objectives of the associations? How long have you been a member? (**specify in table below**)

9. Name of Association	**10. Objectives**	**11. # of Years in the Assoc.**

37) In the past, did you belong to any group or association?

□ Yes

□ No (**proceed to section J**)

If **yes**: What association/s? What were the objectives of the associations? Why did you leave the association? (**specify in table below**)

12. Name of Association	**13. Objectives**	**14. Reason for Leaving**

(Note to interviewer: Ask questions 38 to 40 if the respondent is a member of the fishers' association at present. If not proceed to section J)

38) How would you describe the leadership of your present association?

□ Democratic

□ Autocratic

□ Others (**specify** _____)

39) In general, how are decisions made in your association?

□ Consensus

□ Majority decision

□ Imposed/dictated

□ Others (**specify** _____)

40) How do you rate the credibility of your present president/leader?

□ Very credible

□ Credible

□ Slightly credible

□ Not credible

J. Fishery-Related Rules/Agreements

41) What rules exist among fishers and other users of the marine reserve which are not embodied in the reserves' ordinances/laws (*informal rules*), e.g., fishing practices, fishing grounds, fishing gear, areas for water sports, etc.? What are the reasons for these rules?

15. Informal Rule	16. Reason for the Rule

42) What ordinances/laws (*formal rules*) related to the marine reserve are being enforced? What are the reasons for these rules?

17. Ordinance/Law	18. Reason for the Ordinance

K. Attitudes toward Rules and Decision-Making

Please state whether or not you agree with the following statements:

43) Decision making on managing fisheries should involve those who will be affected by the decision.

□ Strongly Agree
□ Agree
□ Neutral
□ Disagree
□ Strongly Disagree

Why? Please explain your answer. _____.
_____.

44) Rules on fish harvesting rights must be changed.

□ Strongly Agree
□ Agree
□ Neutral
□ Disagree
□ Strongly Disagree

Why? Please explain your answer. _____.
_____.

45) Rule breaking is acceptable.

□ Strongly Agree
□ Agree
□ Neutral
□ Disagree
□ Strongly Disagree

Why? Please explain your answer. _____.
_____.

Please choose one of the statements provided to describe:

46) Distribution of management responsibilities between the government and the fishing community.

☐ The government has all the responsibility for the fisheries management while fishers will have none.
☐ The government has most of the responsibility for the fisheries management while fishers will have relatively less of the responsibility.
☐ The government and the fishers have equal responsibility for the fisheries management.
☐ The government has less of the responsibility for the fisheries management while fishers have most of the responsibility.
☐ The government has no of the responsibility for the fisheries management while fishers have all the responsibility.
☐ Both the government and the fishers do not have any responsibility for the fisheries management.

L. Rule Enforcement

47) Based on your observation, what marine reserve rules and regulations are often violated at your fishing area.

_____.
_____.
_____.

48) Where do violators come from?

☐ Within our fishing area.
☐ Within our village
☐ Other (**specify** _____)

49) What is done with the violators?

☐ Warned
☐ Arrested
☐ Jailed
☐ Fined
☐ No action
☐ Others (**specify** _____)

50) Who is responsible for enforcing fishery-related rules and regulations?

☐ Fishers only
☐ Fishers' association only
☐ Government only
☐ Both fishers and government
☐ Both fishers' association and government
☐ Fishers, fishers' association and government
☐ Others (**specify** _____)

M. Performance Indicators of Co-management

I will show you a ladder diagram (on p. 17). You will choose a step on the ladder that corresponds to the indicators I will present. The first step on the ladder describes the worst

possible situation. As the step goes higher, the situation gets better. The highest step on the ladder describes the best possible situation. Please assess the situation in two periods: before the project, and today.

Equity

1. Participation

1.1 Participation in community affairs in general

The first step on the ladder indicated a situation where you cannot participate in any meeting on community affairs in general (e.g., political, social, etc). The highest step indicates a situation where you can participate in all meetings on community affairs in general.

Before the project _____ Today _____.

1.2 Participation in marine reserve management

The first step on the ladder indicates a situation where you cannot join any meeting on marine reserve management. The highest step represents a situation where you can join all meetings on marine reserve management.

Before the project _____ Today _____.

2. Influence

2.1 Influence over community affairs in general

The first step indicates a situation where whatever you say or do makes no difference at all with respect to community affairs in general (e.g., social, political). The highest step shows a situation where your opinion on community affairs counts.

Before the project _____ Today _____.

2.2 Influence over marine reserve management

The first step indicates a situation where whatever you say or do makes no difference with respect to marine reserve management. The highest step indicates a situation where your opinion on management of the marine reserve counts.

Before the project _____ Today _____.

3. Control over fisheries

The first step indicates a situation where whatever you have no control over who, where, and how fish is to be harvested. The highest step shows a situation where you can control who, where, and how fish is to be harvested.

Before the project _____ Today _____.

4. Fair allocation of access rights to resources of the marine reserve

The first step shows a situation where the allocation of access rights to resources in the marine reserve is completely unfair. Certain persons are allowed to harvest (or use) anywhere they please in the reserve while others are not allowed to harvest any fish (or use anywhere) at all. The highest step indicates a situation where the allocation of access rights to resources in the marine reserve is completely fair. The same rights are given to everyone.

Before the project _____ Today _____.

5. Satisfaction with marine reserve management (multiple use zone) arrangements
The first step indicates a situation where you are totally dissatisfied with the management of the marine reserve. The highest step shows your full satisfaction with marine reserve management.
Before the project _____ Today _____.

6. Benefits from the marine reserve
The first step describes a situation where the marine reserve yields no benefits to you at all in terms of fish caught from the waters. The highest step shows a situation where the marine reserve provides significant benefits to you in terms of fish caught from the waters.
Before the project _____ Today _____.
If better off or worse off than today, why? _____.
_____.

7. Overall well-being of the household
The first step portrays the worst possible existence for your household (i.e., little food, inadequate shelter, and sickness). The highest step indicates more than enough food for your household, the best possible house and healthy household members.
Before the project _____ Today _____.

8. Household income
The first step shows no income at all for your household. The highest step shows the best possible income you can imagine for your household.
Before the project _____ Today _____.

Efficiency
1. Ease of collective decision-making on rules governing the use of marine reserve resources
The first step indicates a situation where it is very difficult for fishers (and other users of the marine reserve) in your community to decide on rules pertaining to the use of marine reserve resources. The highest step refers to a situation where it is very easy for fishers (and other users of the marine reserve) in your community to decide on rules pertaining to the use of marine reserve resources.
Before the project _____ Today _____.
If better off or worse off than today, why? _____.
_____.

2. Quickness of resolving community conflicts on issues related to the marine reserve
The first step describes a situation where fishers in your community take a very long time to resolve conflicts related to the marine reserve. The highest step shows a situation where fishers in your community resolve conflicts related to the marine reserve very quickly.
Before the project _____ Today _____.
Why? _____.
_____.

Sustainability
1. Overall well-being of fisheries resources

The first step indicates an area with no fish, where the water is so foul that nothing can live in it. The highest step is described as a situation where fish is abundant.
Before the project _____ Today _____.
If better off or worse off than today, why? _____.
_____.

2. Compliance with rules of the marine reserve
The first step shows a situation where no one complies with the rules of the marine reserve (i.e., fishery rules, use of fishing gear, use of certain areas for certain marine activities etc). The highest step describes a situation where everyone obeys the rules of the marine reserve.
Before the project _____ Today _____.

3. Knowledge of marine reserve management
The first step describes a situation where fishers (and other users of the marine reserve) in your community have little knowledge of the marine reserve, particularly management of marine users' activities. The highest step indicates a situation where fishers (and other users of the marine reserve) have adequate knowledge of fishery, particularly management of marine users' activities.
Before the project _____ Today _____.

4. Exchange of information on marine reserve management
The first step indicates a situation where you find it very difficult to obtain information on marine reserve management. The highest step describes a situation where you find it very easy to get information on marine reserve management due to an active information exchange.
Before the project _____ Today _____.

LADDER DIAGRAM

10
9
8
7
6
5
4
3
2
1