Opportunities for Sustainable Livelihoods in One Protected Area in Each of the Six Independent OECS Territories, for the OECS Protected Areas and Sustainable Livelihoods (OPAAL) Project
OECS CONTRACT Number OECS/121/05

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ACRONYMS

ACAPG	Aupicon Charcoal and Agricultural Producers Group (St. Lucia)
AFR	Annandale Forest Reserve (Grenada)
CANARI	Caribbean Natural Resources Institute
CERMES	Caribbean Environmental Resource Management
CFRAMP	Caribbean Fisheries Resource Assessment and Management Programme
CFRNP	Central Forest Range National Park (St. Kitts)
CNP	Cabrits National Park (Dominica)
EAG	Environmental Awareness Group (Antigua)
EEZ	Exclusive Economic Zone
ESDU	Environment and Sustainable Development Unit
FFEM	*Fond Français pour l'Environnement Mondial*
FNPD	Forestry and National Parks Division
GEF	Global Environment Facility
IRF	Island Resources Foundation
NEMMA	North-East Marine Management Area (Antigua)
NRM	Natural Resource Management.
OAS	Organization of American States
OECS	Organization of Eastern Caribbean States
OPAAL	OECS Protected Areas and Associated Livelihoods Project
PSMA	Pointe Sable Management Area (St. Lucia)
SLNT	St. Lucia National Trust (St. Lucia)
SMMA	Soufriere Marine Management Area (St. Lucia)
SPF	Small Projects Facility
SVG	St. Vincent and the Grenadines
TCMP	Tobago Cays Marine Park (SVG)

I. INTRODUCTION

The close connection between protected areas and sustainable development is being appreciated more and more. Originally protected areas were created for purposes of biodiversity conservation, and the formation process goes something like this:

1. Boundaries are drawn,
2. Thoughts are focused,
3. Regulations are enacted,
4. Funding is obtained,
5. Human-power is concentrated

All this for the survival of species (like turtles, lizards, birds and fish) and ecosystems (like forests, wetlands, seagrass beds and coral reefs).

In the early days when protected areas were being created (by biologists) the idea was to fence off an area and to keep humans out. This idea is itself unsustainable, especially on small islands. Human beings can extract resources from nature for their own use (food, clothing, shelter) without degrading the natural environment. This is called "Sustainable Use", and is the current thinking about how protected areas should be managed. People should be "a part" not "apart" from protected area planning and management. When protected areas are zoned, there can be "no take zones" (what some people call; "core areas"); but not the whole protected area. Humanity is an important part of the ecosystem of Planet Earth, and must be central in protected area planning.

Follow this train of thought:

1. "*Fisheries management is not the management of fish*". If humans left the fish alone they would manage quite well.
2. "*Fisheries management is the management of the activities of human beings towards fish*". Therefore fisheries management is a social science, falling within the science of behaviour change.
3. Therefore fisheries management in the Caribbean must be driven by scientists with these skills, and natural scientists are hired as needed for specific tasks.

This train of thought was spread throughout the Caribbean region by this author when he sat on the Technical Committee of the Caribbean Fisheries Resource Assessment and Management Programme (CFRAMP). The same process applies to forest management:

1. "*Forest management is not the management of trees*". If humans left the trees alone they would manage quite well.
2. "*Forest management is the management of the activities of human beings towards trees*". Therefore forest management is a social science, falling within the science of behaviour change.
3. Therefore forestry management in the Caribbean must be driven by scientists with these skills, and natural scientists are hired as needed for specific tasks.

Of course if aquaculture, mariculture and silviculture are required, then specialists in these disciplines should be on staff. Natural Resource Management (NRM) also needs the skills of natural scientists to do resource assessments to advise how well the management efforts are going, and to suggest strategies. Resource depletion is the result when natural scientists drive the process of NRM, since they are not trained in the science of people and behaviour change.

Protected Areas have uses other than Biodiversity Conservation; protected areas may also be used to encourage local sustainable development. The process for setting up a Sustainable Development Area would be the same as for an environmental protection area:

1. Boundaries are drawn,
2. Thoughts are focused,
3. Regulations are enacted,
4. Funding is obtained,
5. Humanpower is concentrated

All this for the purpose of manpower training, sustainable job creation, the increase of GDP, poverty alleviation, improvement in levels of living and sustainable human development.

Both objectives – biodiversity conservation and human development (which equals **sustainable development**) – can take place through the medium of protected areas.

WHAT IS SUSTAINABLE DEVELOPMENT?

Probably the best known definition of sustainable development came out of the Brundtland Commission Report 1987: sustainable development is

> "*Development that meets the needs of the present without compromising the ability of future generations to meet their own needs*" (UN Commission on Environment & Development).

But this language can be obscure to many, and difficult to apply to the real world, especially by those without training in the science of development. This author has translated this definition into different disciplinary idioms in an effort to make it more meaningful:

The Language of Accounting: When development is sustainable, society lives off the profit and interest from the portfolio of natural assets without depreciating the capital base of this portfolio, and preferably even increasing it.

The Language of Economics: Sustainable development is dependent upon a nation or geographical region achieving its full productive potential, while at the same time enhancing the resource base upon which output must rest. Sustainable development ensures at least the same potential economic opportunities for the future as are available today.

The Language of Sociology: Sustainable development is being fair to the future; it means progress today without reducing (but preferably enhancing) the capacity of future generations to progress; it is about leaving to the next generation a similar or better resource endowment than which was inherited. Sustainability matters because future generations matter.

The Language of Political Science: Sustainable development means empowerment of the stakeholders in the limited natural resources of a nation such that they take part in the decisions affecting the allocation of those scarce natural resources for their benefit, such that the benefit to future generations from those same resources is not compromised, and preferably is enhanced.

The Language of Biology: Sustainable development means harvesting animals and plants (renewable resources) at or below their rate of natural increase, maintaining maximum or optimal population levels.

Protected areas can be used to achieve biodiversity conservation and sustainable development at the same time. Protected areas are a flexible instrument, adaptable to every ecosystem type and every human context. They are certainly appropriate for the Caribbean.

THE OPAAL PROJECT

The OECS through its Environment and Sustainable Development Unit (ESDU), has designed a project aimed at improving the management of protected areas in the six (6) independent member states (Figure 1.1) by introducing sustainable development ideas and methods. With funding from the **Global Environment facility (GEF)** of the United Nations through the International Bank for Reconstruction and Development (the World Bank) acting as an Implementing Agency of the GEF, the ***Fond Français pour l'Environnement Mondial (FFEM)*** of the Government of France, and **the Organisation of American States (OAS)**, the OECS has initiated the **OECS Protected Areas and Associated Sustainable Livelihoods (OPAAL) Project**.

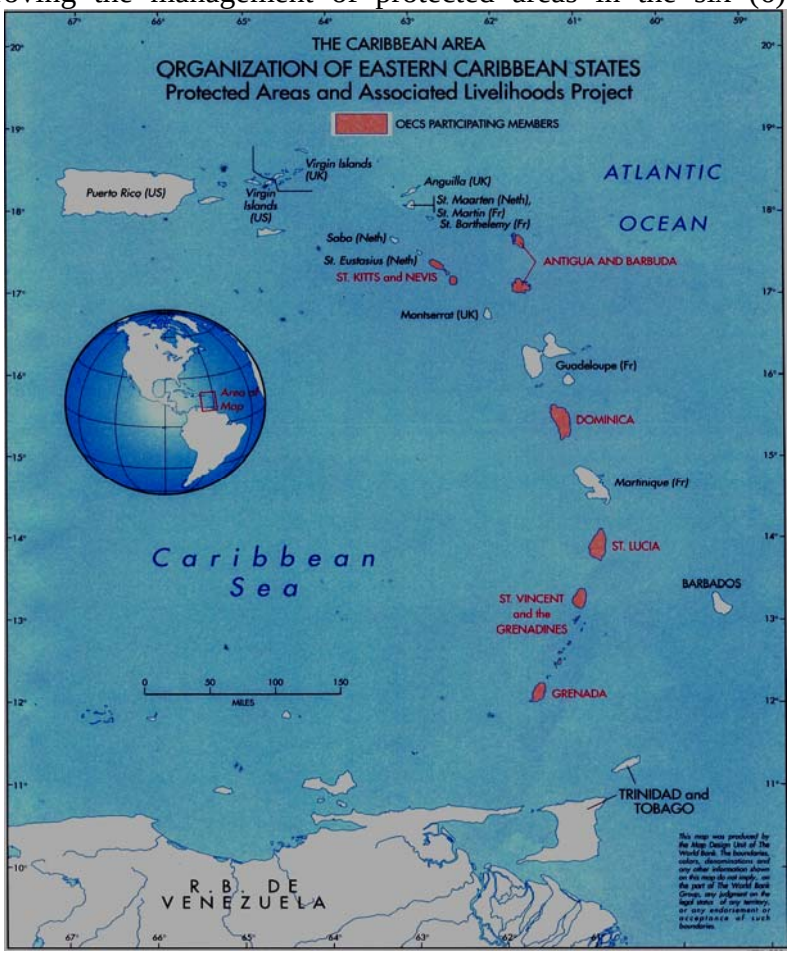


Figure 1.1: The geographical scope of the OPAAL Project.

Significant impediments continue to exist in terms of an effective framework for establishing and managing protected areas in the Caribbean as a means of ensuring that the region's biodiversity does not suffer further degradation. Existing institutional arrangements within OECS member states are weakened by gaps in the present policy framework, including limited incorporation of environmental and social costing into economic decision-making, and inadequate systems in support of integrated planning, information sharing and collaboration among agencies and other stakeholders. Inadequate planning and coordination continue to pose significant threats to biodiversity conservation, since poorly managed upstream construction, tourism development, coastal development, and rural development can result in impacts such as pollution, erosion, coastal sedimentation and the unsustainable exploitation of both living and non-living resources.

> The Global Objective of the OPAAL Project - To contribute to the conservation of biodiversity of global importance in the OECS by removing barriers to effective management of Protected Areas and increasing the involvement of civil society and the private sector in the planning and management of Protected Areas and the sustainable use of these areas.

Each participating country has selected an OPAAL Demonstration Site – either an already existing protected area or one about to be created; to receive country-specific benefits under the project; the Demonstration Site has to have official protected status. The sites selected by each participating country were:

Antigua & Barbuda	North East Marine Management Area (NEMMA)
Dominica	Cabrits National Park (CNP) – marine component only
Grenada	Annandale Forest Reserve (AFR)
St. Christopher & Nevis	(proposed) Central Forest Range National Park (CFRNP)
St. Lucia	(proposed) Pointe Sable Management Area (PSMA)
St. Vincent & Grenadines	Tobago Cays Marine Park (TCMP)

Four protected areas are already declared, and three are in preparation. The sites in Grenada and St. Kitts are forests (land only), the site for consideration in Dominica is marine only although the park has a terrestrial component; while the others are both terrestrial and marine to a greater or lesser extent.

The OPAAL Project has four (4) components:

Component 1 (**Policy, Legal and Institutional Reform**) involves assisting the countries to reform their protected area policies and their legal and institutional arrangements for managing protected areas; and to updating their systems plans for protected areas;

Component 2 (**Protected Area Management and Associated Livelihoods**) involves assisting the countries to prepare management plans or to update existing management plans for their demonstration sites; and a review/evaluation of the sustainability of the livelihood opportunities within or associated with the selected protected areas;

Component 3 (**Capacity Building for Protected Area Planning and Management**) involves assisting the countries to conduct a regional and national training needs assessment; a regional environmental awareness study; and national public awareness programmes.

Component 4 (**Project Management**) capacitates the OECS to manage the project.

This present consultancy report falls under Component 2: **Protected Area Management and Associated Livelihoods**, but because of the integral nature of protected areas, there is a certain amount of overlap between the components.

COMPONENT 2 OF THE OPAAL PROJECT

Component 2 of OPAAL deals with protected areas management and associated, alternative and new livelihoods. The component's objective is to promote biodiversity management and conservation through the establishment and strengthening of protected areas, complemented by support for alternative and/or new livelihoods within or in proximity to the protected areas. The livelihoods sub-project is geared to ensuring stability and adequacy of income and benefits to those groups and persons who depend on the resources in the protected area for livelihood support or where there is a displacement of the livelihoods because of the establishment of the protected area.

Livelihood activities supported under the project will focus on improving and demonstrating real economic benefits, especially for new, sustainable enterprises. Potential livelihood opportunities include: tourism and ecotourism development; craft training and development; organic farming; alternative low-impact reef fisheries; all of which will be supported by micro-grants through the OECS Small Project facility (SPF). Also open to support are market research, consultations and interviews with key governmental and NGO agencies, and on-site visits with local entrepreneurs and businesses where needed.

The project recognizes that stakeholders, in or around a protected area, who are not provided financially attractive sustainable livelihoods, can undermine the process of change by holding on to destructive patterns of use within the protected area. Livelihood activities supported under the project will focus on improving and demonstrating real economic benefits, especially for new, sustainable enterprises.

The Terms of Reference of this consultancy are the following:

"The Contractor will be required to collaborate with resource users, natural resource management agencies, community based organizations and other key stakeholders to:

a. identify existing economic activities and livelihoods associated with the Protected Areas, taking into consideration relevant national policies and initiatives and the existing socio-economic context;
b. identify threats to these livelihoods;
c. assess the present and potential sustainability of these existing and proposed livelihoods;
d. identify and prioritize new potential viable livelihood opportunities; these livelihoods must be consistent with the goals of the Protected Area;
e. Identify relevant, institutional and organizational arrangements/mechanisms required in support of these livelihood sub-projects."

For the operations within a protected area to be sustainable, each livelihood within the protected area must be itself sustainable. Where livelihoods degrade the natural resources in a protected area, the activities need to be adjusted or discontinued; where there is excess capacity within a protected area, new sustainable livelihoods can be fostered to make optimal use of these resources.

METHODOLOGY

The suite of methodologies used for implementing these Terms of Reference was as follows:

- An inception visit was made to the OECS headquarters in St. Lucia to sign off on the workplan and methodology;
- Literature was collected on each site and country;
- The boundaries of each protected area were identified on a map or photograph;
- The legal status of each protected area was determined;
- The residential communities proximate to each protected area were identified;
- Using secondary sources or census data, the socioeconomic context of each protected area was determined; emphasis was placed on the poverty profile, the unemployment situation, and material culture issues which might negatively impact on the environment such as the type of toilet facilities[1] or the type of fuel used for cooking[2].
- Using on-site observation and interviews of key informants, an inventory of livelihoods was conducted at each site; an idea of the sustainability of each livelihood was obtained from observation, interviews and secondary sources;

[1] Extensive use of soak-away pits would pollute the aquifers and downstream marine areas.
[2] Extensive use of firewood or charcoal could contribute to deforestation.

- Using on-site observation, interviews of key informants, and personal experience, the possibilities for new sustainable livelihoods were proposed;
- Using secondary sources and personal experience, recommendations for natural resource management were developed for each site;
- A workshop near each site was organized by the OPAAL National Focal Point at which preliminary findings were presented and feedback obtained; the major output of the workshops was a series of project ideas for funding under the OECS SPF;
- A set of project ideas for each site were then recommended by this author;
- After all the fieldwork was complete, a visit was paid to OECS headquarters to debrief the project staff.

THE STRUCTURE OF THIS REPORT

Following this introduction containing the Project Background, Terms of Reference and Methodology, are the six (6) Country Reports which are the main outputs of the consultancy. These country reports are presented in the order in which the fieldwork took place: St. Lucia, Dominica, St. Kitts, Antigua and Barbuda, Grenada, and St. Vincent and the Grenadines.

Each country report begins with a description of the OPAAL Demonstration Site, and an assessment of its socioeconomic context. Then the inventory of associated livelihoods and an assessment of their sustainability are presented. Next are observations and recommendations concerning the arrangements for management of the natural resources in each protected area. Following this is a report on the country workshops, including a list of those attending and their affiliations, and the project ideas they drew up. Each report concludes with a list of the consultant's project ideas.

The report concludes with a consolidated bibliography.

2. ST. LUCIA COUNTRY REPORT
THE POINT SABLE MANAGEMENT AREA

2.1 DESCRIPTION OF THE POINTE SABLE MANAGEMENT AREA

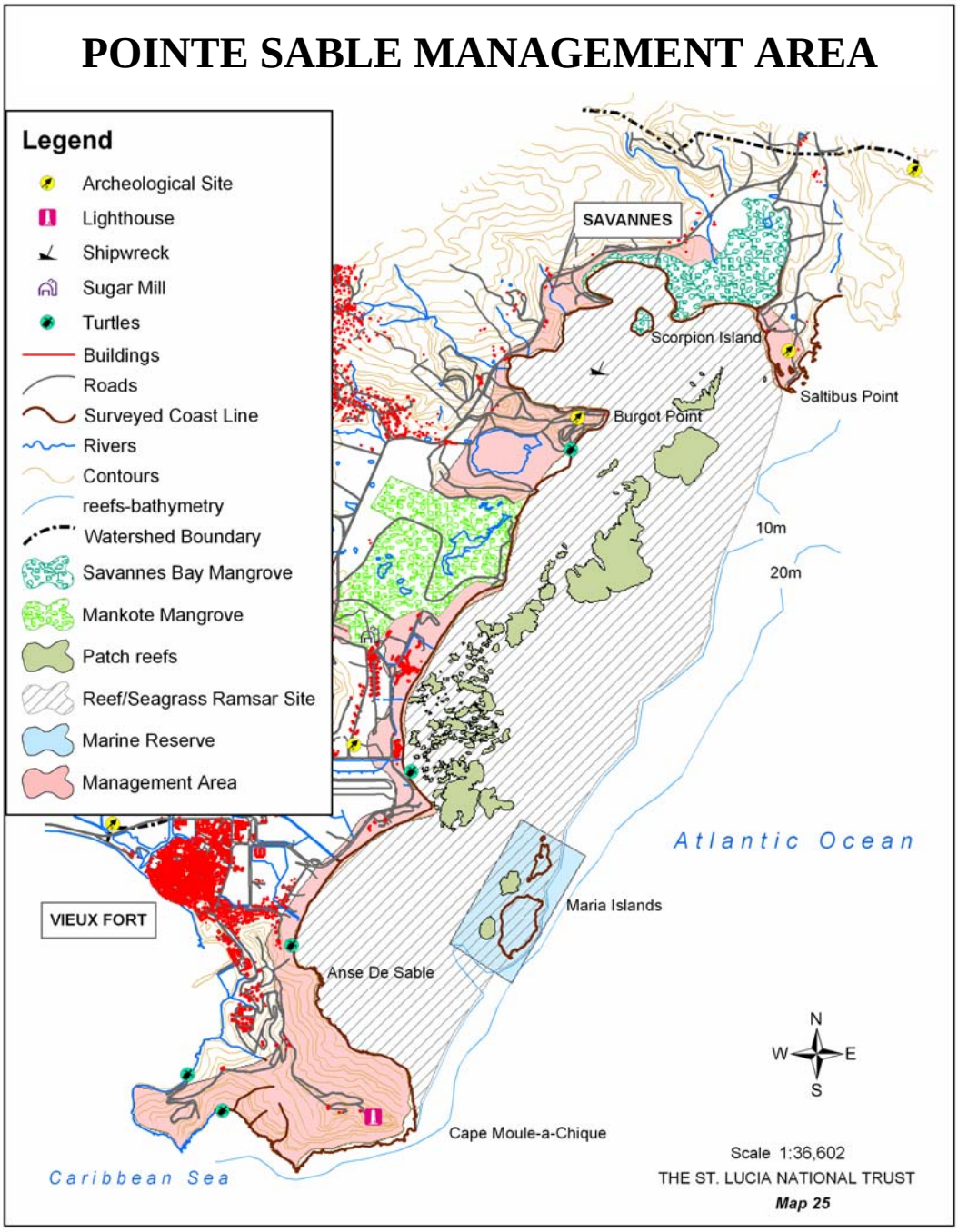


Figure 2.1: A sketch of the proposed Pointe Sable Management Area

The proposed Pointe Sable Management Area (PSMA) is located on St. Lucia's southeast coast. It is approximately 250 hectares in area. Terrestrially, it consists of a narrow coastal strip and the Moule-a-Chique peninsula (Figure 2.1); the marine area is larger, consisting of long sandy beaches, the Savannes Bay and Mankòtè Mangroves, Scorpion Island and the Maria Islands, several coral reefs and an offshore sand bank. Most of the terrain is low and undulating, the highest point being at Moule-a-Chique (223 metres), at the southern tip of St. Lucia.

Tropical dry and very dry forests predominate, with the main vegetation being grassland, coconut groves, mangroves and scrub forest.

Four coastal ecosystem types – seagrass beds, mangroves, coral reefs, and nearshore islands – are present. In addition, the area serves as the habitat for five endemic species of herpetofauna, the most note-worthy of which are two species found on the Maria Islands and nowhere else in the world: the St. Lucia Racer snake *(Llophis ornatus*) and the Maria Islands (Whiptail) ground lizard (*Cnemidophorus vanzoi*). The area also includes several historical sites, including old fort sites, a lighthouse and a World War II-vintage radar tracking station. The existing and proposed protected zones within the proposed Pointe Sable National Park are listed in Table 2.1 below.

Figure 2.2 The Maria Islands: (left) Maria Minor and (right) Maria Major. (*Espeut photo****).***

TABLE 2.1: ZONES WITHIN THE PROPOSED POINTE SABLE MANAGEMENT AREA
Wildlife Reserve (existing)
Maria Islands
Marine Reserves (existing and proposed)
Savannes Bay Mangrove (existing)
Anse Pointe Sable to Mankòtè Mangrove (existing)
Maria Islands Reef (existing)
Artificial reef at Moule-a-Chique (existing)
Reef from Caesar Point to Mathurin Point (existing)
Reefs from Saltibus Point to Moule-a-Chique (proposed)
Nature Reserves (existing and proposed)
Savannes Bay and Queen's Chain (proposed)
Maria Islands (existing, with proposed extension to include surrounding waters)
National Landmark (existing)
Upper Moule-a-Chique
Historic Sites (proposed)
Saltibus Point
Burgot Point
Belle Vue Sugar Mill
Amerindian Site northwest of Pointe Sable
Sites of two old forts at Moule-a-Chique

Permanent human habitation within the area is negligible; however, populations that are or would be affected by the proposed PSMA, lie around the inland and coastal communities of the eastern and southern areas of the town of Vieux-Fort, including the communities of Bellevue, Beausejour, Moule-a-Chique, Retraite, Pierrot, Cocao/Vigé and Bruceville. The primary activities in the communities adjacent to the proposed PSMA are agriculture, charcoal production, fishing and tourism. Saint Lucia's international airport is located in close proximity to the site, along with several commercial, industrial and tourism operations. While these provide economic opportunities, they also combine to exert pressure on the natural resources of the area. Of special concern are the destruction of coral reefs and mangroves, coastal erosion, over-fishing and pollution (arising from inadequate waste disposal and agricultural runoff), all of which are exacerbated by on-going and proposed development within and near the boundaries of the PSMA.

Figure 2.3: View from Moule a Chique to the north. The town is Vieux Fort; the arrow marks the alignment of the runway of Hewanorra International Airport (*Espeut photo****).***

There has been considerable conservation work in the area since 1981, and up to the late 1990s it was widely regarded as one of the best managed areas in St. Lucia. Some effort has been made in the past to develop "community based" ecotourism within the area. As part of this effort, a bird-watching tower and trails were established and guided tours undertaken within the community-managed Mankòtè mangrove in order to supplement the income of the charcoal producers who depend on the resource for their livelihood. Visitation is minimal at present, but would likely increase after the area is declared as a Management Area and supported by promotional and marketing activities. Some of the major activities within the area include sports recreation, fishing, charcoal production, nature tourism tours, and windsurfing.

Two of the largest mangroves in St. Lucia, the Mankòtè and Savannes Mangroves are located within the proposed PSMA. These Mangroves have been officially declared under the RAMSAR Convention on Wetlands, and are the only "RAMSAR sites" in St. Lucia. The Mankòtè Mangrove, with four species of mangroves, is the largest mangal on the island. In the early 1980's, there was an effort to conserve the area by giving the community a stake in managing and protecting the resources within the mangroves, and the **Aupicon Charcoal and Agricultural Producers Group** was established. Savannes Bay is highly utilised for fishing, and to a lesser extent, for sea moss (*Gracilaria spp.*) production.

The majority of PSMA land is owned by the Government of St. Lucia, but vested in the St. Lucia Air and Sea Ports authority (SLASPA) and the National Development Corporation (NDC). The NDC has ownership over most of the land covered by the proposed PSMA.

According to the social assessment undertaken for the OPAAL Project, the main concerns of stakeholders in relation to the proposed PSMA included ensuring local involvement in co-management of the proposed area, protecting the mangroves; ensuring livelihoods from charcoal production, sea moss cultivation and fishing; and promoting recreational uses in the area and eco-tourism. Other concerns included ambiguities about land tenure status in some areas, dumping of garbage and waste in rivers, mangroves and the sea; and use of agrochemicals.

Altogether, the area is a representative sample of tropical Caribbean island coastal ecosystems in a relatively good state of preservation. However, ongoing and proposed development activities within and near its boundaries make the proposed PSMA very vulnerable.

2.2 SOCIOECONOMIC CONTEXT OF THE POINTE SABLE AREA

As mentioned above, permanent human habitation within the boundaries of the proposed management area is negligible; however St. Lucia's second largest township is but a few hundred yards away. It is important to know the socioeconomic context in which the proposed management area will be located; unemployment and poverty levels in the immediate surroundings of any area with abundant harvestable natural resources can be an indicator of the threats and challenges its managers will face. At the same time at the other end of the economic scale, the presence of investors flush with money may present threats and challenges of a more serious kind; construction of hotels, golf courses and piers on the shoreline in the name of "development" has the potential to negatively impact or eliminate coastal ecosystems.

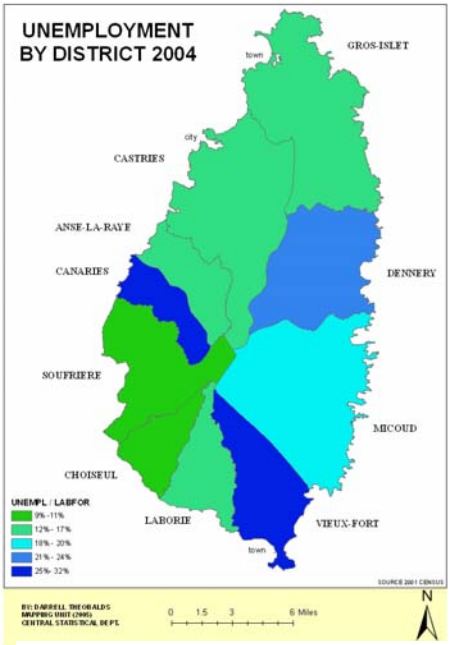


Figure 2.4: Unemployment in St. Lucia for 2004, by District.

Of St. Lucia's ten political Districts, Vieux Fort – in which the PSMA falls – has the highest unemployment levels (25%-32%). It lies pretty near to Soufriere and Choiseul (see Figure 2.4) both of which have the lowest unemployment levels (9%-11%). The District of Soufriere contains the Soufriere Marine Management Area (SMMA), a world-famous and (by all accounts) successful effort at natural resource management which balances extractive (e.g. fisheries) and non-extractive (e.g. tourism) uses of the natural resources in a sustainable manner. The hope must be that creating a Management Area at Pointe Sable will not only improve the environmental profile of the area, but improve the socioeconomic conditions of the residents as well.

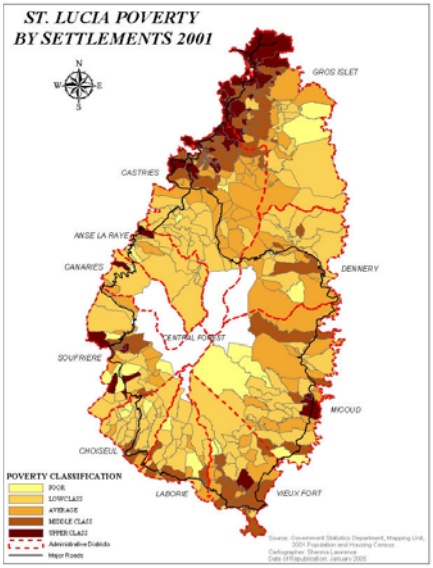


Figure 2.5: Poverty in St. Lucia for 2001, by Settlements.

The Statistics Department of the St. Lucia Government has calculated the 2001 poverty profile for all 282 communities within the island state, and has classified them into the categories: "Poor", "Low Class", "Average", "Middle Class", and "Upper Class"[3]. Figure 2.5 is a pictorial representation.

According to the Statistics Department of the Government of St. Lucia, the Pointe Sable area is "Middle Class" to "Average" with one small "Low Class" area and one small "Poor" area. Figure 2.6 shows detail for the south of St. Lucia.

[3] This, of course, represents an average for the whole community, and does not mean that poorer or richer individual households cannot be found there.

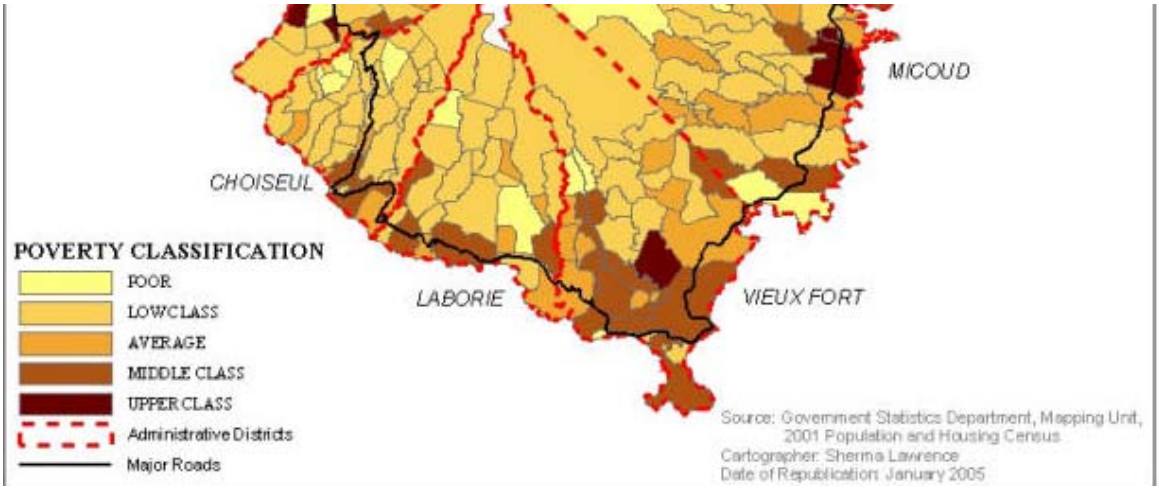


Figure 2.6: Detail of Figure 2.5 for southern St. Lucia.

Moule a Chique is zoned "Middle Class" because the few homes on the slopes (outside the proposed boundary) are upscale. Vieux Fort is "Middle Class" except for Bruceville which is "Low Class". Most of Savannes Bay is classed "Average" except for a small part which is classed "Poor".

The Central Statistical Unit scored and ranked all 282 communities in St. Lucia in terms of their levels of living. The poorest (Park Estate in Laborie) scored 5.46, and the wealthiest (Cap Estate in Gros Islet) scored 15.27. Thirteen of the ranked communities were adjacent to Pointe Sable, and their scores and relative rankings are presented in Table 2.2 below:

TABLE 2.2:
POVERTY SCORE AND RANKING OF ST. LUCIA COMMUNITIES ADJACENT TO POINT SABLE (Census 1991)

RANK	COMMUNITY	SCORE
31	Belleview	7.11
36	Bruce Ville – Shanty Town	7.18
39	Viancelle	7.19
60	Fonde Sabot	7.53
85	Coolie Town – Roots Alley	8.05
94	Morne Cayenne	8.16
121	Pierrot	8.49
147	Pomme	8.90
150	St. Urban	8.92
157	Derriere Morne	9.05
181	Savannes	9.37
248	Beane Field	11.20
250	Moule a Chique	11.31

The poorest community in Pointe Sable was ranked 31st poorest in St. Lucia, and the wealthiest was ranked 250 out of 282 – the 32nd wealthiest in St. Lucia[4]. This confirms that the Pointe Sable area is in the middle – not the poorest, and not the richest.

[4] For an explanation of how the poverty score was calculated see Appendix 1 of **St. Lucia Core Welfare Indicators Survey**. November 2004.

The St. Lucia Central Statistical Unit was instrumental in assisting this writer to obtain 1991 Census Data specific to the Pointe Sable area. Data from the relevant Enumeration Districts[5] were tabulated to provide an idea of the socioeconomic context, as follows:

TABLE 2.3: TENURE OF RESIDENCES ADJACENT TO THE PROPOSED PSMA (Census 1991)		
Freehold	569	34.3%
Lease	159	9.6%
Rent	256	15.4%
Use Rent-Free	121	7.3%
Share	3	0.2%
Squat	435	26.2%
Other	32	1.9%
Not Applicable	84	5.1%
TOTAL	**1,659**	**100.0%**

Just about one-third of the householders owned their premises, and another third leased or rented, while just about one-quarter were squatters (Table 2.3). The vast majority of households disposed of their human waste in soak-away pits (Table 2.4), which means that nutrient pollution will eventually end up on the reefs. Just about 17% of the households have no sanitary facilities, which is a good indicator of low socioeconomic status.

TABLE 2.4: DISPOSAL OF HUMAN WASTE ADJACENT TO THE PROPOSED PSMA (Census 1991)		
Sewer	8	0.5%
Septic Tank	700	42.5%
Pit	618	37.5%
Other	49	3.0%
None	272	16.5%
TOTAL	1,647	100.0%

Despite the high unemployment, the living standards in the Vieux Fort District are, on average, relatively high. Some relate this to high levels of remittances flowing into Vieux Fort from relatives living overseas, which should not be considered sustainable. Should the inflows dry up or decline substantially, it could thrust many below the poverty line.

Clearly it would be more sustainable if the standard of living in the area and the country was grounded in a labour force working hard and contributing to the Gross Domestic Product. The OPAAL Project has the potential to contribute to this effort.

[5] The EDs were 10301-10302, 10401-10403, 10501-10502, 10601-10602, 10701-10704, 10804-10805, 12107-12108.

2.3 LIVELIHOODS IN THE POINTE SABLE AREA

2.3.1 FISHING FOR FINFISH, LOBSTER AND CONCH

The marine part of Pointe Sable is used for diving, setting fish traps and nets, and for harvesting sea urchins. There are two sites where the catch from the Pointe Sable area is landed (Figure 2.7): Savannes Bay (red arrow) within the area to the north, and Vieux Fort (blue arrow) outside the area to the south. The following data, kindly provided by the Fisheries Department, Ministry of Agriculture Forestry & Fisheries gives a good indication of the fishing activity based there.

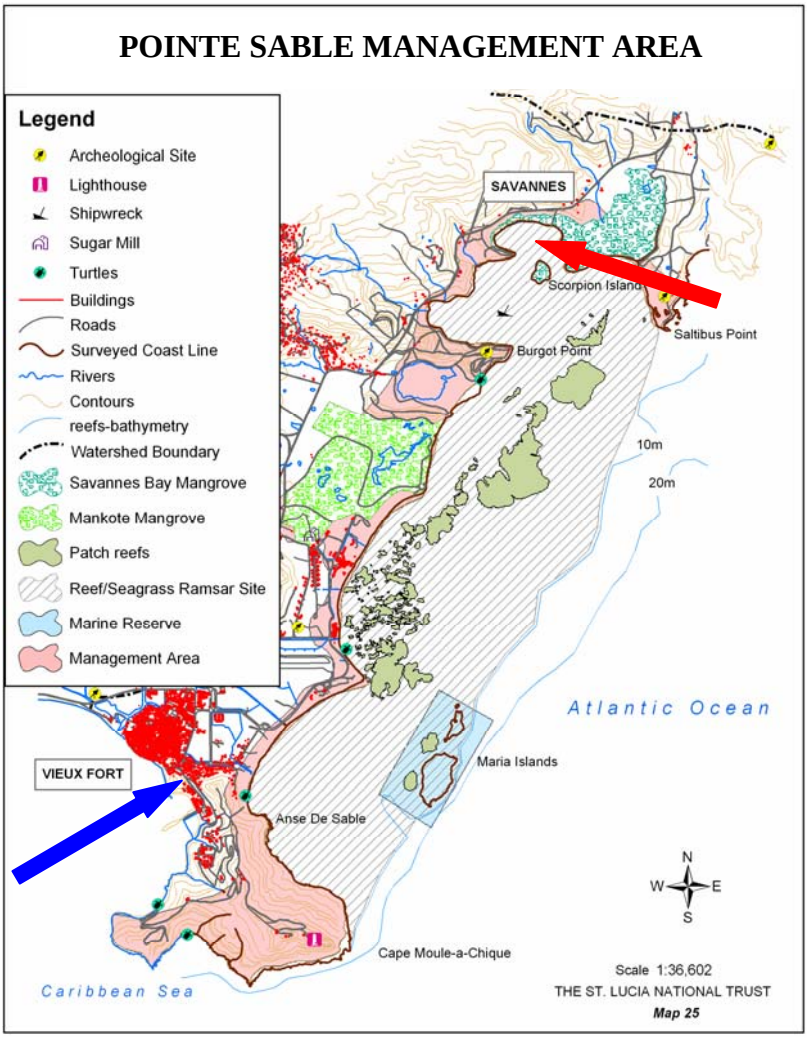


Figure 2.7: Map of the Pointe Sable area showing the two fish landing sites

It must first be pointed out that there is no requirement in St. Lucian law for fishers to be licensed, neither are they required to pay any sort of fee (resource rent) for the right to extract a valuable resource (fish) from the natural environment nor to pay for the fish itself. The law does require fishing vessels to be licensed, and their annual license fee may be considered a resource rent, as may the fish landing fee which is collected based on the volume of fish landed. These costs are borne by vessel owners and not by each individual fisher. At the same time each registered vessel owner and fisher benefits from certain duty-free concessions on boats, engines and equipment, to a duty-free pickup truck, and to participate in any training offered.

Table 2.5 gives the number and type of fishers registered at the two landing sites for 2002 and 2004[6].

TABLE 2.5:
NUMBER AND TYPE OF FISHERS REGISTERED AT THE TWO LANDING SITES (2002 & 2004)

	SAVANNES BAY		VIEUX FORT	
	2002	**2004**	**2002**	**2004**
Full-Time	32	33	243	121
Part-Time	7	7	117	240
Boat-Owners	3	4	18	25
TOTAL	**42**	**44**	**378**	**386**

[6] "Boat Owners" refers to persons who own fishing boats but who themselves do not go to sea; the "Full-Time" and "Part-Time" fishers may or may not own their own boats

For both the Savannes Bay and Vieux Fort fish landing sites there is a slight increase in the number of registered fishers over the two-year period, but the dramatic change is the shift in Vieux Fort from "Full Time" to "Part Time" status. Over the period, the number of "Full Time" fishers in Vieux Fort was cut in half, and the number of "Part Time" fishers doubled. This suggests that less money is being made from fishing, and so persons are reducing the time they spend in that industry. The fact that they are not reported as having left the industry altogether suggests some residual confidence in the sector, and that the registered fishers still have some capital invested in the industry; or it could mean that they have not bothered to remove their names from the register of active fishers.

Figure 2.8: The boat parking area at Savannes Bay (*Espeut photo****).***

Table 2.6 gives the number and type of fishing boats registered at the two landing sites for 2002 and 2004. ["Dugout Canoes" are traditional vessels propelled by oars; "Fibreglass Pirogues" are canoes powered by outboard engines; and "Transom Boats" are decked vessels which are powered either by inboard or outboard engines].

TABLE 2.6:
NUMBER & TYPE OF REGISTERED FISHING BOATS AT THE TWO LANDING SITES (2002 & 2004)

	SAVANNES BAY		VIEUX FORT	
	2002	**2004**	**2002**	**2004**
Dugout Canoes	3	1	52	11
Fibreglass Pirogues	17	15	117	102
Transom Boats	0	0	4	1
TOTAL	**20**	**16**	**173**	**114**

In 2003 the St. Lucia Fisheries Department conducted an island-wide exercise to verify whether the number of fishing vessels on their books were actively engaged in fishing, which resulted in the de-registration of a number of aged and decrepit boats; and this explains part of the decline shown in Table 2.6 above. The decline in "Dugout Canoes" by itself could just mean retooling and upgrading by traditional fishers to increase efficiency; but the fact that so many vessels have gone out of service and have not been replaced indicates that there has been some flight from the fisheries sector, probably due to a decline in the profitability of the fisheries sector, because of fish pot theft, or that some new more profitable economic sector has drawn away the fishers. Put in other words more to the point of this study, the livelihood of fishing in the Pointe Sable area is not sustainable, which puts it under threat.

Figure 2.9: Fishing vessels (fiberglass pirogues) moored at the Vieux Fort Fisheries Complex (*Espeut*

More evidence of unsustainability comes from the data in Table 2.7 presenting the catch at Vieux Fort for the years 2000, 2002, 2003 and 2004. Catch data for Savannes Bay is available only for 2000 which does not allow any comparisons or conclusions re sustainability to be drawn on this account.

TABLE 2.7: CATCH (TONNES) BY SPECIES LANDED AT VIEUX FORT (2000, 2002, 2003, 2004)				
SPECIES	**2000**	**2002**	**2003**	**2004**
TUNA	138.2	69.57	148.0	127.3
DOLPHIN	219.8	164.5	110.8	147.5
WAHOO	87.4	86.8	53.5	112.7
SNAPPER	24.4	18.5	26.2	9.3
FLYING FISH	1.0	0.24	1.91	0.0
SHARK	0.3	0.77	0.78	1.5
LOBSTER	0.0	0.50	3.91	0.6
CONCH	0.0	0.25	0.004	0.3
OTHERS	16.7 (3.4%)	25.1 (6.9%)	23.1 (6.3%)	24.5 (5.8%)
TOTAL	**487.9**	**366.2**	**368.2**	**423.6**

From 2000-2004, the overall catch first fell and then rose by 2004 to a level below the initial 2000 levels. The exception to this trend is "Wahoo", the catch of which fell but rose by 2004 to a level greater than in 2000.

Fig 2.10: Reef fish being weighed in Vieux Fort (*Espeut****).***

One of the factors (emerging out of the interviews) causing the variability in these data is the introduction south of Vieux Fort (outside Pointe Sable) of Fish Aggregation Devices (FADs), three over the period. These anchored floating objects attract large pelagic fish[7], making them more easily caught by fishermen using hook-and-line or gill nets. Optimists believe that they are the answer to the prayers of fishers for bigger catches; pessimists believe that they do not increase the number of fish in the sea – only the ease of catching the few fish left; pessimists believe that FADs will only increase the speed of overfishing, and are negative in the long-term. The short time-series of catch data in Table 7 seems to support the assertions of the pessimists.

Figure 2.11: Coastal pelagics caught on St. Lucia's west coast being sold in Vieux Fort (*Espeut photo****).***

But it must also be pointed out that this discussion is interesting but somewhat irrelevant to this study, since the FADs are not inside the boundaries of the proposed PSMA; indeed the only finfish fishery in the shallow waters of the target area is a reef demersal fishery and a coastal pelagic fishery, both of which are lumped together in Table 2.7 as "other". Although there was a slight increase in this category over time, in no year for which data was obtained did the "other" category contribute even 7% of the total catch. Clearly fishing activity within the PSMA alone cannot provide enough income to support a fisher and his

[7] Pelagic fish (from the Greek meaning "wanderers") are larger deep-sea ocean-going species like tuna, dolphinfish and wahoo which feed in the water column – sometimes on the surface. Coastal pelagics like herrings and sprats are smaller and operate in schools over a wide area in shallower water, like in the PSMA. Pelagics are contrasted by reef demersal fish which are bottom feeders exclusively on coral reefs.

family; indeed one might argue that fishing within the PSMA is really a marginal activity to the pelagic fishery from where more than 90% of the catch comes.

In an effort to collect qualitative evidence for overfishing, the few fishers of reef demersals interviewed were asked about the usual symptoms of overfishing, namely: (1) Is your total catch weight declining? (2) Is the average size of the fish you are catching declining? (3) Is the species composition of your catch changing; i.e., are you seeing less quality fish (groupers, snappers) and more common fish (grunts, parrotfish) and trash fish (doctors, squirrel fish)? The answers to all three questions was a unanimous yes! And personal observation of reef demersal catch (e.g. in Figure 2.10) supports the hypothesis that reef fish are also overfished (despite the slight increase in the "other" category). Finally, interviews with staff of the Fisheries Department supported this assertion.

The fishers and fisheries officers also expressed the opinion that another reason why fishing within the proposed PSMA is unsustainable is because the ecosystems which are the primary habitat for fish (sea grass, mangroves and coral reefs) are being slowly degraded by land-based sources of marine pollution. No data on water quality was available, but an inspection of several rivers which empty into the PSMA did not reveal any clear waters which might indicate a pollution-free flow. Until pollution is arrested, fishing in Pointe Sable will never be sustainable; the capacity of these habitats to support fish life will constantly be falling.

Figure 2.1 The river entering the PSMA near Savannes Bay (*Espeut photo****).***

It is a safe conclusion that the fisheries within the proposed PSMA are in slow decline. It will be possible to reverse this decline, but not while absorbing large amounts of new entrants into the fishery. Diversification into new economic sectors is required to employ the large numbers of young people born into the fishing communities of the District of Vieux Fort each year.

The strategies which need to be employed to achieve a sustainable fishery are well known and discussed in the literature, and should be included in the management plan and regulations for the Pointe Sable Management Area once it is created. These include:

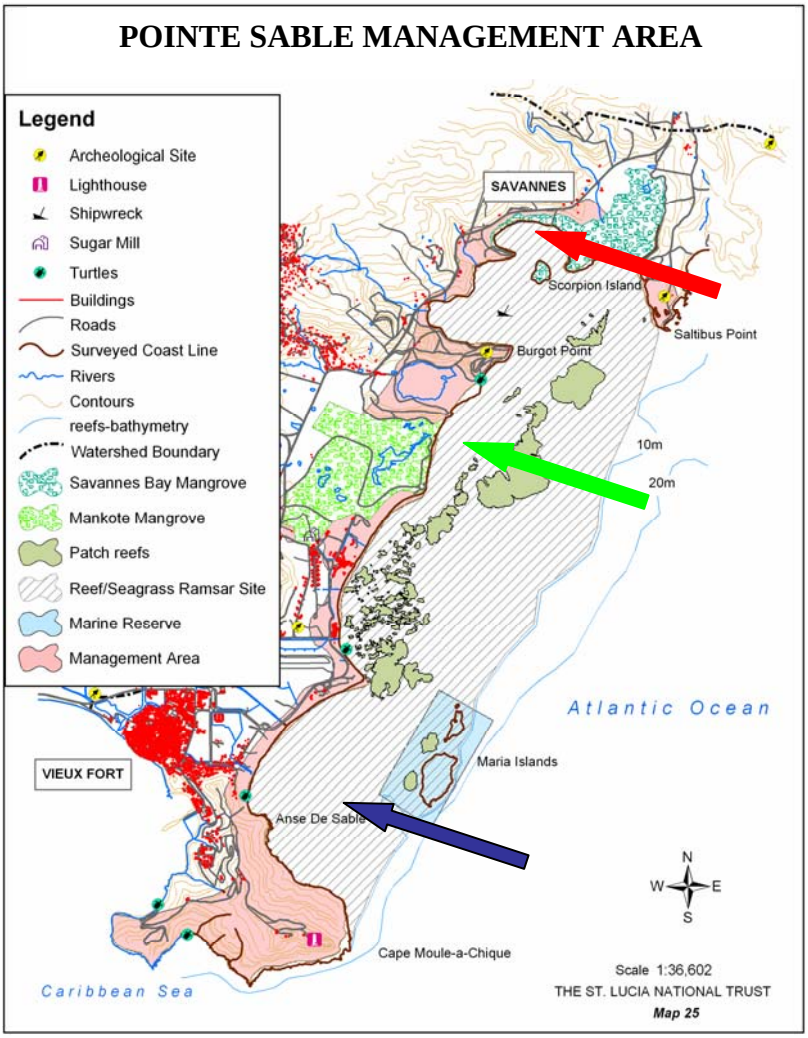
- the enforcement of a ban on destructive gear (including seine nets);
- the enforcement of a ban on small mesh in nets and traps;
- the enforcement of no fishing with SCUBA or hooka[8];
- the enforcement of no-take zones;
- the enforcement of closed seasons on certain species (like lobster and conch);
- the enforcement of a system of limiting new entrants into the fishery;
- the enforcement of effluent discharge standards which are friendly towards fish habitat.

In the Soufriere Marine Management Area a few miles away, fisheries management has caused the catch of each fisher to triple. The same thing can happen in Pointe Sable.

[8] A hooka rig employs a compressor located in the boat feeding air down to a diver through a hose and mouthpiece; whereas with the use of SCUBA the diver has to surface when the tank is empty, the hooka diver can stay down as long as he likes until hunger bites, or until the supplies of fuel to run the compressor are exhausted.

2.3.2 FISHING FOR SEA URCHINS

Fishing for the white sea urchin (*Tripneustes ventricosus*) takes place at Savannes Bay (red arrow), Bwa Chadon (green arrow; also called Aupicon) and Sandy Beach (blue arrow; also called Anse Sable).



As currently practiced, the harvesting of sea urchins at these three sites seems to be unsustainable. The principal mechanism introduced to manage the fishery has been to close the fishery, allowing a sea urchin harvest for only a few weeks each year. The urchin population increased, and harvesting was allowed in 2001-2003, but stocks again declined (suggesting that harvest levels were unsustainable) and again the season has been closed.

The exception is around Creole Day[9] (the last Sunday in October), a celebration of St. Lucian traditions such as the roasting and consumption of the gonads of sea urchins. Although no fishing for sea urchins is ever allowed around the Maria Islands Wildlife Reserve, this law is commonly disobeyed.

In fact all year round, illegal sea urchin harvesting for local consumption and export to Martinique is common. It was reported that children illegally fish for sea urchins just before each school year opens, to buy their schoolbooks. The system of local management of sea urchin stocks seems to have broken down.

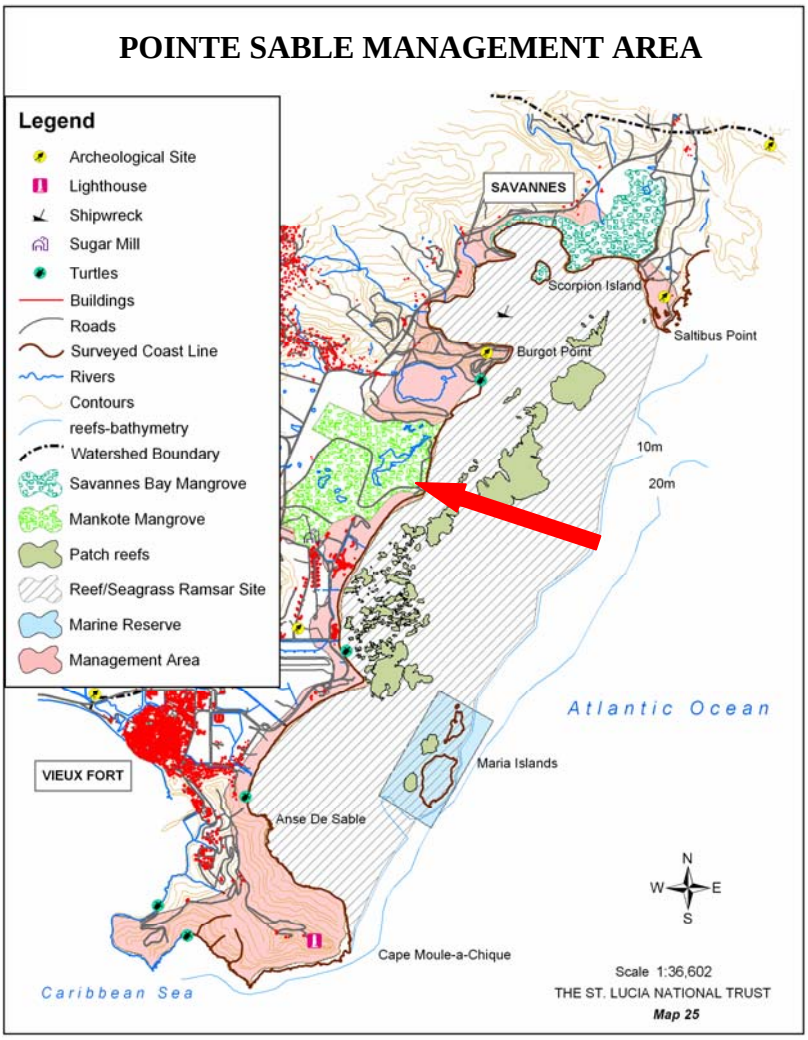
Some system needs to be put in place in the Point Sable Area to make sea urchin harvesting sustainable. Through stakeholder meetings the community must be persuaded to adhere to the closed seasons, and the ban on harvesting in the Maria Islands Marine Reserve. Those who manage the area must be encouraged to include enforcement in its suite of strategies. There is much in the literature concerning the success in sea urchin management in Laborie (just a few miles away) encouraged by the Caribbean Natural Resources Institute (CANARI) some years ago[10]. This success needs to be evaluated, and any positive elements transferred to the Pointe Sable area.

Possibly sea urchin stocks could be enhanced through seeding the reefs with “test-tube” blastulas.

[9] World Creole Day is October 29.
[10] For example, see Smith & Koester (2001).

2.3.3 CHARCOAL PRODUCING

The story of the sustainable use of the Mankòtè Mangal (red arrow) for the production of charcoal by the **Aupicon Charcoal and Agricultural Producers Group** (ACAPG) has been the subject of several often-cited publications in the literature on community-based natural resource management[11]. All four mangrove species found in St. Lucia are present, but only white mangroves (*Laguncularia racemosa*) and buttonwood mangroves (*Conocarpus erecta*) were harvested for charcoal.



The 63 ha Mankòtè mangal – 20% of St. Lucia's mangrove resources – was protected in 1986 and in an informal agreement with the government, the ACAPG were given: (1) sole access rights to the wood; (2) the responsibility to rotate in at least a two-year cycle; (3) specific guidelines for cutting practices which permit coppicing; (4) a ban on cutting adjacent to water bodies; (5) the duty to assist with research and monitoring; and (6) the right for trained members of the ACAPG to engage in income-generating tourism activities. Technical assistance and training was provided to the members of the ACAPG by the Caribbean Natural Resources Institute (CANARI). Only the 16 ACAPG members could legally cut mangroves. A trained member would measure the stems and give the OK to cut suitable trees in the approved method to ensure sustainability. A boardwalk and bird-watching tower would be built to encourage nature tourism and to provide an alternative income to the ACAPG members.

Figure 2.2 The headquarters of the ACAPG (*Espeut photo****).***

This author visited the headquarters of the operations of the ACAPG, set up as a base for nature tourism. Visible were a number of storyboards telling the story of the sustainable

[11] See, for example, Smith & Berkes (1993), Hudson (1997), Geoghagen & Smith (1998), Samuel & Smith (2000),

use of the Mankòtè Mangal (red arrow) for the production of charcoal by the ACAPG.

How sustainable is charcoal production at Mankòtè? This question may be addressed at two levels: biologically and institutionally.

Institutionally: The last meeting of the ACAPG was in March 2004; six (6) members attended. Only three (3) members are still cutting and burning charcoal, although no measurements are now taken to determine readiness; the decision to cut is by inspection at the discretion of the cutter. About 12 non-members are now cutting illegally and unsustainably. There is no enforcement of the agreement between the government and the ACAPG.

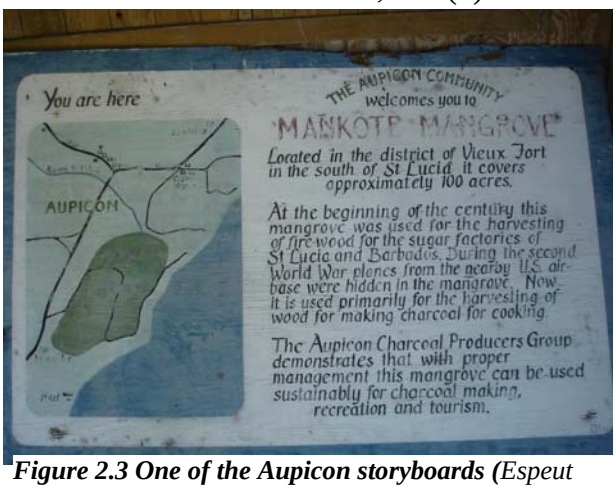


Figure 2.3 One of the Aupicon storyboards (*Espeut photo****).***

Biologically: There is much less mangrove now; the total mangrove area continues to decrease. This author did not observe any mangroves near the road through Mankòtè. The red mangroves (which no one wants to cut) are big and plentiful. The interviewees advised that the white and buttonwood mangroves are not re-growing, and a vine is taking over the area where the healthy mangroves were. Clearly the agreed coppicing methods are not being followed.

As far as the tourism is concerned, the boardwalk was never built. The bird-watching tower, however, was built; the local community is upset that no government official was present at its dedication. The tower soon collapsed, and was never rebuilt. Tourism at Mankòtè has never worked.

Figure 2.4 All that remains of the bird-watching tower: the base (*Espeut photo****).***

One can only conclude that the mangrove cutting at Mankòtè to make charcoal is unsustainable: both biologically (the mangroves are disappearing) and institutionally (the **Aupicon Charcoal and Agricultural Producers Group** has broken down). Some years ago, CANARI closed its offices in Vieux Fort and moved its operations to Trinidad. The technical support the **Aupicon Charcoal and Agricultural Producers Group** had received did not allow them to sustain themselves once the support was no longer offered.

If sustainability in the Pointe Sable Management Area is to be attained, then:

- Mankòtè must be brought under active management again;
- either the ACAPG must be resuscitated with a return to the agreed procedures, or no further cutting in Mankòtè should be allowed;
- white and buttonwood mangroves should be replanted;
- a study needs to be done as to why tourism there failed, and based on the findings, a new tourism strategy needs to be prepared and implemented.

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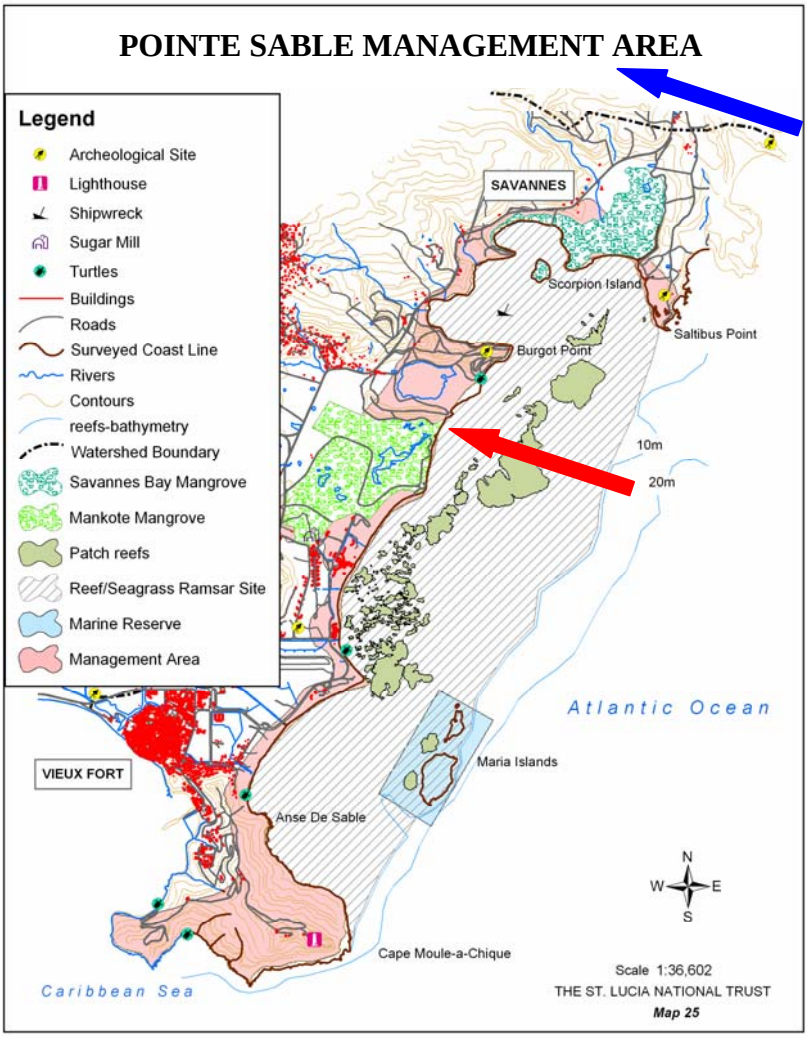
2.3.4 SEAMOSS FARMING

The collection of seaweed from the wild (mostly *Glacilaria spp.*) for the preparation of traditional "seamoss" drinks[12] seemed to occur at a rate which threatened the health of wild stocks. The technology for mariculture of seaweed species suitable for the preparation of these drinks – indeed species more suitable since strain selection has resulted in high-agar-yielding varieties – was developed by the Department of Fisheries and the Caribbean Natural Resources Institute (CANARI) as a strategy to take pressure off wild stocks. The technology was successfully transferred to small-scale farmers by the above who also offered ongoing technical support.



Strands of the seed stock are woven into the twisted strands of plastic rope many dozens of feet long, and tied in the shallows to grow. They require some attention as the strings have to be shaken free of accumulated sediment every few days. After a few weeks the bushy growth is removed for drying and packaging, and the rope re-seeded. There have been numbers of publications describing the method[13]. Before it moved its operations to Trinidad, CANARI began to experiment with *Euchuma spp*[14]. as an improvement on *Gracilaria*.

During the survey, sea moss mariculture was taking place at Pralin (blue arrow; outside the PSMA) and Aupicon (red arrow).

Praslin: The site is out to sea (too far to swim) and a boat is required to get there. The Praslin fishers (who assist the sea moss farmers with transport) are selling off their boats since fishing is in decline; so transport is difficult. The Praslin farmers still use *Gracilaria* which has an epiphyte[15] problem. After Tropical Storm Debbie the farms at Praslin were wiped out. Since then twenty-nine (29) persons restarted, but they were damaged by Hurricane Ivan; sixteen (16) are active now. Persons have moved out of seamoss farming into fishing, vegetable farming,

[12] The active ingredient in *Gracilaria* is **agar**, a colloidal substance used as a culture medium, and as a thickener in the food industry.
[13] See, for example, Smith (1992).
[14] The active ingredient in *Euchuma* is **carrageenan**, a colloidal substance also popular a thickener in the food industry because it does not become as thick.
[15] A red alga grows on the outside of the *Gracilaria* discolouring the product.

charcoal burning, construction trades; some have migrated. There is a Seamoss Processing Plant at Praslin which buys all the seamoss produced at Praslin, and converts it to a gel which is sold to the Bounty distillery at EC$5/gallon.

Aupicon: some years ago there were a dozen farmers; more recently there were six (6) farmers, but the number is now down to three (3) due to death and migration. One farmer says that two years ago he had about 100 strings; now he has 50 strings. He grows both *Gracilaria* and *Euchuma*. He packages the dried seamoss in 100g bags; he sells about 200 bags/month to supermarkets in Castries. He used to sell 200lb/month to Barbados, but not any more; they complained that the yield of agar had declined, and they never called again. He used to sell 200 bags/month to Antigua; not any more. He used to sell 200 bags/month to Dominica; not any more[16]. He now has a marketing problem and has scaled back his production. He has never sold to the Praslin factory because they have never asked him; he thinks they are well supplied. Besides, he says, they "buy too cheap".

The issue here does not seem to be one of environmental sustainability but of economic sustainability. There is no effluent discharge from sea moss farming, and no apparent negative environmental consequences. Indeed, because lobster post-larvae recruit in large numbers on the strings, seamoss mariculture may in fact lead not to a neutral but to a positive environmental balance sheet. Still, seamoss farming involves some drudgery: the strings have to be shaken three times/week for some months; and there is the problem of theft of the sea moss and the rope.

The main competition to sea moss farming are the harvesters of wild product, who pick up the sea moss on the beach and get an immediate return with much less drudgery.

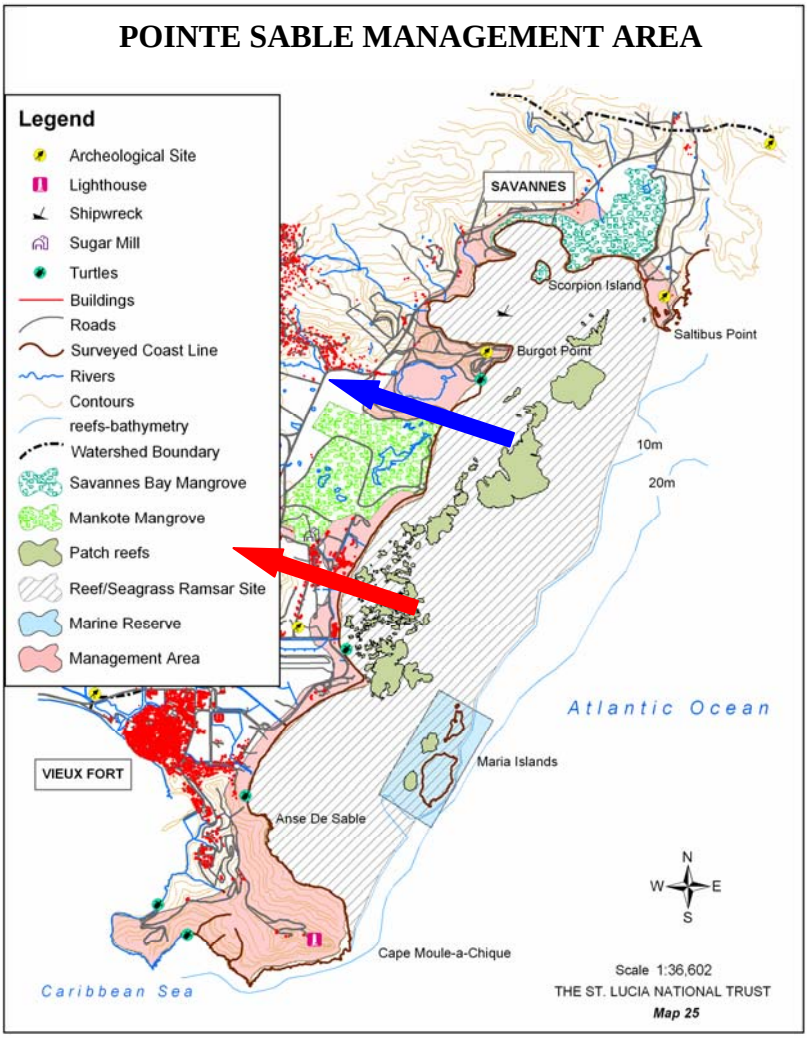
Unless demand improves and the price increases or wild stocks decline, there does not seem to be much of a future in expanding seamoss farming. Just because seaweed mariculture is technically feasible does not make it an economically feasible operation[17].

[16] Later when in Dominica, this author checked with the client, to be told that he now obtains his supply of seamoss much more cheaply and reliably – and in much more quantity – from wild harvesters in Haiti.

[17] See Espeut (1991) for a full treatment of these issues.

2.3.5 TILAPIA AND FRESHWATER SHRIMP AQUACULTURE

Although no aquaculture of *Tilapia spp.* or shrimp (*Macrobrachium sp.*) takes place within the boundaries of the proposed Pointe Sable Management Area, there are operations nearby such that they could be said to be in the "buffer zone"[18] of the PSMA.



In Beausejour (red arrow) there are two aquaculturists with nine (9) ponds between them, each pond containing a mix of *Tilapia* and *Macrobrachium*. The shrimp post-larvae are supplied by the Government, but the brood-stock is tired with only a 50% survival rate.

In Aupicon (blue arrow) there is one aquaculturist with one pond with Tilapia only. They are fed with Tilapia grower meal, green figs or ripe bananas.

How sustainable is Tilapia or shrimp aquaculture near to the PSMA? The animal waste from either shrimp or fish would pollute any waters they are discharged in. It is likely that even the small amount of animal waste that is presently generated contributes to the nutrient pollution of the local rivers and adjacent coastal waters. Water quality analysis is required to get a clear understanding of the nutrient profile. Sustainability would demand that the effluent from aquaculture is treated.

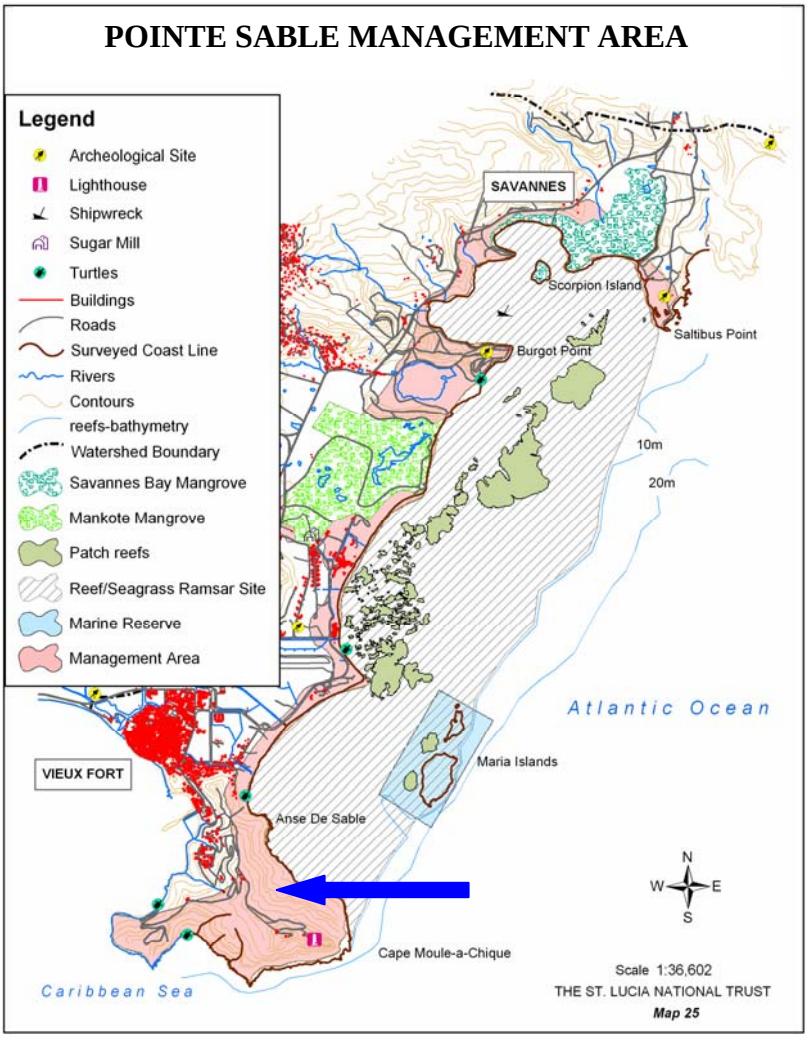
There would seem to be potential for aquaculture in the buffer zone of the PSMA if:

- wastewater treatment can be provided for the effluent; and
- if the availability and quality of shrimp post-larvae from government (or private) hatcheries can improve.

[18] A buffer zone is the region not in the protected area, but near it, such that activities taking place there could negatively impact on the protected area.

2.3.6 HARVESTING FOREST PRODUCTS

There are walking trails through the forest of Moule a Chique (blue arrow) through which harvesters of forest products gain access to the vegetation they require. They harvest: (1) saplings for broomsticks; (2) *La Tanye* for broom bristles; (3) *Ti Bom* to sweep out traditional ovens; (4) *Bois Bande* a root with a reputation for being an aphrodisiac, a constituent in traditional preparations; and (5) bay leaves for personal use, and more recently, commercially. No hunting of animals in the forest was reported.



What livelihoods are involved here? Broom-making is one, as well as the collection of bay leaves; the rest may be considered to be non-market uses of forest products.

How sustainable is broom-making and collection of bay leaves on Moule a Chique? No studies have been done on the amounts harvested, and no easy way to estimate sustainability presents itself. More technical studies need to be done before a definitive answer can be given. Until then, applying the precautionary principle would lead to a necessary assumption that the amounts of these plants available in the wild are not sufficient to allow commercial promotion of these activities to support additional livelihoods.

No assessment is available of the demand for forest products, especially those used for non-market purposes. Should it be determined that sufficient demand exists, it might make an interesting project to culture these culturally important plants, and to transfer the technology to suitable community members.

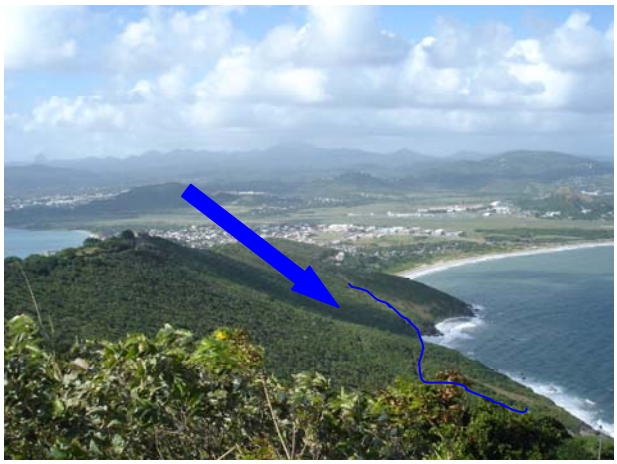


Figure 2.5 The slopes of Moule a Chique, with tracing beside one of the walking trails marked with the blue arrow (*Espeut photo****).***

2.3.7 THE MANY ASPECTS OF TOURISM

One of the attributes of the proposed Pointe Sable Management Area is that it is physically beautiful, possessing natural features on land and sea which could support both traditional Caribbean tourism (sun, sand, sea, etc.) and the newer types of visitor experiences emphasizing nature and heritage attractions. This embodies the potential for expanding the tourism sector in southern St. Lucia which has not achieved its full potential. New livelihoods can be generated within the PSMA, and with effort, it can be ensured that they are sustainable.

2.3.7.1 Beach Hotels, Beach Resorts and Beach Restaurants

Within the boundaries of the Pointe Sable Management Area are a number of hotels and resorts:

- Club Mistral/The Reef
- Coconut Bay Resort
- Juliette's Lodge
- Skyway Inn

Each of these has a restaurant, and there are also restaurants on the beach:

- Chak Chak Restaurant
- Pointe Sable Beach Resort

How sustainable are these hotels, resorts and restaurants? Are they built far enough away from the water line to prevent coastal erosion? It would appear that they dispose of their solid waste away from the area, for no piles of garbage were observed; but how do they dispose of their human waste, their kitchen and bathroom wash-water, and their kitchen waste (e.g. used stale cooking oil and grease)? No studies seem to have been done on their ecological footprint, including their discharges, and no easy way to estimate sustainability presents itself. More technical studies need to be done.

Before permits are given for new hotels, resorts or restaurants to be built, the cumulative impact of all the existing hotels, resorts and restaurants together with any new proposed entity should be investigated.

2.3.7.2 Dive Shops, with SCUBA and Snorkelling Tours

There is one dive shop within the PBMA which offer SCUBA and Snorkelling Tours; in addition, private divers and snorkellers explore the waters of the PBMA.

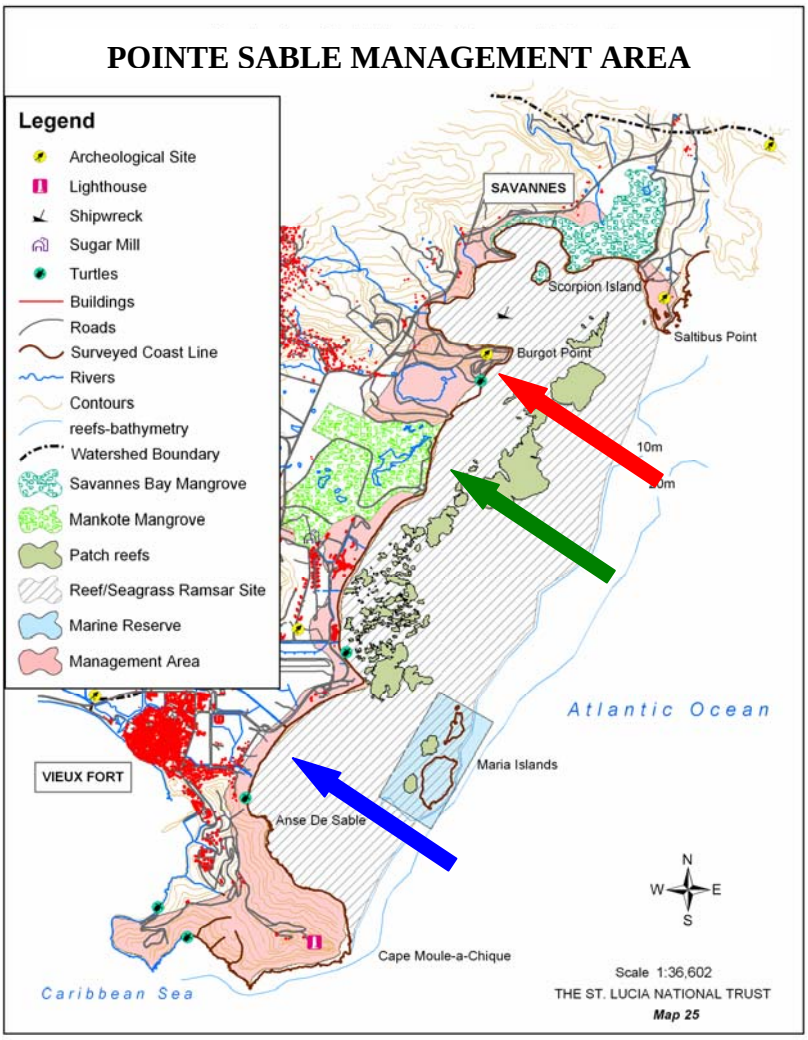
The issue is not really the sustainability of the Dive Shop but the sustainability of the activities of the divers, although the location of the dive shop and the nature of its discharges into the environment must follow acceptable standards. SCUBA compressors may be electrical or powered with petroleum fuels, but all use oil.

At the moment there is only one dive shop, and the volume of divers on the reef should not be an issue as long as they conform to best practices and reef etiquette. When the number of tourists increases such that more dive shops will be required, then an assessment of the cumulative impact should be undertaken to determine the maximum number to be allowed for sustainability.

To best be able to monitor the reef usage, SCUBA and snorkel operators should be required to brief all their patrons best practices and reef etiquette as a part of their permit to operate, and should be required to report on the number of persons taken on the reefs per month.

2.3.7.3 Beach Bathers

Beach bathing takes place across the PSMA, but is concentrated at Bwa Chadon (red arrow), Aupicon (green arrow) and Anse Sable (blue arrow) beaches. The beach bathers themselves may not be doing anything unsustainable, but putting permanent facilities in place to facilitate them (change rooms and toilets) may cause problems if they are built too close to the shoreline, and if they discharge human waste such that it soaks away into the sand. Such structures should obey accepted norms concerning setbacks and discharges.



Sometimes seagrass is uprooted (especially by hotels) in order to make the beach "better" for swimmers. This should not be permitted.

It was reported that these beaches are used by sea turtles for nesting, and use by humans may disrupt this process. Lighting at night on or behind the beach may confuse nesting females, and removal of beach vegetation may render the area unsuitable for nesting. In addition, motor vehicles driving over the beach may compact the sand making it impossible for turtles to dig proper nests, and vehicles driving over nests under the sand may destroy the eggs. And of course, humans and their pets (e.g. dogs) may rob the nests of their contents.

Figure 2.17: Pointe Sable beach scene (*Espeut Photo****).***

Lighting on the beach should be restricted[19] and the regulations for the beach area should prescribe where motor vehicles may drive and park. The discovery of turtle tracks and nests could be an educational opportunity.

There is the potential for user-conflicts (e.g. swimmers and jet skis), and the seaspace should be appropriately zoned.

There are issues to do with security and personal safety, especially at night. It has been reported that it is not uncommon for cars to park on the beach or in the area for the purpose of courting, and that robberies have taken place.

[19] Lights should be shaded so as not to be visible from the sea.

2.3.7.4 Horseback Riding on the Beach and Surroundings.

It is the custom for local youths to ride horses for recreation in the savanna east of Vieux Fort (within the PBMA) and on the beaches of the Pointe Sable area. These horses are not penned, but are allowed to graze freely on the savanna (see Figure 2.6).

Figure 2.6 Horses grazing freely on the savanna (red arrow). Note the airplane taking off from Hewanorra airport in the background (*Espeut photo****).***

Should the savanna area be developed as a picnic and recreation area, there is the likelihood that the horses (and/or their droppings) may disturb the picnickers. They must be pastured properly and their droppings cleaned up from the public area.

Riding horses on the beach may disturb swimmers and sun-bathers, and there are issues to do with animal droppings on the beach sand. Some restriction needs to be placed on where horseback riding can take place.

Figure 2.7Stray goats foraging on Point Sable beach, Maria Islands in the background (*Espeut photo****).***

Indeed stray animals (e.g. goats and cows) roaming on the beaches and on the savanna may become a nuisance and a health hazard (see Figure 2.7). It should be possible to put measures in place to minimize this.

There is the potential for developing horseback riding as an activity for tourists in Pointe Sable. The horses and guides are already in place, and what may now be considered a nuisance may become a popular and lucrative attraction. A riding trail could be developed to channel riders away from becoming a nuisance or a threat to other users of the area.

The stream flowing through the savanna is already used by locals for fishing. The savanna has the potential to become the centre for family recreation in Vieux Fort for locals and tourists alike. All the more reason to manage the presence of wandering horses, goats and cows.

Figure 2.20: Local youths fishing in the stream running through the Vieux Fort savanna within the PSMA (*Espeut photo****).***

2.3.7.5 Craft Production.

Craft production using raw materials taken from the PSMA has declined with the decline of tourism in southern St. Lucia over the last few years.

In the past the leaves of coconut trees were harvested and woven into hats and other objects. This would affect the production of coconuts if the coconut trees were stripped of most of their leaves.

More disturbing was the harvesting of coral to make jewelery and ornaments, and the taking of turtles to make turtleshell ornaments, both of which, it was reported, have all but ceased.

Figure 2.21: Local craft: a Castries roadside (*Espeut****).***

There is the potential for developing a craft industry without negatively impacting on the environment. Figures 2.21 and 2.22 show clever craft carved from coconut husks displayed by the roadside in Castries[20].

Should more visitors be attracted to southern St. Lucia because of the PSMA, they may wish to purchase tokens to remember their visit, which will create a market for high quality art and craft items. Training in craft production is available in St. Lucia, but not particularly near to Vieux Fort. It should be possible to operate a craft training programme in Vieux Fort for unemployed young men and women who have the aptitude.

Figure 2.22: A closer view of "The Pirate" (*Espeut photo****).***

[20] For photographs of craft making in St. Lucia using natural plant materials, see Page 7 of ST. LUCIA. **National Biodiversity Strategy and Action Plan of St. Lucia**. Castries: Ministry of Agriculture, Forestry and Fisheries. 2000.

2.4 THE IMPERATIVE FOR THE ESTABLISHMENT OF THE POINTE SABLE MANAGEMENT AREA

Funding is available through the OPAAL Project for the implementation of many strategies which will improve the management of the natural resources in the Pointe Sable area, as well as improve the sustainability of the livelihoods of the persons who live nearby. These funds only become available when the Pointe Sable Management Area becomes a reality in law.

Although some areas within the proposed PSMA have been brought under some sort of conservation regime, the overall area is still to be brought under a management regime despite efforts over several decades.

A Pointe Sable National Park Planning Committee (PSNPPC) was established during the 1990's with the primary mandate to develop Management Guidelines for the proposed Pointe Sable National Park. Grant funding was received from the United Nations Environmental Programme to assist the Committee in preparing the Management Guidelines which were published in May 1999 and circulated to stakeholders. Although they provided informal guidance, the Management Guidelines were never adopted. Reports have suggested that the reason for the non-adoption of these guidelines were largely related to widespread reservations about the desirability and feasibility of creating a separate management entity as proposed in the Guidelines.

Ministry endorses Pointe Sable National park

The development of the Pointe Sable National Park (PSNP) in Vieux Fort was endorsed by the Ministry of Tourism last week. Parliamentary Representative in the Ministry of Tourism, Ms. Menissa Rambally, made the announcement on behalf of her Ministry, at a PSNP Tourism Workshop, held last Friday September 12, at the Skyway Inn in Vieux-Fort.

"We must commit ourselves to ensuring the enhancement and preservation of parks such as Pointe Sable, which highlight the features which made our tourism product competitive," Rambally said in her closing remarks. "I want to wish this project well and assure you of our support."

Approximately 50 participants from various sector including tour operators, charcoal producers, seamoss harvesters, fishermen, restaurateurs, small hoteliers and other members of the business community, examined the opportunities and constraints of tourism development, arising from the establishment of the PSNP.

Plans for the restoration of the Belle Vue Sugar Mill in Beanfield were also unveiled at the workshop by architect Brian Camacho. This plan includes development of the surrounding grounds, producing a potential site for the St. Lucia Jazz Festival. It is expected that project will result in numerous spinoffs for the entire south of the island. This project is being spear headed by the Vieux-Fort Heritage Conservation Group, with support from the Pointe Sable National Park Project.

Minister of Tourism Hon. Philip Pierre

The Pointe Sable National Park concept is for the creation of a multi-use park integrating both environmental conservation and development, and encompassing both marine and terrestrial areas. The proposed park stretches from Pointe de Caille to Moule a Chique.

Figure 2.23: Article in** the Voice**, September 23, 1999

At the final meeting of the PSNPPC, which was held in February 2000, recommendations were made for the formulation of a Pointe Sable National Park Advisory Committee (PSNPAC). The recommendation was accepted by Government, and in May 2001 the PSNPAC was established. The PSNPAC was primarily required to facilitate the coordination of management activities within the proposed Pointe Sable National Park and to lead the consultative process towards creation of permanent institutional arrangements for management of the Park. The PSNPAC met several times and sought to address a number of issues related to its primary mandate. At its final meeting in April 2002, the PSNPAC arrived at several conclusions and made several recommendations including the following:

- "The creation of a Pointe Sable National Park is both desirable and feasible."
- "The option of creating a Pointe Sable National Park Foundation is not possible at this time but may be feasible in the future."
- "In the medium to long-term, the preferred institutional arrangement is one that would (a) allow all management agencies to retain current management responsibilities, and (b) place the responsibility for co-ordination in the hands of an appropriate local organisation, either

a new organisation, or an existing one. This preference is justified by the fact that a local organisation would have more focus and more legitimacy, and would be in a better position to mobilize people and resources."

- The PSNPAC also recommended that the St. Lucia National Trust be given the mandate "to coordinate management activities at the Pointe Sable National Park, with the understanding that this responsibility be transferred to an appropriate community-based organisation at a later stage." The PSNPAC also proceeded to make specific recommendations of the functions of the coordinating agency and the approaches which the St. Lucia National Trust (SLNT) should take to fulfil its mandate in relation to the PSNP. The PSNPAC also acknowledged efforts of the SLNT, at that time, to develop a project on Protected Areas which was expected to be funded Global Environment Facility.

Since the final meeting of the PSNPAC, the SLNT has to some extent been coordinating management activities within the PSNP area. However the efforts of the SLNT have been hampered by resource constraints within the institution. Also, the SLNT had been pursuing the development of a local project on Coastal Wetlands and Associated Livelihoods expected to be largely funded by the GEF, from which the PSNP area was expected to benefit significantly. Over time, this local project evolved into the sub-regional, OECS Protected Areas and Associated Livelihoods (OPAAL) Project, but the PSNP has still not received any statutory protection, despite words of support from the government.

2.5 PROJECT IDEAS FOR ACCESSING THE OECS SMALL PROJECTS FACILITY (SPF) TO ACHIEVE SUSTAINABILE LIVELIHOODS IN THE POINTE SABLE MANAGEMENT AREA

A workshop was held on January 19, 2006 with stakeholders in the Pointe Sable Management Area (PSMA) to scope out project ideas which might be eligible for funding under the OECS Small Project Facility (SPF). The workshop was organized by the St. Lucia National Trust (SLNT) and was held at Juliette's Lodge just outside Vieux Fort. The following persons with the indicated affiliations attended:

PERSON'S NAME	AFFILIATION
Bishnu Tulsie	Director, St. Lucia National Trust
Lavina Alexander	Programme Officer, St. Lucia National Trust
Darnley Lebourne	Consultant, former SLNT field officer for Pointe Sable
Monica Moses	Southern Tourism Development Corporation
W. Monty Maxwell	STDC/ Vieux Fort Town Council
Isaac Mathurin	Southern Development Corporation
Caroline Eugene	Ministry of Physical Development, Environment and Housing
Augustus Cadette	Ministry of Social Transformation
Christopher James	Ministry of Agri, Forestry and Fisheries – Department of Fisheries
Keith Mortley	Ministry of Agri, Forestry and Fisheries – Department of Fisheries
Hardin JnPierre	Ministry of Agri, Forestry and Fisheries – Department of Fisheries
Ross Gardner	Ministry of Agri, Forestry and Fisheries – Department of Fisheries
Thomas Nelson	Min of Ag, Forestry and Fisheries – Department of Fisheries
Lenius Lendor	St. Lucia Marine Terminals Ltd
Kennedy J. Burke	Royal St. Lucia Police Force
Cpl. Kentry Frederick	St. Lucia Marine Police Unit
Ainsley John	Seamoss farmer
David T. Popo	OECS Secretariat – ESDU
Peter Espeut	Consultant to the OECS

The participants were organized into two groups – one focusing on natural resources issues, and the other focusing on tourism issues – and were asked to come up with project ideas. Individuals were also encouraged to submit separately their individual ideas even if they did not come up in the group discussion. Below is a list of the project ideas which emerged (in no particular order):

Group 1 (Natural Resources) Project Ideas:

1. A study to identify appropriate fishing methods and required zoning to ensure sustainable fishing in the protected area.
2. A project to highlight and launch strategies/a campaign to stop land-based pollution. The polluters/sources of pollution to be identified and measures taken to curb pollution.
3. Study/project to recommend and implement appropriate methods to increase seamoss production. Marketing on regional level to be explored and production geared to exporting seamoss regionally and internationally.
4. Project to enhance sea urchin stocks, including enforcement of legislation.
5. Project to impart business training for the benefit of small producers engaged in economic activities in the protected area.
6. Study on how to improve aquaculture for increased production of freshwater fish and other species (e.g. shrimp, crayfish).
7. Development of historical sites and attractions of historical importance within the protected area e.g. Moule a Chique lighthouse, tours of plantation sugar mills, etc. These will be developed as tourist attractions for visitors (local and overseas) who come to the south.
8. Study to show the impact of tourism-related activities on coastal ecosystems – especially on the marine environment – to inform government development policy for coastal areas.
9. Project for revitalization of Mankoté mangrove. Why did the previous tourism initiative fail? How can a sustainable tourism drive using the mangroves be launched?

Group 2 (Tourism) Project Ideas

10. Developing the old Radar Station at Moule a Chique into a museum, lookout point, restaurant, bar, craft centre, interpretation centre.
11. A craft market in Vieux Fort.
12. Developing a recreational area with permanent structures which can then accommodate outdoor activities. This can then be used to facilitate the *Swaye Vieux Fort* weekly activity.
13. Convert the area adjacent to the annex (entrance to Vieux Fort) into a park/botanical garden displaying species both of flora and fauna.
14. Development of a nature trail and tour operation along the coastline of the Pointe Sable Management Area.

Project Ideas submitted by an individual.

15. Revitalization of the Mankoté mangrove area including the replanting/reforestation of the area (with white mangrove and buttonwood). The reorganization of the Aupicon Charcoal Producers Group. The rebuilding of the watchtower (preferably in concrete).

16. Zoning of the entire Pointe Sable area (e.g. Soufriere Marine Management Area/SMMA). Identifying prohibit areas, fishing priority areas, recreational areas. Then physical demarcation could be done.
17. A docking facility for the safety of vessels as well as a proper fish landing facility for the selling/cleaning of fish to be built at Savannes Bay. Also the construction of locker room facilities for the security and safety of boat owners.
18. Undertaking a feasibility study of the viability/profitability of the production of spiny lobsters and snappers.
19. Study on the sustainability of the harvest of *La Tanye* for broom production.

Consultant's Recommendations

New Sustainable Livelihoods

1. To estimate the carrying capacity of the PSMA for tourism-related activities
2. Training in the production of high quality (sustainable) art and craft
3. Development of a craft market in Vieux Fort
4. Training in tour-guiding skills
5. Development of a nature trail along the coastline of the Pointe Sable Management Area
6. Development of the tourism product in Mankote, including a study of past efforts;
7. Development of historical sites within the PSMA as tourism attractions

Strengthening the Sustainability of Existing Livelihoods

1. To develop and implement a plan towards the sustainability of the fisheries sector
2. To estimate the carrying capacity of the PSMA for existing livelihoods
3. Training of resource-users in environmental sustainability and business issues
4. Marketing of the tourism attractions in the PSMA
5. Study on treatment of the effluent from aquaculture for sustainability
6. Reorganization of the Aupicon Charcoal Producers Group
7. Replanting of the Mankoté mangrove

Management Recommendations

1. The OECS to use its influence towards the creation of the Pointe Sable Management Area
2. The designation of a lead entity to advance the management process of the PSMA
3. The creation of a local stakeholder entity to guide the management process
4. The preparation of a management plan for the PSMA with stakeholder participation
5. The preparation of a zoning plan for the PSMA
6. The preparation of regulations for the PSMA with stakeholder participation
7. Provision for the collection of user fees from resource users
8. The establishment of the capacity for the management entity to measure water quality
9. To estimate the carrying capacity of the protected areas

3.0 DOMINICA COUNTRY REPORT: THE MARINE SEGMENT OF THE CABRITS NATIONAL PARK

3.1 DESCRIPTION OF THE CABRITS NATIONAL PARK

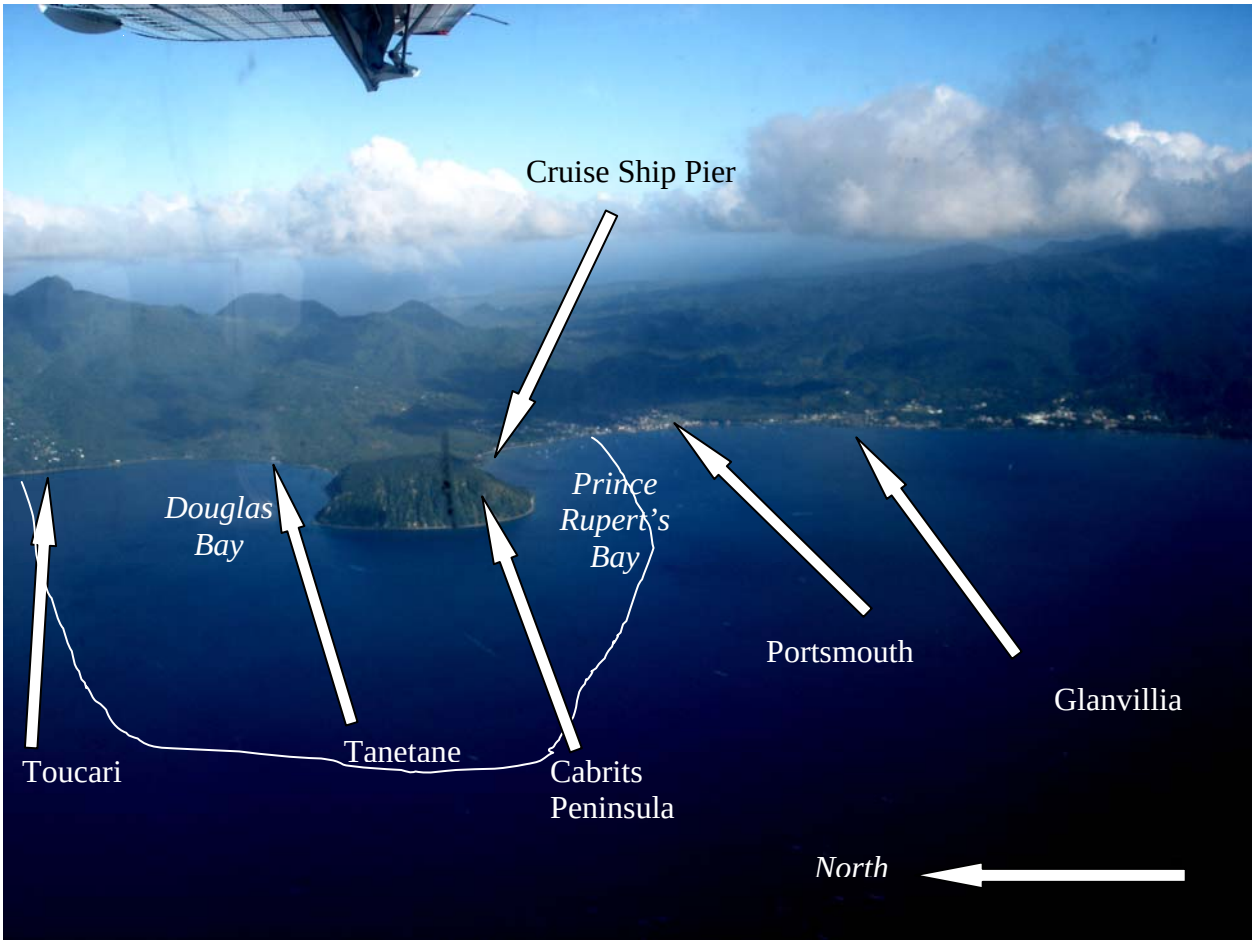


Figure 3.1: Annotated aerial photograph showing the marine portion of the Cabrits National Park approximately landward of the white line (*Espeut photo****).***

The Cabrits Peninsula is located in the northwest of the Commonwealth of Dominica, approximately one mile north of the town of Portsmouth. The Peninsula is dominated by two volcanic peaks, East Cabrit (140 m high), and West Cabrit (180 m high) separated by a central valley. On West Cabrit is located Fort Shirley whose construction began in the 1770s by the British to defend Portsmouth, Dominica's first major town, from attack by the French. There are plans to further develop these battlements into the main heritage attraction of Dominica.

In addition to its historical importance, the Peninsula is also rich in biological diversity and contains some of the most significant stands of dry forest remaining in Dominica. East Cabrits is separated from the mainland by a substantial wetland, the island's largest.

In December 1986 the Cabrits Peninsula and surrounding marine area was declared as Dominica's second national park – the Cabrits National Park (CNP). The designated area is 1,313 acres in extent, of which the marine portion measures approximately 1,053 acres, fully 80% of the total. It is the only protected area in Dominica that encompasses both terrestrial and marine ecosystems. Since its declaration, a cruise ship berth and reception facility and a visitor centre were constructed in 1990 and 1998, respectively.

Offshore, the marine communities are dominated by sea grass beds and coral reefs. Due to the volcanic origin of Dominica and the Cabrits peninsula, a narrow island shelf prevails around the headland which is a continuation of a submarine mountain, descending uninterrupted to over 100 feet. The underwater slope is composed of boulders covered with a layer of sea life. Toward the northwestern tip of the peninsula, the slope becomes less steep and the boulders exist in depths of 10 feet. One unique feature of the northwestern Cabrits are colonies of elkhorn coral (*Acropora palmata),* which are a rare sight on the west coast of Dominica.

Immediately north of the Cabrits peninsula is Douglas Bay whose floor is sandy with patches of sea grass beds making up 35% of the cover. The coral reef cover is pronounced from depths of 40 feet, with boulders and coral heads interspersed with sand patches making up 30-40% of the substrate. The once fairly extensive sandy beach is now a narrow fringe which is generally sandy but is occasionally transformed to a rocky interface by high wave energy due to freak turbulent swells and seasonal storms. Replenishment of the sand on the beach frequently occurs as a gradual, natural process over time. One of the richest coral reef communities in the area runs from the northern end of Douglas Bay to Douglas Point. This is made up of elkhorn coral (*Acropora palmata),* brain coral (*Diploria labyrinthiformis)* and finger coral *(Porites porites)* with an array of gorgonians and sponges.

Toucarie Bay, located north of Douglas Bay, is an extensive sandy expanse with patches of boulders and with coral cover at each end. Unlike Douglas Bay, Toucarie Bay was popular for its wide sandy beach until the onslaught of Tropical Storm Iris and Hurricanes Marilyn and Luis in 1995 which took away much of the sand. A large flat expanse of coral reef exists in 40 feet of water and extends over a gradual slope into deeper water.

The seagrass, coral reefs and the wetland east of the Cabrits peninsula constitute all the ecosystems in the life cycle of coral reef demersal[21] fish, which has led to Douglas Bay and Prince Rupert's Bay to be one of the must fecund fisheries in Dominica. The wetland was drained in 1985-1987 for "developmental purposes", disrupting the ecological balance between the wetland and the sea. A gradual flow of nutrients in and out of the swamp is essential for the health of marine life. The drainage has affected the buffering capacity of the wetland and consequently large amounts of silt are being channeled directly into the marine environment. These changes account for a significant amount of the resource degradation seen in the CNP.

The remainder of the marine area, approximately 55% of the CNP, is deeper than 150 ft (50m). During the winter months (January to April), up-welling currents bringing nutrients from the depth to the surface are more abundant, as well as the deep-slope pelagic fish[22] which follow the nutrients. The area immediately east of the cruise ship berth is a very popular fishing ground for coastal pelagics[23], namely large schools of jacks (*Caranx hippos*) which feed on the nutrients available. Stocks of larger and lesser pelagics are always present. These include skipjack tunas (*Katsuwonus pelamis*), ocean garfish (*Strongylura leiura*), barracuda (*Sphyraena*), jacks *(Caranx hippos),* scad mackerels and other inshore pelagic species. Ballyhoo *(Hemiramphus spp.)* and sprats (*Sardinella spp.*) usually school around the sea grass beds in the Douglas Bay and Toucarie Bay areas where they spawn and feed.

Record catches of Yellowtail Snapper (*Ocyurus chrysurus)* around the Cabrits peninsula have been reported by fishermen. Other demersal species namely, Blackbar soldierfish (*Myripristis jacobus),* Coney (*Epinephilus fulvus)* and Parrot fish (*Scarus spp*) are also common to the area.

[21] Demersals are bottom-feeders; coral reef demersals stick around coral reefs, feeding in relatively shallow water.
[22] Pelagic fish feed in the water column; deep-slope pelagics spend most of their time in deep water.
[23] Coastal pelagic fish spend most of their time in shallow water, but are wide ranging.

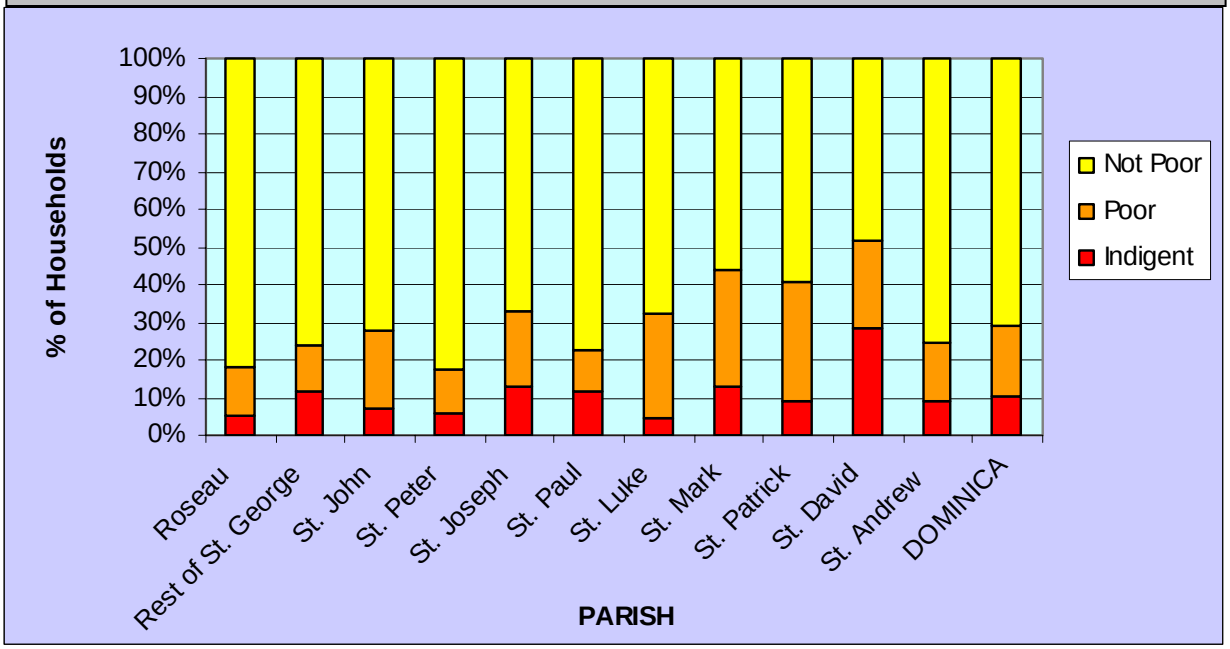
Extensive marine mammal studies by Lawrence and Watkins (1987-94) along the north-western coast of the island have reported that sperm whales and dolphins (*Tursiops and Stenellas*) are common to the periphery of the marine space at issue. The latter species are said to venture into the nearshore areas.

Unlike the terrestrial section of the CNP, the CNP does not appear to be rich in cultural resources. Although there may be several wrecks in this area, scuba divers have reported only one wreck north of Toucarie Bay. There is evidence of two 18th century cannon off the shoreline of the Cabrits north peninsula. These cannon may be directly linked to the history of Fort Shirley on West Cabrits.

3.2 SOCIOECONOMIC CONTEXT OF THE CABRITS AREA

Permanent human habitation within the land boundaries of the CNP is negligible; however Dominica's second largest township containing a campus of Ross University, fronts on the marine portion. In assessing sustainable livelihoods it is important to know the socioeconomic context in which the national park is located. The levels of unemployment and poverty in the immediate surroundings of any area with abundant harvestable natural resources can be an indicator of the threats and challenges its managers will face. At the same time, at the other end of the economic scale, the presence of investors flush with money may present threats and challenges of a more serious kind.

Figure 3.2:
Percentage Dominican Households in Poverty, by Parish



In terms of poverty, of Dominica's twelve civil parishes[24], St. John – in which Cabrits falls – lies about in the middle; four parishes have more households below the poverty line, and seven have a higher percentage of indigent households. Cabrits falls in the worse-off half in terms of poverty, and in the better-off half in terms of indigence (Figure 3.2 and Table 3.1). In relative terms it has the same percentage of households in indigence and poverty as the national average. St. John has 9% of all of Dominica's poor households.

[24] For this analysis, Roseau is split into two parishes – the city (urban) area and the rural part of the parish.

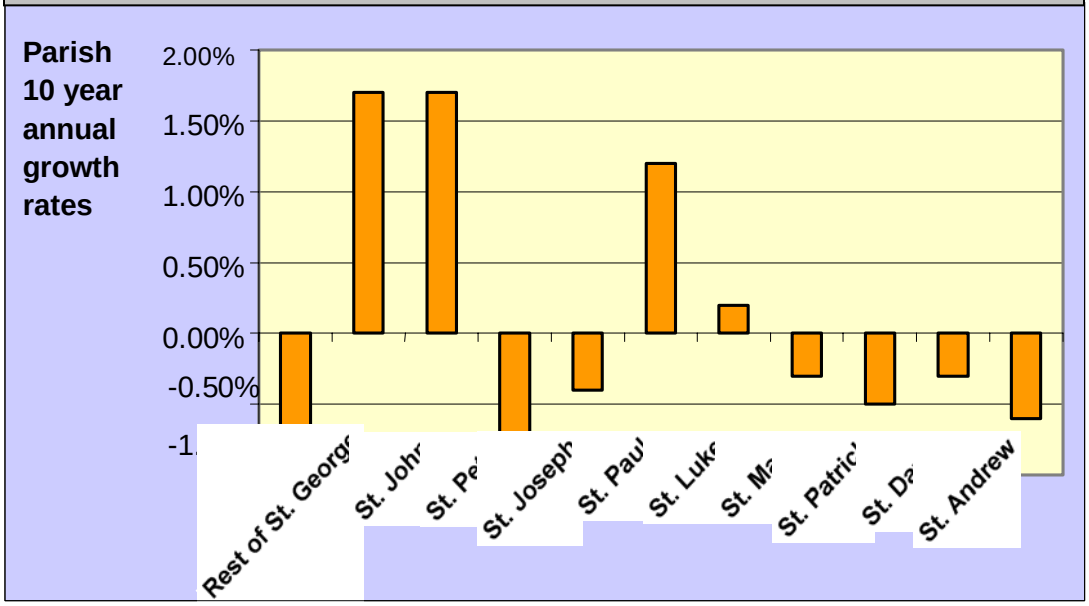
Table 3.1: Geographic Distribution of Household Poverty, 2001							
PARISH	**Indigent**	**Poor**	**All Poor**		**Not Poor**	**Total**	**% of all poor**
St. George (Roseau)	5%	13%	18%	(23%)*	82%	100%	12%
Rest of St. George	11%	12%	24%	(39%)	76%	100%	6%
St. John	7%	21%	28%	(37%)	72%	100%	9%
St. Peter	6%	12%	17%	(31%)	83%	100%	1%
St. Joseph	13%	20%	33%	(44%)	67%	100%	11%
St. Paul	12%	11%	23%	(36%)	77%	100%	9%
St. Luke	4%	28%	32%	(48%)	68%	100%	3%
St. Mark	13%	31%	44%	(62%)	56%	100%	4%
St. Patrick	9%	32%	41%	(48%)	59%	100%	16%
St. David	28%	23%	52%	(67%)	48%	100%	15%
St. Andrew	9%	16%	25%	(32%)	75%	100%	12%
TOTAL	10%	18%	29%	(39%)	71%	100%	100%

* *Figures in ( ) relate to population. All other figures related to households*

Is the population of the Cabrits area growing faster than the rest of Dominica? Can we predict whether the number of persons needing livelihoods will grow, putting additional stress on the natural resources in St. John (which also includes Indian River)?

Figure 3.3 shows that St. John has the highest mean annual population growth rate (over the last 10 years) of all the parishes in Dominica (about 1.7%/year). Interestingly, seven of the twelve parishes (including urban Roseau) have negative population growth rates. If this trend continues, the number of persons needing livelihoods in the Cabrits area will grow over time, putting additional stress on its natural resources.

Figure 3.3:
Percentage Mean Annual Population Growth Rate, Dominica, by Parish



What presently are the livelihoods in the Cabrits area? The Dominica Central Statistical Office was very helpful in selecting from the parish of St. John just those persons from the 2001 Census living near to the Cabrits[25], and running some relevant tables. The Dominica 2001 Census Report allowed some national comparisons with the circum-Cabrits area.

[25] The communities selected were (1) Bell Hall, The Cabrits, Tatan, etc.; (2) Capuchin, etc.; (3) Clifton, Hermitage, etc.; (4) D'leau Chaud; (5) Glanvillia/Zicack Park (6) Gutter & Lagoon; (7) Lagon; (8) Derriere, La Rosine; (9)

Table 3.2:
Employed Persons by Occupational Group, by Gender, for the Cabrits Area, All Dominica, 2001

	Cabrits Area			All Dominica		
	Male	**Fem**	**Total**	**Male**	**Fem**	**Total**
Legislators, Senior officials, managers	76	93	169 (9.6%)	721	958	1,679 (6.8%)
Professionals	28	25	53 (3.0%)	499	416	915 (3.7%)
Technicians & associated professionals	94	89	183 (10.4%)	1,104	1,505	2,609 (10.5%)
Clerks	34	126	160 (9.0%)	515	1,864	2,379 (9.6%)
Service/shop/market/sales workers	136	180	316 (17.9%)	1,459	1,936	3,395 (13.7%)
Skilled agricultural & fishery workers	169	24	193 (10.9%)	3,768	658	4,426 (17.3%)
Craft and related trade workers	262	29	291 (16.6%)	3,611	548	4,159 (16.8%)
Plant & machine operators/assemblers	103	4	107 (6.1%)	1,237	75	1,312 (5.3%)
Elementary occupations	131	164	295 (16.7%)	2,077	1,845	3,922 (15.8%)
Not stated	1	0	1 (0.1%)	12	3	15 (0.1%)
TOTAL	**1,034**	**734**	**1,768**	**15,003**	**9,808**	**24,811**

The presence of the campus of Ross University in Portsmouth with its large cadre of foreign students and university lecturers is probably the biggest determinant of socioeconomic conditions in the Cabrits area, although it cannot completely mask the underlying poor living conditions of the locals.

Table 3.2 compares occupational groups in the Cabrits area with Dominica as a whole for 2001. The fact that Cabrits has a larger percentage of "Legislators, Senior Officials & Managers" than all of Dominica is almost surely a direct consequence of the presence of the medical school. So also is the higher-than-national proportion of "Service Workers, Shop/Market Sales Workers" who provide services to the campus staff and students. The lower-than-national proportion of "Skilled Agricultural & Fishery Workers" is indication of the urban character of Portsmouth and its suburbs. One implication of this for the Cabrits National Park is that direct and indirect university employment draws persons away from extractive occupations like fishing, woodcutting and charcoal burning, taking pressure off the natural resources.

Table 3.3:
Employed and Unemployed Persons, and those not in the labour Force, by Gender, for the Cabrits Area, All Dominica, 2001

	Cabrits Area			All Dominica		
	Male	**Female**	**Total**	**Male**	**Fem'le**	**Total**
Employed	1,034	734	1,768	15,003	9,808	24,811
Unemployed	129	46	175	2,030	1,024	3,054
Home Duties	118	521	639	1,382	6,852	8,234
At school	330	307	637	2,303	2,494	4,797
Retired	177	189	366	2,140	2,636	4,776
Disabled	54	37	91	959	986	1,945
Other	11	8	19	128	72	200
Not stated	20	13	33	315	155	470
TOTAL	**1,873**	**1,855**	**3,728**	**24,260**	**24,027**	**48,287**
TOTAL LABOUR FORCE	**1,163**	**780**	**1,943**	**17,033**	**10,832**	**27,865**
LABOUR FORCE PARTICIPATION	**62.1%**	**42.0**	**52.1%**	**70.2%**	**45.1%**	**57.7%**
UNEMPLOYMENT RATE	**11.1%**	**5.9%**	**9.0%**	**11.9%**	**9.5%**	**11.0%**

Lamothe Estate, Cottage, Cocoyer, etc; (10) Portsmouth – town, suburban & hinterland, Chance, Glanvillia, Zicack; (11) Toucarie, Morne Cabrit, etc.

Table 3.3 displays data on labour force participation and employment. The presence of the university skews the data: in Cabrits 17.1% of the population is in school, compared with 9.9% in Dominica. This makes labour force participation (52.1%) in the Cabrits area, lower than in Dominica (57.7%). But the local presence of the university demanding supplies and services makes the unemployment rate (9.0%) in Cabrits lower than in Dominica (11.0%). Note that the male unemployment rate is higher than for females both in Cabrits and the wider Dominica.

Table 3.4 displays data on tenure of dwellings. Again the presence of a large number of university students requiring accommodation to rent has skewed the tenure data. The high proportion of rental units has reduced the proportion of owned units.

Table 3.4:
Households, by Type of Tenure, for the Cabrits Area, All Dominica, 2001

	Cabrits Area		All Dominica	
	Number	**%**	**Number**	**%**
Owned	1,255	65.8	15,918	71.2
Squatted	5	0.2	145	0.6
Rented (private)	523	27.4	4,150	18.6
Rented (government)	1	0.1	82	0.4
Leased	1	0.1	29	0.1
Rent-Free	107	5.6	1,880	8.4
Other	15	0.8	109	0.5
Not stated	1	0.1	46	0.2
TOTAL	**1,908**		**22,359**	

It would be possible to demonstrate the same effect of the university on "Main Type of Cooking Fuel" (gas) and "Main Source of Water Supply" (public water piped into home).

The Principal Type of Fuel used for Lighting (Table 3.5) reveals the underlying low levels of living of the Cabrits residents. Despite the university community, about the same proportion of households in Cabrits (84.9%) as in Dominica (86.0%) uses the public electricity supply. Despite the presence of the university community, about the same proportion of households in Cabrits (1.7%) have no electric light compared with Dominica as a whole (1.4%).

Table 3.5:
Households, by Type of Lighting, for the Cabrits Area, All Dominica, 2001

	Cabrits Area		All Dominica	
	Number	**%**	**Number**	**%**
Gas	2	0.1	58	0.3
Kerosene	124	6.5	1,764	7.9
Electricity – Public	1,619	84.9	19,237	86.0
Electricity – Private Generator	42	2.2	368	1.6
Other	88	4.6	629	2.8
None	33	1.7	303	1.4
TOTAL	**1,908**		**22,359**	

By making better use of the numbers of tourists which pass through the Cabrits area each month, with the investment of OPAAL funds it should be possible to increase employment levels even further, lift more households out of poverty, and further raise the standing of living of the residents around the Cabrits National Park through sustainable livelihoods.

3.3 LIVELIHOODS IN THE CABRITS NATIONAL PARK

3.3.1 FISHING FOR FINFISH, LOBSTER AND CONCH

The marine part of the Cabrits National Park (CNP) is used for fishing: setting fish traps and nets, diving, and dropping handlines. Fishers from Bioche, Capuchin, Colihaut, Dublanc, Portsmouth, and Tucarie extract fish resources from the CNP and land their catch on their home beach. The following data, kindly provided by the Fisheries Department of the Ministry of Agriculture, Forestry & Fisheries, gives a good indication of the fishing activity taking place in the Cabrits area.

Figure 3.4: Net fishers at Toucari, north of Cabrits (*Espeut photo****).***

It must first be pointed out that there is no requirement in Dominican law for fishers to be licensed, neither are they required to pay any sort of fee (resource rent) for the right to extract a valuable resource (fish) from the natural environment nor to pay for the fish itself. The law does require fishing vessels to be licensed, and their annual license fee may be considered a resource rent, as may the fish landing fee which is collected based on the volume of fish landed. These costs are borne by vessel owners and not by each individual fisher. At the same time each registered vessel owner and fisher benefits from certain duty-free concessions on boats, engines and equipment, to a duty-free pickup truck, and to participate in any training offered.

Table 3.6 gives the number of fishers registered at the six landing sites for 1994, 1999 and 2004, and the number of boats for 2004.

TABLE 3.6:
NUMBER OF FISHERS/BOATS REGISTERED AT THE LANDING SITES (1994, 1999, 2004)

	FISHERS	FISHERS	FISHERS	BOATS
	Dec '94	Dec '99	Dec '04	Dec '04
Bioche	19	27	28	16
Capuchin	12	13	13	14
Colihaut	34	36	36	16
Dublanc	7	23	24	15
Portsmouth	8	57	70	63
Toucarie	10	16	16	11
TOTAL	**90**	**172**	**187**	**135**

In each of the six landing sites around the Cabrits there is an increase in the number of registered fishers over the ten year period. In Capuchin and Colihaut the increase is much under 10% – substantially less than 1% per year (i.e. below the population growth rate). In Bioche and Toucari the increase over the decade is between 40-60%, and in Dublanc and Portsmouth the increase is between 200-800%. The overall total increase for the decade is 108% or more than a 10% increase per year. This suggests that there are few options for employment in the Portsmouth area, and so recruits into the fishing industry are much higher than the population growth rate. If it is true that there are numbers of fishers who do not register at all and who are not counted by the system, then the situation is even more dramatic.

Another factor is that an undetermined number of fishers from much beyond the Portsmouth area harvest the marine resources of the CNP, and may well exceed 100. The management regime for the marine portion of the CNP must take this factor into consideration.

Is fishing in the Cabrits area sustainable? There is no way of knowing quantitatively for sure, but data is available to allow us to make a good qualitative assessment.

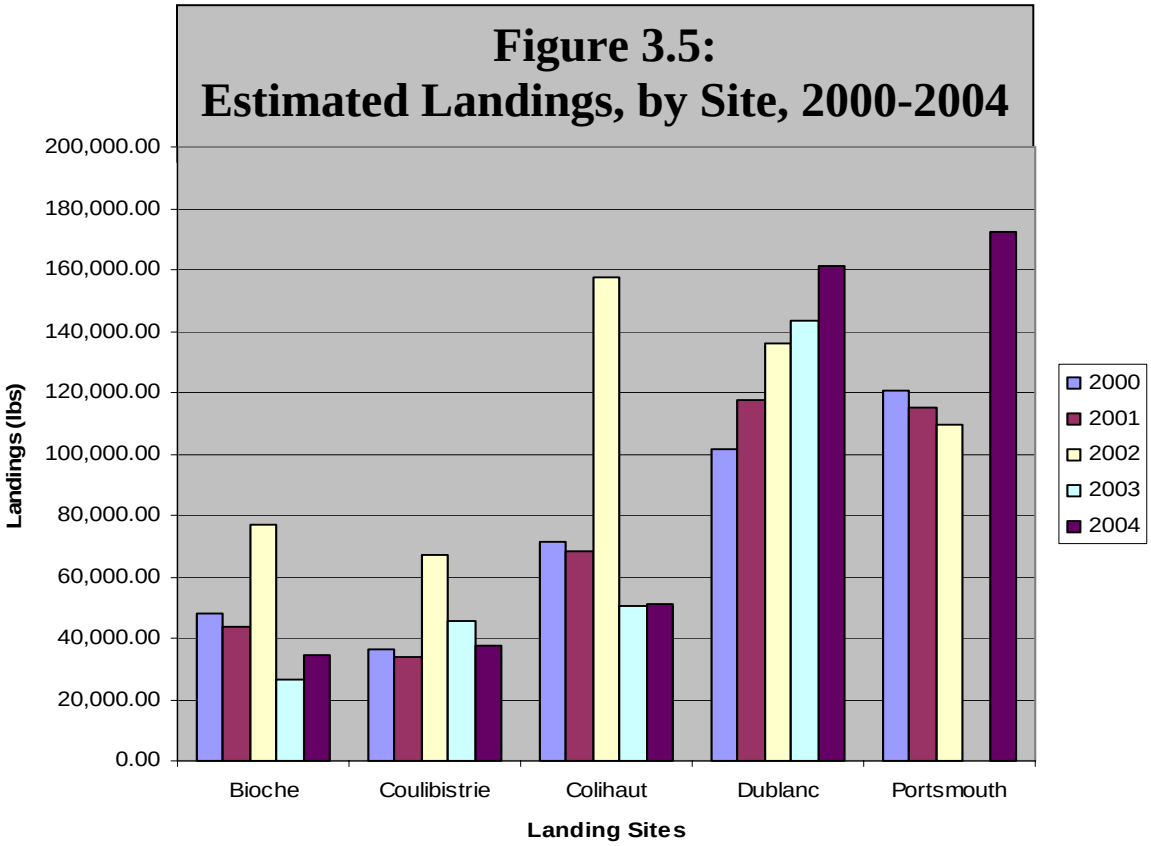


Figure 3.5 displays estimated landings for the relevant sites for the years 2000-2004, the period over which the number of fishers increased overall by about 9% (see Table 3.6). Over the period the catch declined in Bioche, Coulibistre and Colihaut (with some upward and downward movement), but increased overall in Dublanc and Portsmouth (with similar variation). Dublanc increased from about 100,000 lbs to about 160,000 lbs – an increase of about 60%; Portsmouth increased from about 120,000 to about 170,000 – an increase of about 40%.

The suggestion might be that the increase at Dublanc and Portsmouth is due to increased landings there from fishers based in Bioche, Coulibistre and Colihaut, and so a total for the period for all the landing sites might more appropriate. The aggregate for the period 2000-2004 for the landing sites in Figure 5 shows an increase from about 380,000 lbs to about 456,000 lbs, or about 20%; and with the numbers of fishers increasing overall by about 9%, this data does not indicate a decline in the sustainability of the harvesting of the resources in the CNP; it could mean that the resource is underexploited and that the catch is moving towards optimization.

We need to be sure that we base our arguments on resources actually extracted from within the boundaries of the CNP; we know that the fishers target resources both in and out of the CNP. For the purposes of this exercise, we can assume that most of the coral reef demersal fish landed on the beaches are caught within the boundaries of the CNP (since the CNP waters are relatively shallow), and that only a small amount of the pelagic fish are caught inside (since outside the CNP the waters are deeper)[26].

Figure 3.6 below shows that for every landing site near Cabrits, substantially more pelagics are caught than reef demersals, and so to estimate the sustainability of the fisheries within the CNP, we cannot look at total catch; we must focus on the catch of reef demersals.

[26] These assumptions are reasonable, but we don't know for sure the proportion of reef demersals caught outside the CNP, or the proportion of pelagics – especially coastal pelagics – caught within the CNP.

The introduction of Fish Aggregation Devices[27] (FADs) into relatively deep waters (outside the CNP) may (initially) lead to an increase in the catch of pelagic fish, but FADs do not increase the total number of fish; FADs may, in fact, increase the rate of overfishing, and so the initial increase in catch may be temporary.

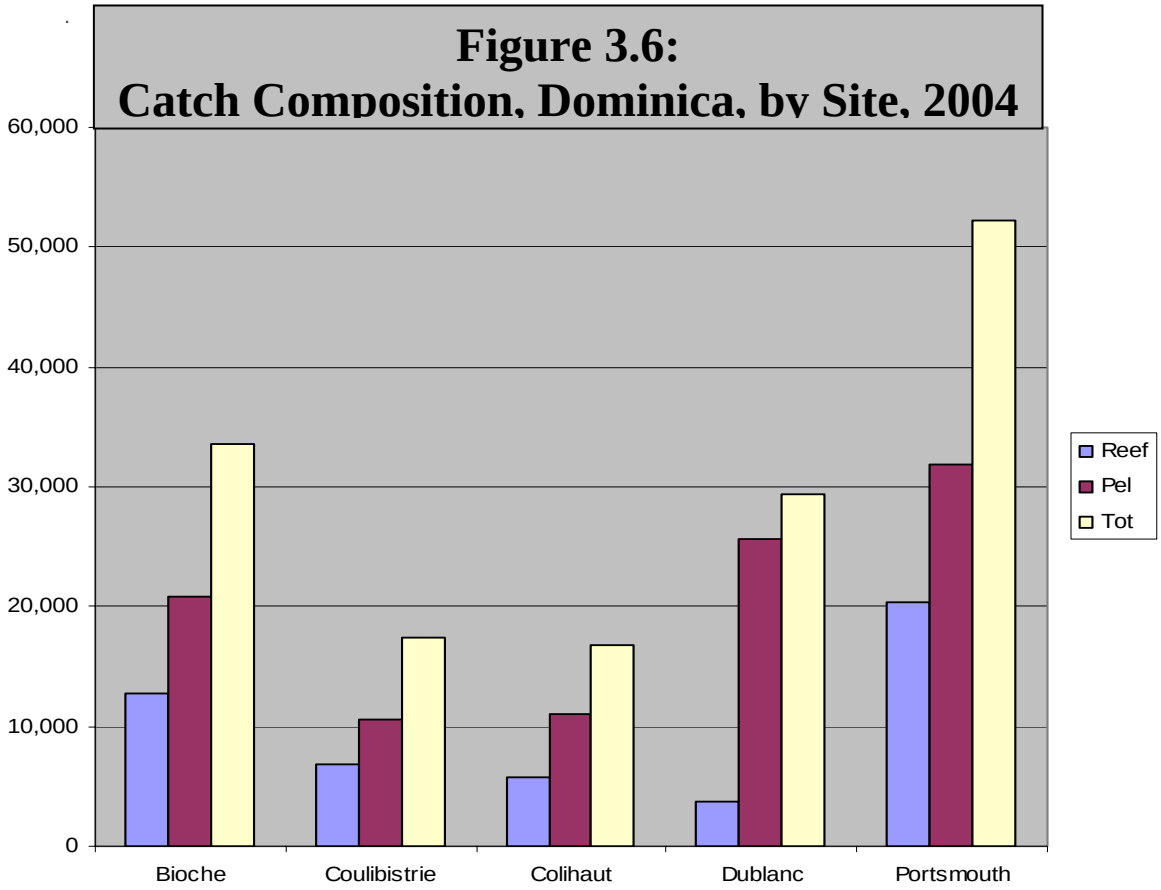


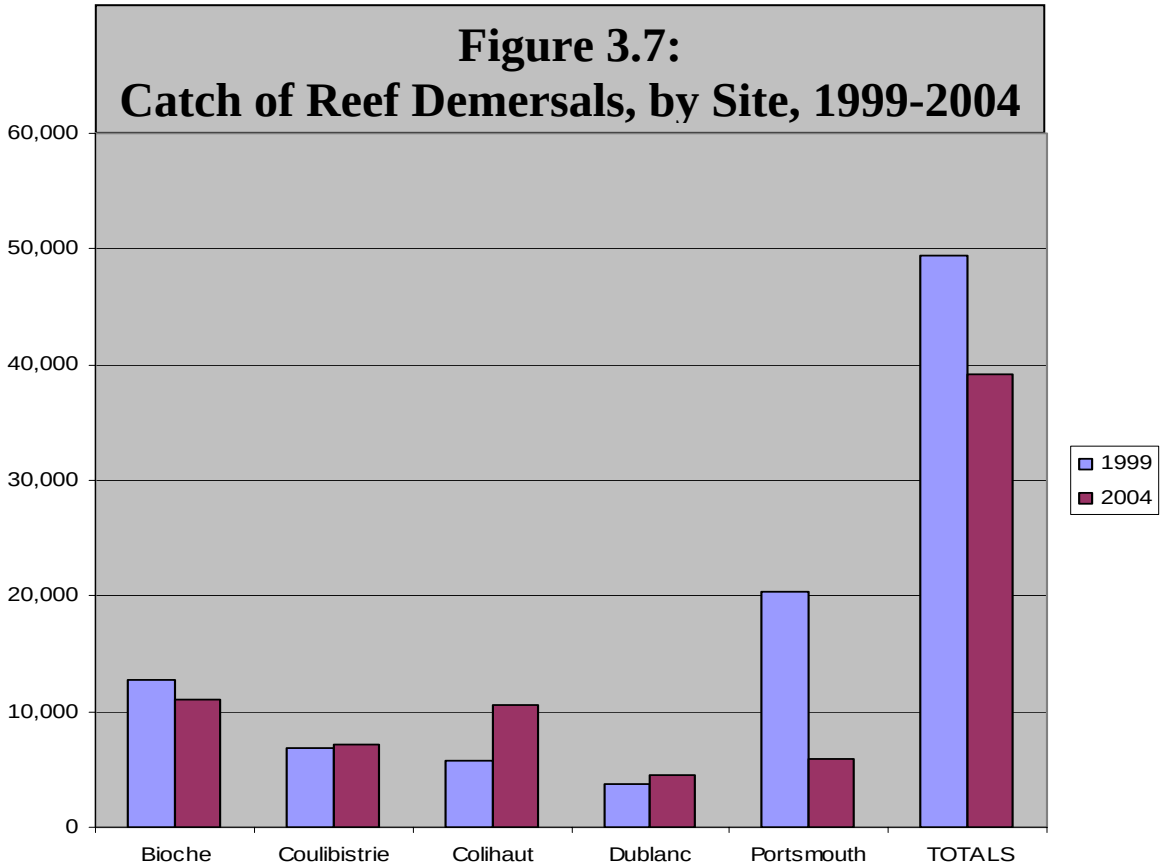
Figure 3.7 below compares the catch of reef demersals between 1999-2004 at the relevant sites, the period over which the number of fishers increased by about 9% (see Table 3.6). The data indicates that the annual catch of reef demersal fish – which we have assumed is the catch within the CNP – declined by about 10,000 lb or about 20% over the period. This is strong indication that the reef demersal fishery within the CNP is not sustainable as currently practiced, and that therefore the livelihoods of the fishers are not sustainable.

It may be asserted that the increases in fishers and catch are associated with the introduction of FADs into the (offshore) pelagic fishery, while the (inshore) reef fishery is in decline. This is supported by evidence from the interviews with catchers of pelagic fish who said their catch is increasing) and reef demersal fish (who said their catch is declining). Finally, interviews with staff of the Fisheries Department supported this assertion.

No data on water quality was available, but it is a fair guess that there will be significant nutrient pollution from sewage (high in nitrates) and wash-water (high in phosphates).

It is a safe conclusion that the fisheries within the proposed PSMA are in slow decline. It will be possible to reverse this decline, but not while absorbing large amounts of new entrants into the fishery. Diversification into new economic sectors is required to employ the large numbers of young people born into the fishing communities around Cabrits each year.

[27] It has been found that pelagic fish congregate under floating objects (maybe it is the shade), and that if a platform is anchored in deep water, some fish will take up residence under it and may be easily caught.



The strategies which need to be employed to achieve a sustainable fishery are well known and discussed in the literature, and should be included in the management plan and regulations for the marine portion of the CNP. These include:

- the enforcement of a ban on destructive gear (including seine nets);
- the enforcement of a ban on small mesh in nets and traps;
- the enforcement of no fishing with SCUBA or hooka[28];
- the enforcement of no-take zones;
- the enforcement of closed seasons on certain species (like lobster and conch);
- the enforcement of a system of limiting new entrants into the fishery;
- the enforcement of effluent discharge standards which are friendly towards fish habitat.

In the Soufriere Marine Management Area in nearby St. Lucia, fisheries management has caused the catch of each fisherman to triple. The same thing can happen in the Cabrits.

[28] A hooka rig employs a compressor located in the boat feeding air down to a diver through a hose and mouthpiece; whereas with the use of SCUBA the diver has to surface when the tank is empty, the hooka diver can stay down as long as he likes until hunger bites, or until the supplies of fuel to run the compressor are exhausted.

3.3.2 THE MANY ASPECTS OF TOURISM

The development of tourism in northern Dominica has gone a far way. Already in place is a cruise ship pier receiving calls each week – a major piece of infrastructure. The terrestrial portion of the Cabrits National Park (CNP) hosts a heritage site of global proportions, and several major studies on optimizing its potential have already been completed. In addition, from the nearby town or Portsmouth, just a few hundred yards from Cabrits, local or foreign tourists may take a boat tour up the beautiful Indian River. Already in place are some hotels, restaurants and beach resorts that cater to a mixed clientiele.

Figure 3.8: A view of Prince Rupert's Bay looking northward towards the Cabrits (*Espeut photo****).***

But it would also be true to say that the tourism sector in southern Dominica – including the CNP – has not achieved its full potential. One of the attributes of the CNP is that it is physically beautiful, embracing the potential for generating new sustainable livelihoods. First, however, let us assess the sustainability of the existing livelihoods.

3.3.2.1 The Terrestrial Portion of the Cabrits National Park

It is full of history. Pre-Columbian farmers, fishers and warriors lived along the shore of Prince Rupert's Bay which they called ***Ouhayo***. It was here that the explorer Christopher Columbus landed on June 18, 1502. Upon the twin hills of the Cabrits lies the remnants of **Fort Shirley** and the scattered 18th Century garrison that changed hands twice in the intra-European wars fought out in the West Indian theatre; those on the ramparts witnessed first hand arguably the most important naval battle ever fought in the Caribbean – the **Battle of the Saintes** – fought in 1782 between navies commanded by England's Admiral Sir George Brydges Rodney and France's François Joseph Paul, the Comte de Grasse. Well known figures such as Sir Francis Drake, Captain John Hawkins, Admiral Lord Horatio Nelson and Prince Rupert of the Rhine (nephew of Charles I), dropped anchor here.

Figure 3.9: Display board showing Fort Shirley on the Cabrits.

The CNP is managed by the Forestry, Wildlife & National Parks Division of the Dominica Ministry of Agriculture, Fisheries & the Environment, with three staff: a part-time manager, and two groundsmen (gardners). Admission tickets to the CNP are on sale at the snack concession just outside the cruise ship pier, on the same building as a craft shop and an orientation display room. A pathway through the battlements (called "The Causeway") has been created and maintained. No tour guides are employed or certified by the park authorities; cruise ship tour operators must provide their own, or the tourists have to use locals who hang about the exit of the cruise ship pier, hustling.

On the face of it, it would seem that this is not the optimal approach. Even if the park managers are unwilling to hire more establishment staff, at least training could be offered to

locals in tour guiding skills (including first aid, CPR, flora and fauna species identification, and "presentation of self") and in Cabrits history; and then successful trainees could be certified, registered, put in some sort of uniform, and could operate on a commission basis. This would broaden the scope of employment in the Cabrits area, and give more of the local folk a stake in the success of the park and the cruise ship business. The increased organization and tourist-friendliness of the operation would encourage more throughput of tourists and locals in the CNP.

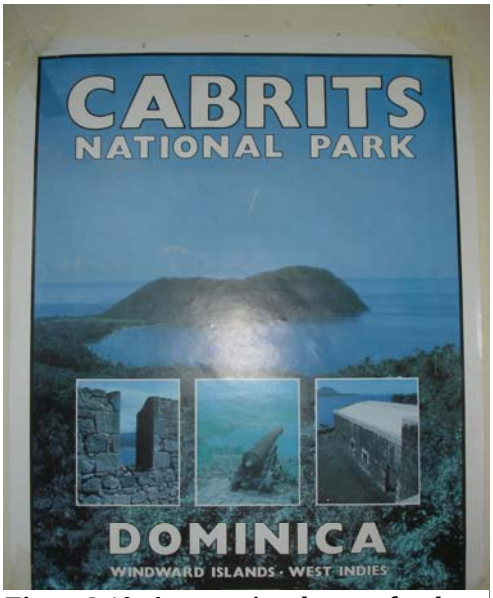


Figure 3.10: A promotional poster for the Cabrits.

Table 3.7 below displays data provided by the park managers on the throughput of visitors into the CNP for the four years prior to the visit of this consultant. It must be explained that residents of the Commonwealth of Dominica do not pay an admission fee to any of the national parks operated by the Forestry, Wildlife & Parks Division[29]. Tourists (babes in arms enter free) may purchase a **Site Pass** (for EC$2) good for one entry to one park, a **Day Pass** (for EC$3) good for entry into as many parks the person can manage to visit in that day; and a **Week Pass** (for EC$10) good for entry as many times into as many parks the person wishes to visit. A record is also kept of foreigners who enter but are exempted from paying (e.g. guests of the government, or tourism promotional visits).

TABLE 3.7:
Visitor History at the Cabrits National Park 2001-2004

	Site Pass	Day Pass	Week Pass	Resi-dents	Babies	Exemp-tions	Total
2001	6,885	203	472	6,292	59	290	16,202
2002	4,593	182	473	8,404	77	284	16,015
2003	4,951	206	505	7,866	41	400	15,972
2004	5,674	239	454	7,444	52	103	15,970

The figures show an overall (if small) decrease in patronage over the four years. Residents are the largest group of visitors, followed by those buying a site pass. Assuming 360 visitor-days per year, in 2004 there were 44 visitors/day, or 1,320/month. This is a relatively small number. If those who did not pay are excluded, this works out to be 18 paying visitors/day, or 212/month – a paltry figure. The funds collected in a day probably will not cover the costs of electricity, or the petrol costs of the Forestry Officer on an inspection visit. Certainly they do not cover the costs of even the tiny staff of the park, which means that under the current arrangements, their livelihoods are not sustainable.

The admission fee to the terrestrial portion of the CNP is good value for money; the problem seems to be marketing. Such a valuable treasure should bring in much more revenue towards the costs of management. At the moment, the CNP is not financially sustainable.

The hope would also be that the quality of the tourism product in the terrestrial portion of the Cabrits would bring in persons who might choose to partake of the tourism product in the marine portion. At the moment, this hope would be in vain. Clearly to be cost effective, both portions of the CNP should be marketed at the same time. Visitors to the area might wish to do more than one activity in a day trip from Roseau, or from a cruise ship docked at the Cabrits.

[29] The others are Indian River, Trafalgar Falls, Morne Trois Pitons, Boiling Lake, Freshwater Lake.

3.3.2.2 The Tremendous Boon of the Cruise Ship Facility

Cabrits already has what most protected area managers would die for: a cruise ship pier, with at least one cruise ship visit per week right into the park. The facility was conceived and built as part of the plans to develop the Cabrits National Park, and we must examine whether the best use is being made of this boon.

Figure 3.11: A relatively small cruise ship tied up at the Cabrits (*Espeut photo****).***

Table 3.8 below is an analysis of the scheduled Cruise Ship calls into Cabrits for 2005/2006 as provided by the Dominica Ports Authority. The Cruise Ship Pier can only handle small vessels, but nevertheless of the 240 calls in Dominica as a whole, Cabrits gets 54 – just under one-quarter; and the ships are scheduled to spend 244 hours at Cabrits – 4.5 hours/ship/call. This is a relatively short stop; the reason is that many tourists complain that there is nothing to do in Cabrits, and they step off the boat into a bus which takes them north straight to Trafalgar Falls. Some never leave the ship!

Table 3.8: The Cruise Ship Schedule for Cabrits 2005/2006	
Calls in Dominica	240
Calls at Cabrits	54 (22.5%)
Hours at Cabrits	243 (mean = 4.5)
Vessel Capacity	13,402
Day Pass visits to Cabrits 2004	~ 200
Site Pass visits to Cabrits 2004	~ 5,600

Even if the cruise ships arrive at the pier below full capacity, the figures indicate that the Cabrits National Park could benefit much more from the cruise ship pier that is right in the park[30]. Something needs to be done to encourage more tourists. With about 13,000 passengers at its doorstep per year, there are tremendous possibilities for sustainable livelihoods in the marine part of Cabrits. The director of the Dominica Port Authority and the Dominica Director of Tourism both confirmed that it is their belief that if there were more to do in the Cabrits area, there would be more cruise ship calls.

Figure 3.18 This skip is situated in the car park of the Cabrits Cruise ship port (*Espeut photo****).***

With a cruise ship port comes the issue of the pollution of Prince Rupert's Bay by solid and liquid ship-generated waste. The management plan for the marine portion of the CNP must take this into account.

[30] Not all the site passes above were sold to cruise ship passengers. Interviews with the ticket vendor in Cabrits revealed that relatively few cruise ship passengers visit the Fort. Most look in at the orientation display room just outside the cruise ship pier and then enter the motor coaches to travel to Roseau. The display room needs to be more exciting, to encourage visitors to enter the VNP.

3.3.2.3 Dive Shops, with SCUBA and Snorkelling Tours

At the moment there are two dive shops in the Portsmouth area which offer SCUBA and snorkelling tours to sites within the marine portion of the CNP, mostly to the students at the university. Less than ten local persons are employed. In addition, local and other divers and snorkellers explore the waters of the CNP outside of a formal dive tour operation.

How sustainable is dive/snorkel tourism in the Cabrits? The issue is not the sustainability of the Dive Shop but the sustainability of the activities of the divers, although the location of the dive shop and the nature of its discharges into the environment must follow acceptable standards. SCUBA compressors may be electrical or powered with petroleum fuels, but all use oil.

The dive sites used by the dive shops do not possess mooring buoys. The dive operator interviewed was more than willing to support the introduction of mooring buoys because they believe it would help their business, as many diver-tourists are quite concerned about coral reef health.

The interviews revealed that very few of the diver-tourists come from the cruise ships. These ships have on board their own diving equipment, compressors and diving instructors, and take their passengers diving without reference to anyone in port. Sometimes, we were told, they may require a local guide to the best dive sites or best route underwater to see the most sights.

The park management needs to include the diving operations based on the cruise ships and private yachts in their management regime for the CNP.

In the January 2005 “TOP 100” issue of **Rodales Scuba Diving Magazine**, Dominica received the following rankings:

Dominica - Caribbean/Atlantic
- #1 Top Small Animals
- #1 Top Marine Life
- #1 Healthiest Marine Environment
- #3 Top Dive Destination
- #5 Top Wall Dive Destination
- #5 Top Snorkeling

At the moment there are only two dive shops, and even with the cruise ship divers and the private divers, the volume of divers on the reef should not be an issue as long as they conform to best practices and reef etiquette. When the number of tourists increases such that more dive shops will be required, then an assessment of the cumulative impact should be undertaken to determine the maximum number to be allowed for sustainability.

As a condition of their permit to operate, SCUBA and snorkel operators should be required to brief all their patrons in best practices and reef etiquette. To best be able to monitor reef usage, all operators (including those on cruise ships) should be required to report on the number of persons taken on the reefs in the CNP per month. Ideally each private diver and snorkeller should report to the CNP office before entering the water. Ideally each diver and snorkeller – those taken out by the Dive Shops, the cruise ship divers and the private divers – should be required to contribute financially towards the management of the CNP.

3.3.2.4 Beach Bathing

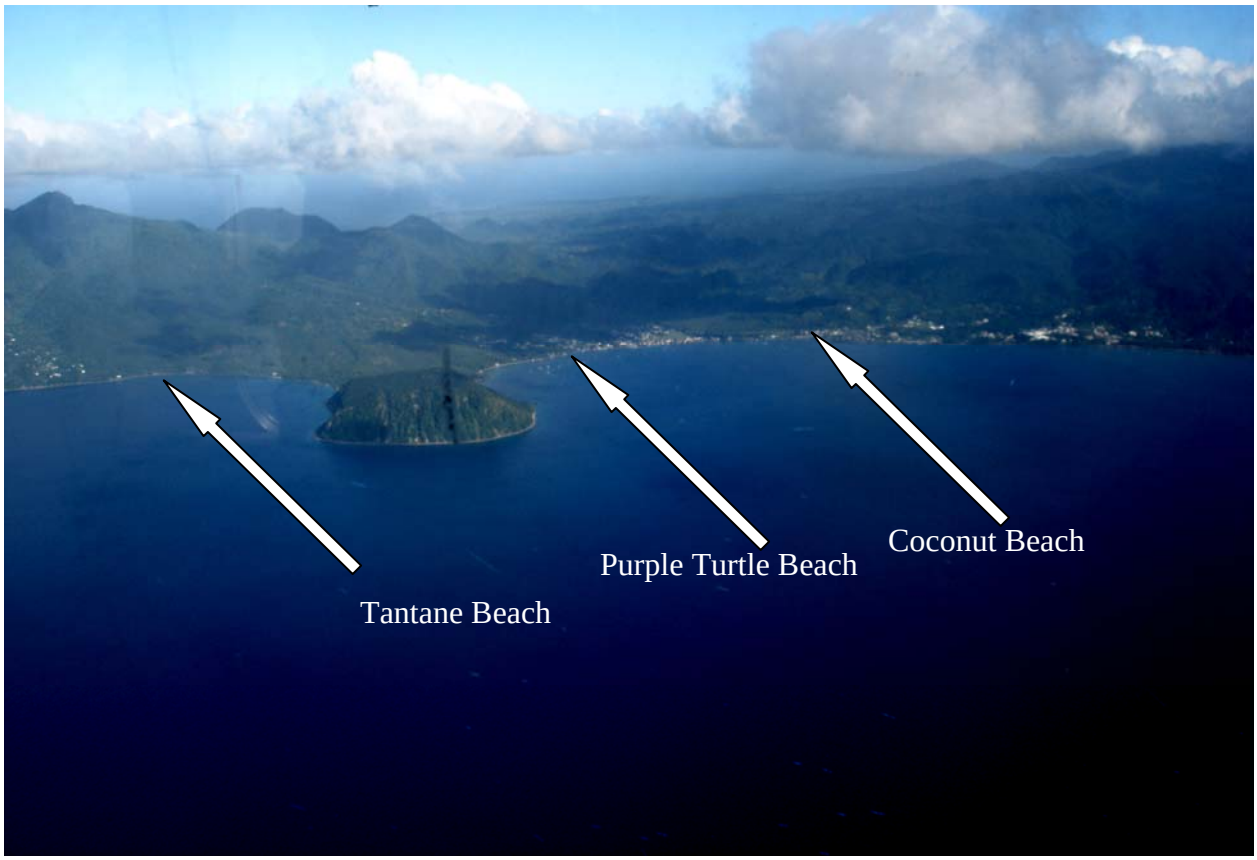


Figure 3.13: The bathing beaches of the Cabrits area. The Cabrits themselves have no beaches (*Espeut photo****).***

Beach bathing takes place across the CNP, but is concentrated at the Belle Hall Beach (Tantane), Purple Turtle Beach and by the Coconut Beach Hotel. The beach bathers themselves may not be doing anything unsustainable, but putting permanent facilities in place to facilitate them (change rooms and toilets) may cause problems if they are built too close to the shoreline, and if they discharge human waste such that it soaks away into the sand. Such structures should obey accepted norms concerning setbacks and discharges.

Sometimes in an effort to make the seafloor underfoot "better" for swimmers, seagrass (they would call it "seaweed") is uprooted (especially by hotels). This should not be permitted.

It is reported that Hawksbill turtles (*Eretmochelys imbricata*) use the Belle Hall

Figure 3.14: Belle Hall beach at Tantane (*Espeut****).***

beach (Tantane) and the Purple Turtle beach for nesting. Turtle awareness programmes should be undertaken each year just before the nesting season to sensitize the public, for humans can disrupt this process. Lighting at night on or behind the beach may confuse nesting females (who may abort egg-laying since they instinctually move towards the dark which they expect to be land) and the newly hatched turtles (who after being born may migrate towards the land instead of the sea since they instinctually move towards the light which they expect to be on the marine horizon). Removal of beach vegetation may render the area unsuitable for nesting. In addition, motor vehicles driving over the beach may compact the sand making it impossible for turtles to dig proper nests; vehicles driving over nests under the sand may destroy the eggs. And of course, humans and their pets (e.g. dogs) may rob the nests of their contents.

Figure 3.15: By Coconut Beach Hotel (*Espeut photo****).***

Lighting on the beach should be restricted[31] and the regulations for the beach area should prescribe where motor vehicles may drive and park. The discovery of turtle tracks and nests could be an educational opportunity.

There is the potential for user-conflicts (e.g. between swimmers and jet skis, or swimmers and boaters), and the seaspace should be appropriately zoned.

These issues should not prevent expansion of beach tourism at Cabrits.

3.3.2.5 Beach Hotels, Beach Resorts and Beach Restaurants

There are no Beach Hotels, Beach Resorts or Beach Restaurants within the boundaries of the CNP, but there are some in the Portsmouth area: the Coconut Beach Hotel, the Picard Beach Cottage Resort, the Portsmouth Beach Hotel, the Casaropa, the Purple Turtle Beach Club, and Big Papa's Restaurant & Sports Bar. With tidal flows changing twice daily, discharges anywhere in Prince Rupert's Bay will cross the park boundary.

Figure 3.16: The Purple Turtle Beach Club, which seems built too close to the waterline (*Espeut photo****).***

How sustainable are these hotels, resorts and restaurants? No studies seem to have been done on their ecological footprint, including their discharges, and no easy way to estimate sustainability presents itself. Technical studies need to be done. Before permits are given for new hotels or restaurants, the cumulative impact should be investigated.

3.3.2.6 A Yacht Anchorage

Sailing tourism is a feature of the eastern Caribbean, and Cabrits has the space and ideal conditions for visiting yachts and sailboats to moor. At the moment the yachts anchor anywhere, and with little order or regulation the area is coming increasingly under pressure. There are growing resource use conflicts; yachts are increasingly anchoring in the waters of the CNP affecting coral reefs and coming into conflict with local fishermen.

[31] Lights should be shaded so as not to be visible from the sea.

The development of Portsmouth as a base for sailing tourism should be encouraged. In the bay, all boats should be required to tie up on permanent moorings which should be ordered and numbered; mooring fees can then be collected. On shore in the short term, residents should be encouraged to establish chandleries to supply the yachts. Arrangements need to be in place for the disposal of ship-generated waste. In the long term, a marina with easy fuelling facilities could be developed. A number of sustainable livelihoods for the residents around the CNP could be generated out of sailing tourism.

Figure 3.17: Touring sailboats anchored in Prince Rupert's Bay (*Espeut Photo****).***

3.3.2.7 Heritage Tours

One does not have to look far for everyday cultural activities in the Cabrits area which have tourism value. A stroll on the waterfront turned up men building a fishing boat the traditional way. At whatever stage the visitors might arrive, the process can be explained in an interesting and entertaining manner. The boat-builders earn money building boats; but it would be hard to imagine them turning down extra revenue from tours. Even if the ship-wrights are not articulate, local persons can be recruited and trained as tour guides along the lines discussed in Section 3.3.1. With tourists (especially from cruise ships) to entertain in port, tourism products can be developed to ensure that more of the cruise ship dollar stays in northern Dominica to generate sustainable livelihoods.

Figure 3.18: Boat-building on the Portsmouth waterfront (*Espeut Photo****).***

3.3.2.8 Horseback Riding

Some tourists just do not want (or are not able) to hike up the Cabrits to view the battlements of Fort Shirley. On cruise ship days dozens of tourists can be seen walking to and from Portsmouth. There is the opportunity for developing horseback riding as an activity for tourists in the Cabrits area. There is land space to properly stable and pasture the horses, and training can be provided to local persons who will function as guides. Visitors can be taken up to the fort on horseback; visitors can be taken to Portsmouth by donkey cart or on horseback. Passing on beaches where the animals and their droppings could be a nuisance is to be avoided. As a means of transportation horsekind are energy efficient. There is the potential to develop sustainable livelihoods in new ways at the Cabrits.

Figure 3.19: Riding on the beach in Jamaica (*Espeut photo****).***

3.3.9 Craft Production

Craft production using raw materials taken from the biodiversity of the CNP seems rare. The leaves of coconut trees are harvested and woven into hats and other objects. This would affect the production of coconuts if the coconut trees were stripped of most of their leaves, but it would not be an environmental issue as such. There is some harvesting of straw to make hats and bags, and wood to make carvings.

Figure 3.20: Craft on sale in the Cabrits gift shop (*Espeut photo****).***

No studies have been done on the volumes of these materials or any other forest products harvested annually, nor on the sustainability of the operations. Replanting of the most commonly harvested species should be explored, and more studies in this area are needed.

With more visitors, there will be an increased market for art and craft items. Should more visitors be attracted to spend time in the north of Dominica, they may wish to purchase tokens to remember their visit, which will create a market for high quality art and craft items. Training in craft production is available in Dominica, but not particularly near to Cabrits. It should be possible to operate a craft training programme in Portsmouth for unemployed young men and women who have the aptitude. There is the potential for developing a craft industry without negatively impacting on the environment.

Figure 3.21: Traditional craft on the desk of the Permanent Secretary, Ministry of Agriculture, Forestry, Fisheries & Protected Areas (*Espeut photo****).***

To be avoided is the harvesting of coral to make jewelery and ornaments, and the taking of turtles to make turtleshell ornaments.

Figure3.22: Textiles in the Roseau market (*Espeut photo****).***

Figure 3.23: Carvings in the Roseau market (*Espeut photo****).***

Figure 3.24: Straw-work in the Roseau market (*Espeut photo****).***

3.3.2.10 Living next to a Protected Area

There is no fundamental incompatibility with having a protected area next to a residential area – or even having human settlements within a protected area. Humanity, wildlife and wilderness can sustainably co-exist; but the opposite is so easy, as the first can overwhelm the latter. Adjustments in lifestyle and settlement technology may be required.

Table 3.9: Households, by Type of Cooking Fuel, for the Cabrits Area, All Dominica, 2001

	Cabrits Area		All Dominica	
	Number	**%**	**Number**	**%**
Coal/Wood	210	11.0	3,510	15.7
Gas	1,627	85.3	18,054	80.7
Kerosene	15	0.8	308	1.4
Electricity	5	0.3	67	0.3
Other	51	2.7	420	1.9
TOTAL	**1,908**		**22,359**	

For example, should a residential community in or adjacent to a protected forest depend on firewood or charcoal for cooking, this could lead to serious impacts and conflicts. Table 3.9 shows that only 11% of the households in the Cabrits area depend on firewood or charcoal for cooking, and there are other forests and woodlands in the area other than the protected Cabrits forests. Interventions could be designed to reduce this figure even further.

Another potential source of incompatibility and conflict between humanity and nature is the pollution of the latter by the former. When the marine environment is involved, then we are into the area of what has come to be abbreviated as "LBS": Land-Based Sources of Marine Pollution. The marine environment can be polluted from a wide variety of sources, including:

- by plant nutrients (mostly nitrates and phosphates coming from agricultural fertilizers, domestic sewage and wash water);
- by biological or chemical agents which remove oxygen from the seawater making it impossible for animals (like fish) to respire there, and therefore they die;
- by sediments (mostly resulting from soil erosion due to poor agricultural practices and poor construction practices);
- by chemical pollution (mostly caused from spills of oil, acids and caustic substances from ports or other land-based facilities);
- by toxic waste (discharges of heavy metals, persistent organic pollutants and other poisonous material);
- by solid waste, i.e. garbage.

Table 3.10 below reveals that there is very little wastewater treatment in the Portsmouth/Cabrits area, resulting in nutrient loading of the marine waters of the Cabrits. This will place coral reefs under serious stress. Caribbean tourism (which is mostly beach-based) is heavily dependent upon healthy coral reefs since these produce sand which creates and replenishes the beaches, as well as provide a context for sports fishing, diving and snorkeling.

No water quality data is available to indicate the extent of the problem. Indeed, no water quality data is available to indicate the presence of any of the pollutants listed above. At the very least a pollution profile should be produced every three months (monthly would be ideal) so that the necessary health advisories can be issued.

Table 3.10: Households, by Type of Toilet facility, for the Cabrits Area, All Dominica, 2001				
	Cabrits Area		All Dominica	
	Number	%	Number	%
Flush toilet and sewer	45	2.4	3,010	13.5
Flush toilet and soak away	1,079	56.6	8,991	40.2
Pit latrine	320	16.8	6,332	28.3
Other	24	1.3	454	2.0
None	440	23.1	3,572	16.0
TOTAL	**1,908**		**22,359**	

Of concern on the public health side is the fact that just under one-quarter of the households have no toilet facilities at all, which creates the risk of water borne diseases such as gastroenterisis.

To cover the Portsmouth area with sewage collection and tertiary treatment technology is called for, but expensive. It should be possible to have a sanitation programme to introduce composting toilets to at least those households which have no toilet facilities at all.

Generally speaking, a management plan for the marine portion of the Cabrits National Park would have to address the pollution issues.

3.4.0 SPECIAL MANAGEMENT ARRANGEMENTS FOR A PROTECTED AREA WHICH CONTAINS BOTH TERRESTRAL AND MARINE COMPONENTS

Sustainability is not just about preventing environmental degradation. If a protected area is not sustainable institutionally and financially, it will most surely fail eventually.

Sometimes the way things were done in the past cause unnecessary “baggage” in the present which can negatively impact on success. The Cabrits National Park is too important for past mistakes to prevent it from being all that it can become for Dominica and for the Portsmouth area.

In Dominica, Forestry, Fisheries and Protected Areas fall under one Ministry. In Dominica, the Management of Marine Parks falls under the Fisheries Department. At the moment, “National Parks” fall under the purview of the Forestry Department. This is fine if the Protected Area is a forest, or is terrestrial. But if the Protected Area is marine, or has a large marine component, this is inappropriate.

It is my understanding that the Cabrits National Park, most of which is marine, was formed without proper consultation with the Fisheries Department.

The management of both terrestrial and marine protected areas should fall under the purview of its own separate department of protected areas.

In the short term for the OPAAL Project, day-to-day management should be in the hands of a body with full stakeholder representation, including government stakeholders.

3.5 PROJECT IDEAS FOR ACCESSING THE OECS SMALL PROJECTS FACILITY (SPF) TO ACHIEVE SUSTAINABILE LIVELIHOODS IN THE CABRITS NATIONAL PARK

A workshop was held on January 24, 2006 with stakeholders in the Cabrits National Park (CNP) to scope out project ideas which might be eligible for funding under the OECS Small Project Facility (SPF). The workshop was organized by the Forestry, Wildlife & National Parks Division of the Ministry of Agriculture, Fisheries and the Environment, and was held at the Cruise Ship Terminal within the CNP. The following persons with the indicated affiliations attended:

PERSON'S NAME	AFFILIATION
Keith Thomas	Port Officer, Dominica Port Authority
Earl Hector	North Dominica Corporation
Urban Irish	Portsmouth Tourism Awareness Centre
Oliver Joseph	Small Business Association
Albert Bellot	GEF/SGP Small Grants
Andew Maglore	Chief Fisheries Officer, Fisheries Division
Derrick Theophille	Fisheries Officer, Fisheries Division
Random Du Bois	Senior Environmental Advisor, FAO Investment Centre
Cyrille John	Asst. Forestry Officer, Forestry & National Parks
Eric Hypolite	Director of Forestry, Forestry & National Parks
Sharon Carriette	Data Supervisor, Fisheries Division
Riviere Sebastian	Fisheries Officer, Fisheries Division
Kerr Serrant	Fisheries Liaison Officer, Fisheries Division
A. Hypolite	Fisherman, Portsmouth
Gregory	Fisherman, Portsmouth
Olive Douglas	Director CALLS
Sr. Agnes Alphonse	Instructor, CALLS Centre
David Williams	Park Superintendent, Forestry & Parks
Leaford St. Jean	Fisherman, Portsmouth
Mavis Seaman	Farmer, Capuchin
Francis Sango	Fisherman, Portsmouth
Andy Mitchell	Fisherman, Portsmouth
Gregory Hamilton	Fisherman, Portsmouth
Osie Junas	Fisherman, Chance, Portsmouth
Clive Francois	Fisherman, Toucarie
Jack Harney	Fisherman, Portsmouth
Crispin Michell	Fisherman, Portsmouth
Dion John	Fisherman, Broche
Andy Ackie	Fisherman, Portsmouth
Elvius Mitchell	Fisherman, Portsmouth
Ignatius Mitchell	Dive Master, Portsmouth
Jacqueline André	OPAAL Co-ordinator, Forestry & National Parks Division
Sarah George	Programme Officer, OECS-ESDU
David T. Popo	OECS Secretariat – ESDU
Peter Espeut	Consultant to the OECS

The participants were organized into two groups – one focusing on natural resources issues, and the other focusing on tourism issues – and were asked to come up with project ideas. The groups were not restricted in the scope of project ideas they could suggest. Individuals were

also encouraged to submit separately their individual ideas even if they did not come up in the group discussion. Below is a list of the project ideas which emerged (in no particular order):

Group 1 (Natural Resources) Ideas:

1. Provide yacht moorings.
2. Construct artificial reefs.
3. Remove seine nets from Cabrits; compensate the owners.
4. Regularly collect data on fishing in Cabrits.
5. Remove fish traps from Cabrits; compensate the owners.
6. Prepare promotional material on the marine part of Cabrits.
7. Market Cabrits as a visitor destination through advertisements and promotion.
8. Closer consultation between all stakeholders and agencies concerning the management of Cabrits.
9. Training in alternative livelihoods.
10. The putting in place of enforcement officers (Park Wardens) for Cabrits.
11. The putting in place of Assistant Park Wardens for Cabrits.
12. Put in place tours of the reefs in glass bottom boats.
13. Put in place game-fishing as a tourism business.
14. Put in place water taxis.
15. Put in place snorkelling as a tourism business within Cabrits (by the Cruise Ship Pier).
16. Support a boat-building industry.
17. Zoning the Cabrits marine area.
18. An education programme about the zoning in Cabrits.
19. The training of local divemasters to support local tourism.
20. Research on the marine resources (inventory and ongoing health) of Cabrits.
21. Put in place an education programme on coral reefs.
22. Put in place an education programme on reef fish and fishing.
23. Promote local boat racing as an attraction.
24. Have an annual Fishermen's Feast.
25. Have a fishing competition.
26. Put in place regular garbage collection in the Portsmouth/Cabrits area.
27. Conduct a reef-cleaning exercise.

Group 2 (Tourism) Ideas

28. Tour guide training for the attractions in Cabrits and surrounding areas.
29. Development of a craft centre for training and production.
30. Establish glass bottom boats for tours.
31. Picture postcards portraying underwater and terrestrial scenes.
32. Construction of a vending facility within Cabrits.
33. Community sensitization concerning tourism.
34. Consultation towards the development of tourism in Portsmouth/Cabrits initiated by a community tourism organization.
35. A monthly fish festival.

Ideas submitted by an individual.

36. Collaborate with the Southern Equestrian Association to develop horseback riding tours.

Consultant's Recommendations

New Sustainable Livelihoods

1. To estimate the carrying capacity of the CNP for tourism-related activities
2. Marketing of the attractions in the CNP
3. Training in the production of high quality (sustainable) art and craft
4. Development of a craft centre in Portsmouth
5. Training in tour-guiding skills
6. Put in place tours of the reefs in glass bottom boats
7. Put in place game-fishing as a tourism business
8. Put in place snorkelling as a tourism business within Cabrits
9. Put in place horseback riding in Cabrits, to Fort Shirley
10. Put in place a donkey cart shuttle system from the pier to Portsmouth

Strengthening the Sustainability of Existing Livelihoods

1. To develop and implement a plan towards the sustainability of the fisheries sector
2. To estimate the carrying capacity of the CNP for existing livelihoods
3. Training of resource-users in environmental sustainability and business issues
4. Put mooring buoys in place for diving tourism
5. Put in place a briefing programme for SCUBA divers and snorkellers

Management Recommendations

1. The creation of a local stakeholder entity to guide the management process
2. The preparation of a management plan for the CNP with stakeholder participation
3. The preparation of a zoning plan for the CNP
4. The preparation of regulations for the CNP with stakeholder participation
5. Provision for the collection of user fees from resource users
6. The establishment of the capacity for the management entity to measure water quality
7. To estimate the carrying capacity of the CNP
8. Community education about the environment and Cabrits
9. To provide yacht moorings

4. ST. KITTS COUNTRY REPORT THE (PROPOSED) CENTRAL FOREST RANGE NATIONAL PARK

4.1 DESCRIPTION OF THE THE (PROPOSED) CENTRAL FOREST RANGE NATIONAL PARK

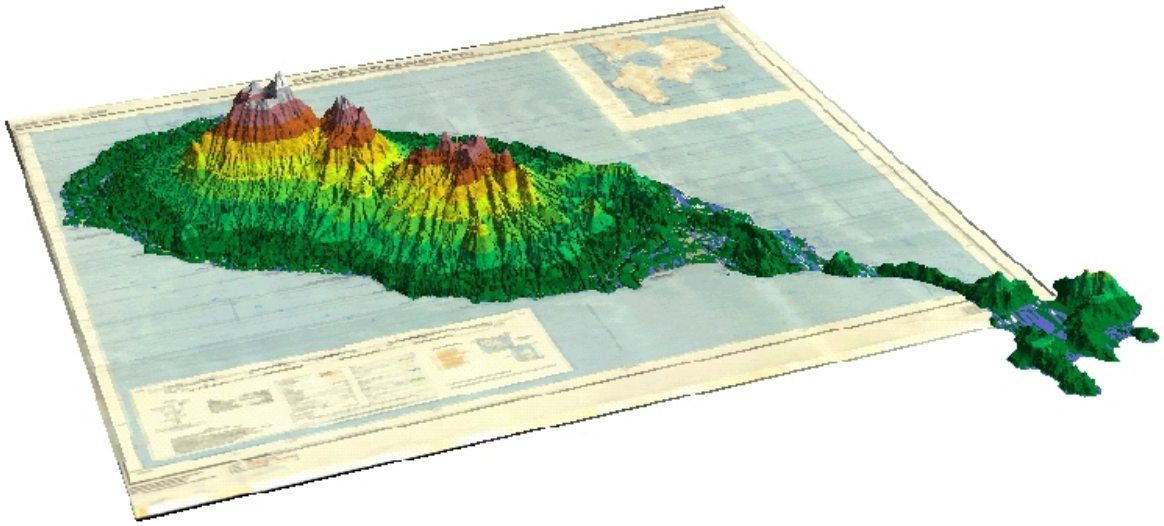


Figure 4.1: St. Kitts in relief showing the three volcanic centres: Mt. Liamuiga at left, Verchild's Mountain in the middle, and Olivees Mountain to the right (*Image from St. Kitts GIS Atlas****).***

The central ridge of the island of St. Christopher (St. Kitts) consists of three volcanic centres (Figure 4.1) in a chain of hills, extending from Mount Liamuiga (3,792 ft/1,156 m) in the northwest, through Verchild's Mountain in the middle range (2,444 ft/745 m), to Olivees Mountain in the southeast (2,953 ft/900 m). The area is 5,382.71 hectares (13,300.91 acres) – almost one quarter of the entire landmass of St. Kitts – and is the last area of extensive forest cover in the island. Almost all the domestic water supplies on the island emerge from this central forest range. In order to protect its water source and to conserve its biodiversity resources, the government has acquired all the land on the central ridge above the 1,000 ft contour, which is now crown (publicly owned) land. Their stated intention now is to declare the whole area a National Park, and have named this protected area as their OPAAL demonstration site.

The area is rich in floral biodiversity; the last detailed study identified 926 plant species, 45 of which were endemic to St. Kitts or the Lesser Antilles (Beard, 1949). Endemic faunal populations are limited, but of note is African Green Vervet Monkey, introduced sometime in the 17th Century; they are a major agricultural pest and are cause for concern to the farming community. In the absence of any monitoring of the forest ecosystems or the activities that impact them, it is not possible to determine the "normal" rate of change in faunal or floral composition. The impact of recent human activities, monkey business and hurricanes on the high altitude flora and fauna is not known, but it is believed that the forest systems of the Central Ridge remain fairly healthy. The demise of the sugar industry could drive monkeys and the unemployed into the forest, which deepens the urgency for some watershed management regime.

Permanent human habitation above the 1,000 ft contour today is zero, but in colonial days the forest was much traversed. Several sugar estates encompassed hundreds of acres of forest,

including land above 1,000 ft. Timber was cut from the forest for their use, and since they obtained their water from the forest, the estates ensured that the watershed was not destroyed.

In the days before motor vehicles, the quickest route from one side of the island to the other was a walking trail across the gently sloping saddle separating the middle and southeast ranges, linking the estates of Phillips in the north to Wingfield in the south (Figure 4.2). It was called "The Military Trail", suggesting that it was surveyed and cut by military engineers to facilitate the quick mobilization of troops.

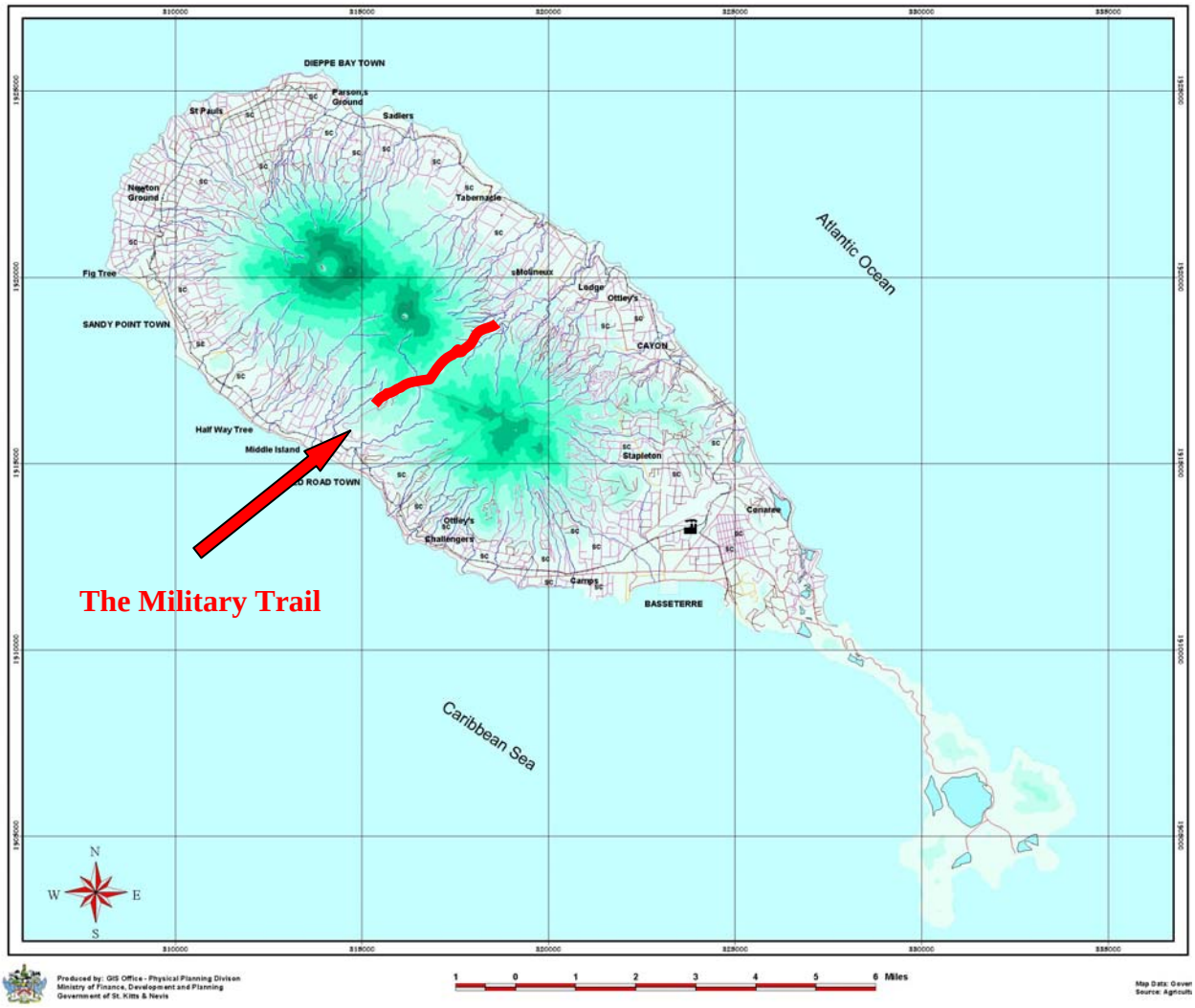


Figure 4.2 Map of St. Kitts showing the Military Trail (the thick red line) (*taken from the St. Kitts GIS Atlas****)***

Trails were also cut into the forest to access the timber, for hunting and for sightseeing. The volcanic crater near Mount Liamuiga in the northwest, and the Dos D'ane Pond on Verchild's Mountain, have been favourite hikes for centuries. Non-timber forest products (including roots and orchids) have also been accessed by these trails.

4.2 SOCIOECONOMIC CONTEXT OF CENTRAL FOREST RANGE

Because the proposed protected area is central to St. Kitts, it contains the uninhabited high interior of all the parishes; so it is not possible to identify a particular parish or residential community or communities associated to the proposed protected area for socioeconomic study. Generally, the socioeconomic context of the Central Forest Range is that of St. Kitts.

Table 4.1:
Key Poverty Estimates for St. Kitts

VARIABLE	%	VARIABLE	%
Poor Individuals	30.5%	Unemployment rate among poor women	9.1%
Poor Households	16.0%	% of Household Heads in Elementary & Low Level Occupations	70.0%
Indigent Individuals	11.0%	Labour Force participation of 15-19 age group among poor	16.1%
Indigent Households	4.3%	Labour Force participation of 15-19 age group among non-poor	6.4%
Poor under 25 years	67.8%	% of Poor with no Educational Certification	57.1%
% of poor that are male	44.0%	% of Poor in Ill-Health	6.4%
% of poor that are female	56.0%	% of Poor using Health Centres	42.4%
% of all Males that were poor	29.0%	Poor in Wooden Dwellings	17.5%
% of all Females that were poor	32.0%	Poor with Outdoor Kitchens	21.5%
Unemployment rate among poor	5.3%	Poor with Pit Latrines	30.5%
Unemployment rate among poor men	0.0%	Poor with Outdoor Baths	35.6%

Source: St. Kitts and Nevis Poverty Study, 1999-2000. Box 3.1.

Table 4.1 presents summary data from the poverty study of St. Kitts conducted in the last months of 1999 and the first months of 2000. Overall, 16.0% of households and 30.5% of individuals are poor[32], while 4.3% of households and 11.0% of individuals are indigent[33]. In St. Kitts, 32% of all females were poor, and 56% of all the poor were female. Males were slightly better off: 29% of all males were poor, and 44% of all the poor were male. Two-thirds of the poor were under 25 years old. Table 4.2 shows that in fact 30% of the poor are under ten years old, indicating that poor families tend to be large with a lot of children.

The unemployment rate among the poor is low because the poor cannot afford to be unemployed. All the poor males were employed; this suggests that wages are quite low in St. Kitts; what we have is the working poor rather than the idle poor. The poor were largely unskilled or lacked educational qualifications; 70% of the heads of poor households were in elementary and low-level occupations requiring little education or skills; 57% of the poor have no educational certification at all. Their ability to earn themselves out of poverty is constrained by their lack of preparation to do so.

There is also evidence that the poor join the labour market earlier than the non-poor. In the age-group 15-19 years 16% of the poor are in the labour force compared to only 6% of the non poor[34]. It is probably their poverty which forces them out of the education system and into the labour force, perpetuating the cycle of poverty.

On the other hand, only 6% of the poor were in ill-health.

[32] Poverty means that their monthly expenditure was less than the cost of meeting their minimal food and other basic requirements. The Poverty Line was EC$280.05 per month or EC$3,360.60 per annum for an individual.

[33] Indigence means that their monthly expenditure was less than the cost of meeting their minimal food requirements. The Indigence Line was EC$177.94 per month or EC$2,135.28 per annum for an individual.

[34] To be in the labour force means that you are employed or unemployed; you are unemployed rather than out of the labour force if you are seeking work and are ready, willing and able to work if offered a job.

Table 4.2: Socioeconomic Status, Population of St. Kitts by Age			
AGE DISTRIBUTION	**SOCIOECONOMIC STATUS**		**TOTAL (%)**
	POOR (%)	**NON-POOR (%)**	
0-4	14.7	8.2	10.2
5-9	15.1	8.7	10.7
10-14	18.0	8.6	11.5
15-19	14.0	9.8	11.1
20-24	6.0	7.0	6.7
25-29	4.9	8.2	7.2
30-34	6.7	6.7	6.7
35-39	6.3	8.1	7.5
40-44	4.1	7.6	6.5
45-49	2.0	5.7	4.6
50-54	1.5	3.6	2.9
55-59	1.3	2.0	1.8
60-64	1.1	2.5	2.1
65 and over	3.6	11.7	9.2
Not Stated	0.7	1.5	1.3
Total	100.0	100.0	100.0
Number	715	1,631	2,346

Source: St. Kitts and Nevis Poverty Study, 1999-2000.

Our interest in poverty (and unemployment) grows from experience in other countries where poverty leads to stress on and degradation of the natural environment. In some countries the poor either head for the hills (with saws and axes to cut themselves some timber or firewood, or to burn some charcoal) or the coral reefs (to catch themselves some fish, by fair means or foul) to survive. This does not mean that the wealthy are not a threat to the natural environment. They possess bigger bulldozers and chain saws and have a much greater capacity to do damage; but the poor are in greater numbers, and we focus on them here.

Figure 4.3/Table 4.3 below shows the spatial distribution of individual poverty in St. Kitts. The parish with the greatest poverty was St. Mary with a slight majority (52.4%) of residents living below the poverty line; just over one-fifth of all the poor people in St. Kitts lived in St. Mary. The parish with the second greatest poverty was St. John with 44.5% of residents living below the poverty line; just under one-fifth of all the poor people in St. Kitts lived in St. John. These two parishes contained about 40% of all the poor people in St. Kitts. Only a small part of the Central Forest Range falls in St. Mary, but St. John has a fairly large chunk of the forest above 1,000 ft. The parish with the highest percentage of the poor in St. Kitts is St. George (the parish with the capital, Basse Terre) with 30.9%; but it has little or none of the Central Forest Range within its boundaries, and so should not be the source of much threat to the forest.

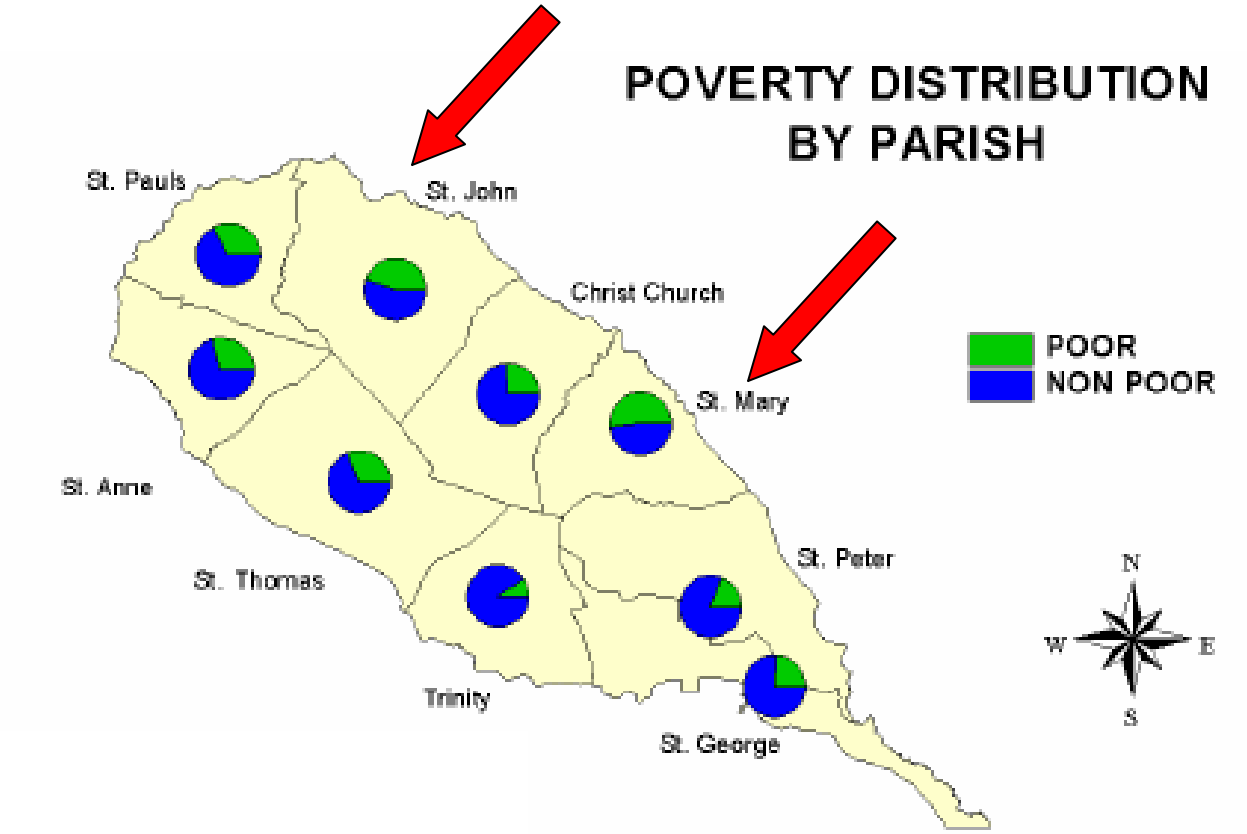


Figure 4.3: The Distribution of Poverty in St. Kitts, by Parish.

Table 4.3: The Spatial Distribution of Poverty, by Parish, St. Kitts, 1999-2000				
PARISH		**As % of Poor Population**	**% of Parish Population**	**Sample No. from Parish No.**
St. George		30.9	24.5	901
St. Paul		5.5	32.0	122
St. John		19.2	**44.5**	308
St. Anne		6.2	28.87	153
St. Thomas		6.2	31.0	142
St. Mary		20.1	**52.4**	275
St. Peter		5.6	18.5	216
Christ Church		5.5	25.7	152
Trinity		1.0	9.1	77
TOTAL	**%**	100	30.5	
	No.	715		2,346

Source: St. Kitts and Nevis Poverty Study, 1999-2000.

Figures 4.4 and Table 4.4 below show the spatial distribution of the severity of poverty in St. Kitts, measured by the Foster-Greer-Thorbeck-P2 Coefficient (FGT2)[35]. The parish with the severest individual poverty is St. Mary (8.700), followed by St. Thomas (6.365) and St. Anne (5.241); the index for all of St. Kitts is 3.865. St. Thomas contains a particularly large section of forest which might, one day, come under threat.

[35] This breaks up the population into equal segments and compares them (i.e. measures inequality).

Figures 4.4 and Table 4.4 also show the parish distribution of the poverty gap index in St. Kitts[36]. The parish with the largest individual poverty gap by far is St. Mary (18.897), followed by Trinity (12.416), St. Thomas (11.260) and St. Anne (10.95); the individual poverty gap index for all of St. Kitts is 9.169. St. Thomas, Trinity and St. Anne – all with deep poverty – contain particularly large sections of forest.

All the indicators point to St. Mary as the parish of greatest poverty; but fortunately, its footprint on the forest is quite small.

Table 4.4:
The Spatial Distribution of Poverty, by Parish, St. Kitts, 1999-2000

PARISH	HEADCOUNT	POVERTY GAP		POVERTY SEVERITY	
		Individual	Household	Individual	Household
All St. Kitts	30.5	9.169	2.469	3.865	0.890
St. George	24.5	6.841	1.864	2.530	0.549
Trinity	9.1	12.416	2.505	5.043	0.680
St. Thomas	31.0	11.260	3.107	6.365	1.632
St. Anne	28.8	10.950	3.079	5.241	1.270
St. Paul	32.0	2.965	0.686	0.967	0.136
St. John	44.5	8.484	2.560	3.846	1.101
Christ Church	25.7	9.449	2.223	3.716	0.778
St. Mary	52.4	18.897	6.309	8.700	2.532
St. Peter	18.5	4.304	1.111	0.937	0.175

Source: St. Kitts and Nevis Poverty Study, 1999-2000.

Figure 4.8 is a spatial representation of unemployment in St. Kitts. The parish with the highest unemployment is St. Mary (6.6%), followed by St. George (6.4%) in which lies the Capital, Basse Terre, and St. Anne (6.3%). Compared to rest of the Caribbean, these figures are not particularly high, and do not suggest any immediate threat to the health of the forest. With the closure of the sugar industry unemployment should rise, but not by a great amount; many migrant workers from Guyana and the Dominican Republic had been hired to harvest the cane, and the demise of sugar will not displace a large number of Kittitian workers.

Over the last decades, St. Kitts has experienced much rural-to-urban migration. This is largely due to the

"*meaningful distinction between the capital Basseterre and the rest of the island based on quality of public facilities, employment opportunities and general standard of living. As in the rest of the Caribbean the capital city enjoys the best of these things.*

Precisely because of this factor, the capital city attracts relatively large numbers of persons lacking in skill and educational certification who are forced to live in poverty. The majority of the poor were found in the two most urban parishes, St. George and St. Mary. Between them these two parishes were home to 51 percent of all of the poor persons in St. Kitts; 31 percent in St. George and 20 percent in St. Mary. The most populous of the rural parishes, St. John had 19 percent of the poor persons in the island. The other 30 percent of the poor were distributed fairly evenly across the remaining parishes. Trinity proved exceptional in this regard. It was home to only 1 percent of the poor compared to an average of 6 percent in the parishes of St. Paul's, St. Anne, St. Mary and St. Peter". [Kairi (2001): 79-80]

This further suggests that present unemployment and poverty does not threaten the forest.

[36] The poverty gap index is the aggregate of the distances of all the poor from the poverty line. It is therefore a measure of the depth of poverty. It also is an indication of the effort required to eradicate poverty in that area.

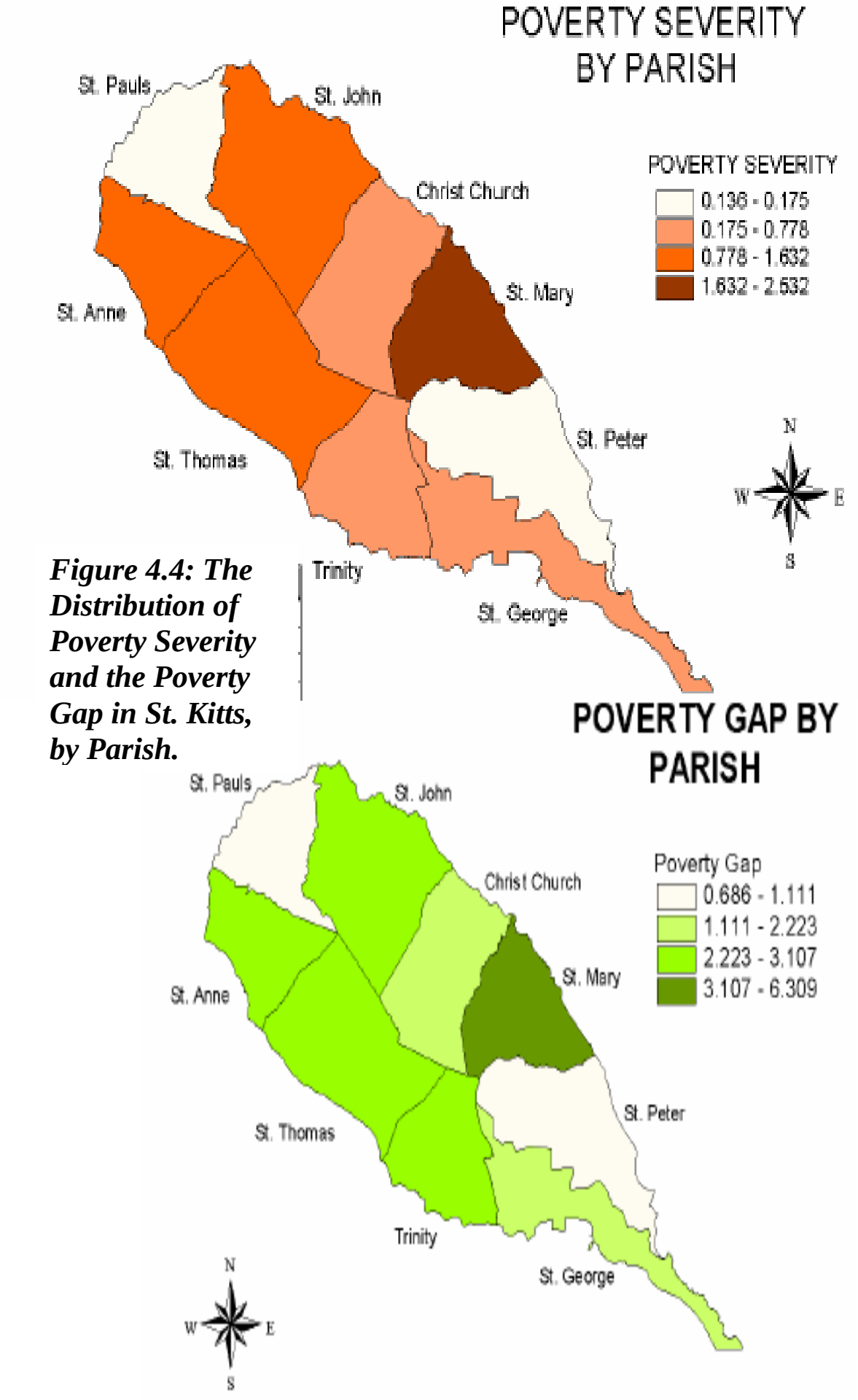
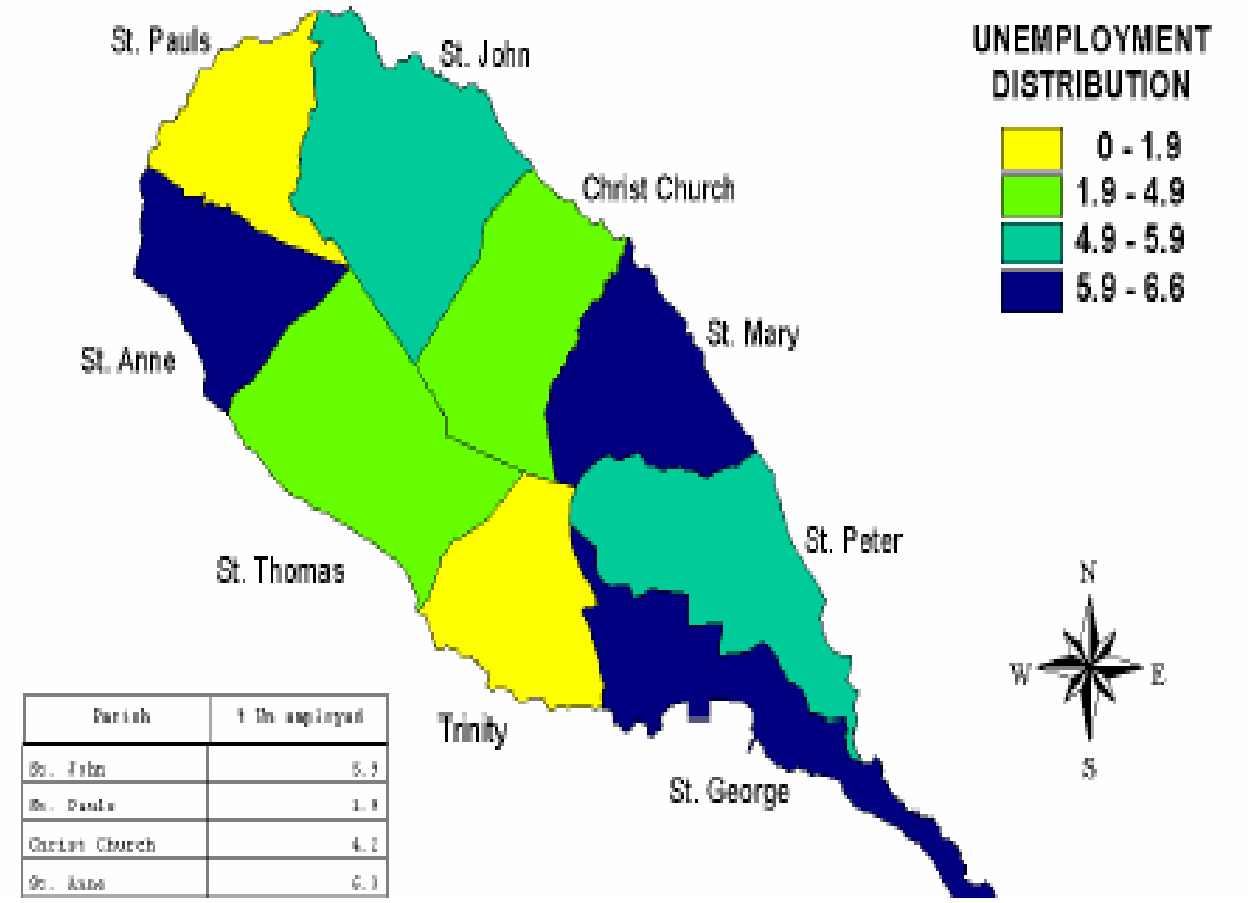


Figure 4.4: The Distribution of Poverty Severity and the Poverty Gap in St. Kitts, by Parish.



Parish	% Unemployed
St. John	5.9
St. Pauls	1.9
Christ Church	4.2
St. Anne	6.3

4.3 LIVELIHOODS IN THE CENTRAL FOREST RANGE

Livelihoods within the boundaries of the proposed Central Forest Range National Park (1,000 ft above sea level and higher) were pretty hard to find! In the first place it proved impossible to gain access to that altitude by road. Attempts were made at both ends of the old Military Trail (at Wingfield and at Phillips) and from Bayfords. It rained (lightly or moderately) on all three days, which made the road too muddy even for a 4-wheel drive SUV, and made it uncomfortable to walk. Nevertheless, it was possible to interview farmers and others who operated below 1,000 ft in all areas[37].

Figure 4.9: The southeastern range at left with Basse Terre in the foreground; Monkey Hill is at right (*Espeut photo* **).***

What sort of livelihoods was looked for? Drawing on experience from elsewhere it was expected to find persons living off **woodcutting** and **charcoal-burning**. The forest is a great source of timber, firewood, stakes, poles, fenceposts, fishpot-sticks, and wood suitable for burning charcoal. All informants said that enough firewood, poles and stakes etc. are available at lower altitudes, so no one need trouble themselves to go so high into the forest to get them, and that enough wood for charcoal is available lower down, so no one need trek into the forest to burn coal, and then have to lug the bags of coal down to a drivable road.

Figure 4:10: A look from the north towards the northwest range (*Espeut photo****).***

Hunting was expected – of birds, of manicou, of monkeys – whether for sport, subsistence or profit. Our advice was that no bird hunting at all takes place in St. Kitts, and that there is no manicou. Our advice was that Monkeys used to be hunted in the past in the forest – some caught alive – but not again; enough monkeys are available close to human settlements and in agricultural plots.

Figure 4:11: A look at the northwest range from the east

Marijuana cultivation in the forest was expected I was told that almost all the marijuana in St. Kitts is grown in the middle of canefields. In fact, I was told by the Minister of National Security that about 1,600 marijuana plants were destroyed in canefields during my first visit. Apparently there is some marijuana in the forest, but a small amount. There is concern

[37] Our vehicle had an altimeter, so we were always aware that we were not in the Central Forest Range.

that with the demise of the sugar estates, the marijuana farmers will have to move into the Central Forest Range.

Farmers **planting food crops** on captured forest land was expected. Our advice was that there was enough land in the lower regions for agriculture, both formal and informal. On our treks, we saw several signs of agriculture, but only on the lower slopes (below 1,000 ft).

Figure 4.12: Farming on a slope in the Phillips area under 1,000 ft. Note the water catchment in the foreground. Note that the hillsides (above 1,000 ft) are not disturbed (*Espeut photo****).***

Persons **pasturing cattle** in the forest on captured forest land was expected. Our advice was that there was enough land available in the lower regions to make it unnecessary for livestock owners to pasture their cattle in the mountains. Only one (illegal) pasture was seen, and it was below 1,000 ft.

Persons **living in the forest** on captured forest land was expected. Our advice was that no one in St. Kitts lived over 1,000 ft above sea level. None were seen in the distance, and the informants all said they had not heard of any. Often when persons farm in the hills they live in field huts during the week and go home in weekends. We neither heard of nor saw any agriculture above 1,000 ft, nor any field huts.

Figure 4.13: Cows grazing in a pasture above Wingfield. There was a small field hut hidden in the bushes to the left (*Espeut photo through the raindrops****).***

Persons **harvesting materials in the forest** to make craft items was expected. Our advice was that there is a craft industry in St. Kitts, but not using forest products.

Well, the expected forest uses were not found, but more than mud, bad roads, and no road were found.

4.3.1 THE HARVEST OF WATER

The St. Kitts Water Services Department harvests water captured by the forest. There are six intakes and one reservoir in the forest itself (Figure 4.14) and a number below it. The water supply for all St. Kitts depends upon the Central Forest Range performing its watershed function.

Some livelihoods are involved in maintaining the water works, but not many; and those livelihoods appear sustainable and not under threat. There is no evidence that water is being overharvested.

This is not a new function for the forest. In former years some sugar estates stretched to above 1,000 ft. They harvested water from the forest for their own use.

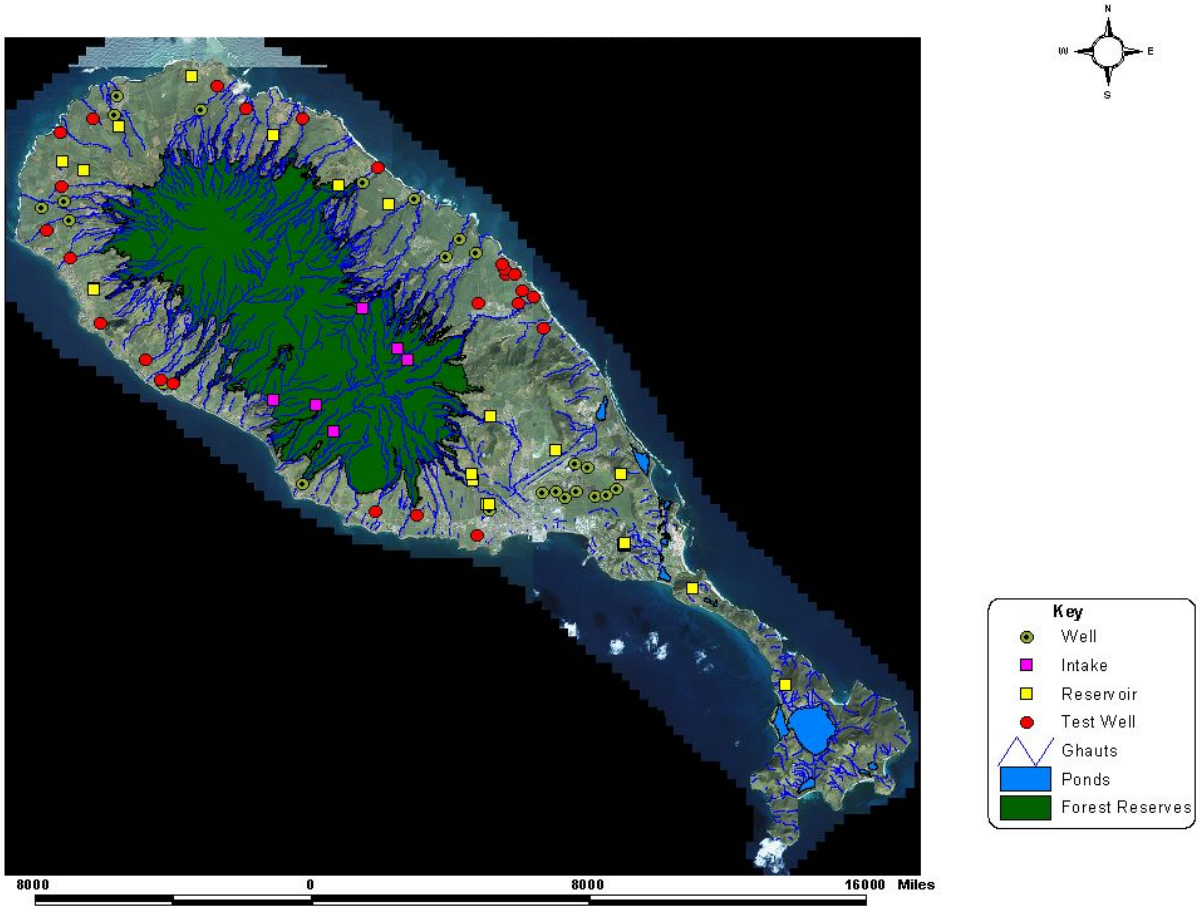


Figure 4.14: A GIS Image of the watershed profile of the Central Forest Range over 1,000 ft above sea level.

4.3.2 THE HARVEST OF ROOTS

I was told that persons harvest the **Kokanga Root** from the forest which gives a mellow taste to rum, mauby and sarsaparilla. There are walking trails through the Central Forest Range through which harvesters of forest products gain access to the vegetation they require. No studies have been done on the amounts harvested, and no easy way to estimate sustainability presents itself.

It is also likely that other roots may be harvested for medicinal purposes, but no studies have been done.

Figure 4.15: Sign at the Peter Manning Trail, Wingfield (Espeut).

No assessment is available of the demand for forest products, especially those used for non-market purposes. Should it be determined that sufficient demand exists, it might make an interesting project to culture these culturally important plants, and to transfer the technology to suitable community members.

4.3.3 THE HARVEST OF ORNAMENTALS

I was told that persons take ornamental plants from the forest for home or commercial use; this may include orchids and palms. This may be legend or it may be fact; my informants were not sure plants were taken from above 1,000 ft. No studies have been done on any amounts harvested, and no easy way to estimate sustainability presents itself. More technical studies need to be done before a definitive answer can be given. If there is demand for forest ornamentals such as orchids and palms, it might make an interesting project to culture them.

4.3.4 THE CULTIVATION OF MARIJUANA

As mentioned above although almost all the marijuana in St. Kitts is grown in the middle of canefields, there is some cultivation of marijuana in the forest. Where this occurs it is likely that the forest is damaged in the process. The security forces of St. Kitts have little capacity to detect and destroy the cultivation of illegal drugs at those altitudes[38].

There is concern that with the demise of the sugar estates, the marijuana farmers will have to move into the Central Forest Range. The security forces of St. Kitts need to obtain the capacity to detect and destroy the cultivation of illegal drugs at altitudes above 1,000 ft.

4.3.5 HIKING TOURISM

One of the attributes of the proposed Central Forest Range National Park is that it is physically beautiful, possessing natural features which could support nature tourism. This embodies the potential for expanding the tourism sector in St. Kitts which has not achieved its full potential. New livelihoods can be generated within the Central Forest Range National Park, and with effort, it can be ensured that they are sustainable.

Figure 4.16: Hikers with Greg's Safaris

Some Kittitian residents already hike into the forest, and a few tour companies take tourists into the mountains. With a little attention, hiking tourism in the Central Forest Range can be expanded.

The most popular hiking route in the Central Forest Range is the **Mount Liamuiga Crater Trail** in the northwest range (See Figure 4.1). This trail is heavily used and is showing signs of overuse. There is an uncomfortable amount of litter along the trail, and there has been some erosion due to overuse. It would appear that the use of this trail at the present time is unsustainable[39].

The following need to be done to make the use of the trail sustainable:

- Litter bins at the start and "No Littering" signage along the way; people must keep their litter with them while on the trail;
- Trail maintenance is needed to combat erosion;
- Handholds and ropes are needed at strategic places;
- Need another trail or two to accommodate hikers to take pressure off the Crater Trail.

[38] The Minister of National Security told me that he had been trying to get the use of some helicopters from the USA but was told that they had none to spare because of the war in Iraq.

[39] The carrying capacity of a hiking trail is a function of the frequency and quality of maintenance provided. The point of unsustainability will quickly be reached if there is little or no trail maintenance.

The 2nd most popular hiking route in the Central Forest Range is the trail to **Dos D'ane Pond** at 3,200 ft. on Verchild's Mountain (See Figure 4.1). Again, the trail shows signs of erosion. The following need to be done to make use of the trail to Dos D'ane Pond sustainable:

- An expert must be employed to improve the alignment of the trail;
- Something needs to be done to improve drainage to reduce erosion.
- Trail maintenance is needed to combat erosion.

The old **Military Trail** from Wingfield to Phillips between the middle and southeast ranges (See Figure 4.2) which was quite popular with Kittitians (especially schoolchildren) in former days has not been much used in recent years; presently it is blocked at Nine Turns Gut, and is in need of maintenance. The following need to be done to make use of the old Military Trail sustainable:

- The difficult area by Nine Turns Gut needs to be repaired;
- The trail needs to be re-opened;
- Trail maintenance is needed to combat erosion.
- The access roads on both sides need to be maintained.

The **Sofa Stone Trail** to the top of Monkey Hill (1,159 ft) needs to be reopened. Although this trail is not in the Central Forest Range, if it is re-opened it will take some of the pressure off the trails in the Central Forest Range.

Some estimate of carrying capacity for each trail must be made, and an effort made not to exceed it. This means that some particular authority must manage the Central Forest Reserve National Park to supervise maintenance and to keep track of usage.

4.5 MANAGEMENT OF CENTRAL FOREST RANGE NATIONAL PARK

Since the 1970s the Department of Agriculture took responsibility for managing the forests as watersheds since both they and the sugar estates harvested water. They had Forest Rangers in place to prevent improper use.

Due to cutbacks, the posts for Forest Rangers have not been filled for some years.

Now that the sugar industry has been brought to an end, the responsibility for the management of the forest is likely to be blurred.

When the Central Forest Range becomes a National Park the management arrangements must be clear. The park authorities can include watershed management in their responsibilities so to prevent any division of responsibilities.

Some sort of User-Fee can be collected from users of the resources (including hiking tourists) to contribute to the cost of park management. Some sort of "Service Charge" can be collected from the national water company representing a resource rent for the water captured by the forest and made available for public consumption[40].

Day-to-day management of the Central Forest Range National Park could be placed in the hands of a non-governmental entity which has the interest and the capacity to do so. In any event, a governing Board of Management should be established with representatives from those interests with a stake in the resources: various government agencies such as for water, forests and tourism; the private sector such as the tour operators; and non-government agencies such as the National Trust and the Heritage Society.

[40] At the moment the users of public water are only paying for the service provided by the water company of treatment and distribution, and not for the service provided by the forest of the capture of the water from rain.

4.6 THE IMPERATIVE FOR THE ESTABLISHMENT OF THE CENTRAL FOREST RANGE NATIONAL PARK

There is general agreement among key agencies that the central ridge forest above the 1000 ft contour should be managed sustainably in order to provide benefits for user groups and at the same time securing the protection of that ecosystem. In keeping with the goals of protection, the key development agencies such as the Development and Control Planning Authority, the Ministry of Agriculture, and the Department of the Environment have agreed that any development that would compromise the integrity of the ecosystem above the 1000ft contour would not be permitted, except in pocket areas in the south where private property exists above that elevation[41]. The Water Department determines that the management of the area is critical to the maintenance of potable water supplies and is keen to work within a management portfolio for the area. The network of trails in the area has proven very beneficial to tour operators and other groups but these activities as well as the possible increasing encroachment by farmers remain unmanaged.

The establishment of the Wingfield Nature Trail as part of the overall development of the Wingfield Watershed as a heritage site is seen as a precursor to the full development of a sustainable management plan for the Central Forest Range Protected Area (CFRPA). With its rich natural and cultural heritage, the Wingfield Watershed and its seven miles of trails has traditionally played a major role in the natural/heritage tourism development in St. Kitts. It is expected that the creation of the CFRPA will extend this sustainable use into the highlands.

Funding is available through the OPAAL Project for the implementation of many strategies which will improve the management of the natural resources in the Central Forest Range, as well as improve the sustainability of the livelihoods of the persons who live nearby. These funds only become available when the Central Forest Range National Park becomes a reality in law.

Although the very remoteness of the Central Forest Range above 1,000 ft has led to the disappearance of almost all human impacts there, legal protection is necessary to ensure a management regime against any future new impacts.

It is hoped that the government of the Federation of St. Christopher and Nevis will complete the arrangements for the declaration of the Central Forest Range National Park as soon as possible so that the country-specific funds under the OPAAL Project can flow.

[41] Why this exception should be made is not clear.

4.7 PROJECT IDEAS FOR ACCESSING THE OECS SMALL PROJECTS FACILITY (SPF) TO ACHIEVE SUSTAINABLE LIVELIHOODS IN CENTRAL FOREST RANGE NATIONAL PARK

A workshop was held on February 21, 2006 with stakeholders in the Central Forest Range to scope out project ideas which might be eligible for funding under the OECS Small Project Facility (SPF). The workshop was organized by the Ministry of Environment and Planning, and was held at the Ocean Terrace Inn in Basse Terre. The following persons with the indicated affiliations attended:

PERSON'S NAME	AFFILIATION
Randolph Edmeade	Ministry of Sustainable Development
Graeme Browne	Ministry of Sustainable Development
Carmen Warde	Ministry of Sustainable Development
Randolph Hamilton	Ministry of Tourism
Kate Orchard	Brimstone Hill Society
Jacqueline Armony	St. Christopher Heritage Society
Daniel Henry	Parks & Beaches Unit
Paul Benjamin	Ministry of Agriculture
Keith Phillip	Ministry of Agriculture
Greg Pereira	Greg's Safaris
David T. Popo	OECS Secretariat – ESDU
Peter Espeut	Consultant to the OECS

Because of the small number of participants, and the fact that they were almost all from the same sector, they discussed project ideas in one group. Below is a list of the project ideas which emerged (in no particular order); the proposed implementing agency is indicated in red:

1. **Re-opening old trails** **TOURISM AUTHORITIES**
   - Mansion Mountain Trail
   - Harris Trail
   - Old Military Trail
   - Trail to the Peak (dangerous, but …)
   - Sofa Stone Trail
   - Camp Crater Trail
   - Dos Anse Trail

2. **The development of new trails** **TOURISM AUTHORITIES**
   Investigations could take place now, and later, future possibilities could be considered. Feasibility studies could be done later

3. **Forestry mapping** **DPPE**

4. An **inventory of floral and faunal species**, and how they are being used. **SCHS**

5. A **biodiversity study** along the old trails to be re-opened; **SCHS**
   Also along the proposed new trails

6. Development of **Interpretation Centres** near the access of forest trails and other forest resources. **DPPE, SCHS**

7. Development of a **Research and Documentation Centre** to facilitate students/scholars/researchers in accessing information on the forest **National Trust**

8. Development of Eco-Lodges and Campsites **Highland farmers**

9. Development of Community-Based Industries/Craft Training/Herbal Medicines/ Processing

Consultant's Recommendations

New Sustainable Livelihoods

1. To estimate the carrying capacity of the CFRNP for hiking
2. Training in tour-guiding skills
3. Training of tour guides in flora and fauna recognition
4. Re-opening of old hiking trails
5. Marketing of the tourism product in the CFRNP

Strengthening the Sustainability of Existing Livelihoods

1. To develop and implement a plan towards the sustainability of the hiking sector
2. To estimate the carrying capacity of the hiking sector
3. Maintenance of the old and new hiking trails

Management Recommendations

1. The OECS to use its influence towards the creation of the CFRNP
2. The designation of a lead entity to advance the management process of the CFRNP
3. The creation of a local stakeholder entity to guide the management process
4. The preparation of a management plan for the CFRNP with stakeholder participation
5. The preparation of a zoning plan for the CFRNP
6. The preparation of regulations for the CFRNP with stakeholder participation
7. To estimate the carrying capacity of the CFRNP

5. ANTIGUA COUNTRY REPORT: THE NORTHEAST MARINE MANAGEMENT AREA (NEMMA)

5.1 DESCRIPTION OF THE NORTHEAST MARINE MANAGEMENT AREA

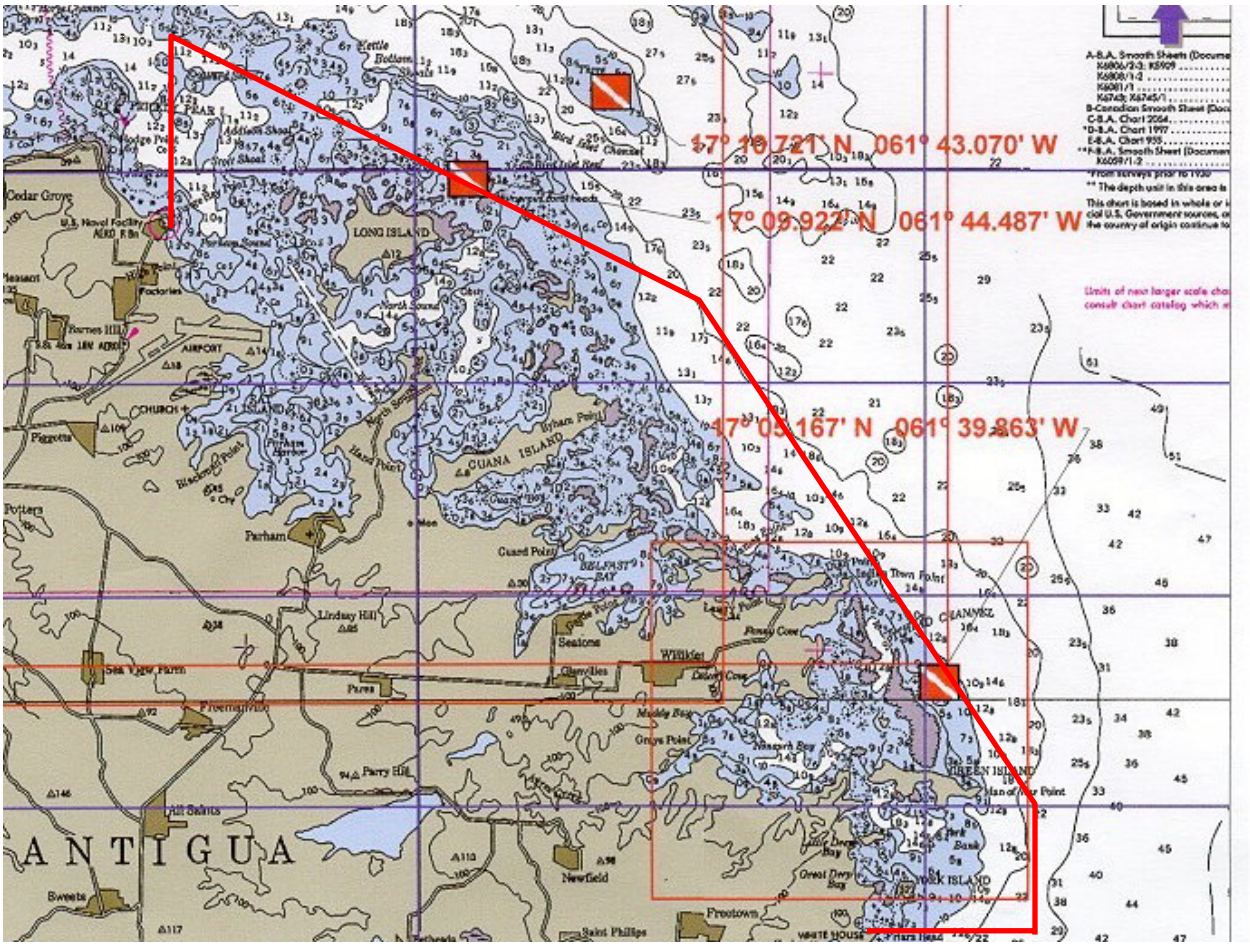


Figure 5.1: The seaward boundary (the heavy red line) of the Northeast Marine Management Area, Antigua.

The North-East Marine Management Area (NEMMA) was declared a Marine Reserve under Section 22 of the Fisheries Act Cap. 173 and published in the Official Gazette Vol. XXV No. 82 dated December 29, 2005. It is located on Antigua's northeast coast running from Beggar's Point in the north to Friar's Head in the south (See Figure 5.1). It embraces all the named and unnamed islands, cays and rocky outcrops within the boundary, including: Prickly Pear Island**,** Great Bird Island, Long Island, Guana Island, Green Island and York Island.

The NEMMA is a refuge for endemic, rare and globally important wildlife. Encompassing over 30 square miles of coastal and marine resources, this area is home to numerous endemic and globally threatened species, including the critically endangered Antiguan racer snake (*Alsophis antiguae*), the hawksbill turtle (*Eretmochelys imbricata*), and the vulnerable West Indian whistling duck (*Dendrocygna arborea*). These islands are considered to be the last retreat for some species that formerly existed in abundance on mainland Antigua. In addition, two of the five vegetation types found on the offshore islands are found exclusively in the northeast.

With few exceptions, the 30+ islands and islets in this area are uninhabited and many are rarely visited by humans. They have therefore escaped much of development-related habitat

destruction and other human impacts that have affected mainland Antigua. From an ecological perspective, the offshore islands offer a living laboratory, serving as indicators to allow for the measurement of changes that have affected local conditions and the rest of the Caribbean over time. Economically speaking, and provided that sustainable use is practiced, the area's resources can provide a viable source of income for local fishery and tourism sectors, as well as a playground for local recreationalists.

However, apart from the threat of natural disasters, there are still grave threats to this area; these are most notably: land-based sources of marine pollution, inadequate awareness of negative human impacts by area users and the general public, the presence of highly destructive invasive species such as the Eurasian black rat and Asian mongoose, insufficient scientific data about the conservation needs of threatened fauna and flora, and inadequate legal protection for offshore island resources. Also, tens of thousands of tourists visit the area every year, with numbers increasing. The impact of this pressure is poorly understood by stakeholders, and there is great need to implement a participatory management strategy for the area.

5.2 SOCIOECONOMIC CONTEXT OF THE NORTHEAST MARINE MANAGEMENT AREA

It is important to know the socioeconomic context in which the NEMMA is located. The levels of unemployment and poverty in the immediate surroundings of any area with abundant harvestable natural resources can be an indicator of the threats and challenges its managers will face. At the same time at the other end of the economic scale, the presence of investors flush with money may present threats and challenges of a more serious kind.

There is no recent poverty assessment of Antigua & Barbuda; but we still want to be able to say something about the socioeconomic context of the NEMMA. Although no poverty line can be drawn (absolute poverty), the standard of living of residents across the boundary of the NEMMA can be compared to the standard of living of all Antiguans (relative poverty). The 26 Census districts on the coast and just inland of the NEMMA were identified[42], and the Central Statistical Office in Antigua was able to generate data from the 2001 Census which could be compared to the data for Antigua as a whole.

TABLE 5.1: UNEMPLOYMENT AROUND THE NEMMA AND IN ANTIGUA

	MALE	FEMALE	TOTAL
NEMMA	8.0%	8.7%	8.4%
ANTIGUA	8.1%	8.8%	8.4%

Looking at the data on unemployment (Table 5.1), there appears to be no significant difference between the communities around the NEMMA and all of Antigua, both overall and for the genders.

[42] The EDs selected were Hodges Bay/Benaire, Fitches Creek, Coolidge, Airport, Parham/Lovers Lane, Parham (Market, Byams Wharf, School 1, School 2), Vernons, Willikies (North, West, Central, South 2, East), Free Town (North, West, South), Glanvilles (Central, Outer), Seatons (Central, Coastal), Long Lane/Collins, Mont Pellier/Brownes Bay/Gaynors, Mill Reef/Half Moon Bay, Long Bay.

TABLE 5.2: POSSESSION OF SELECTED HOUSEHOLD APPLIANCES AROUND NEMMA AND IN ALL ANTIGUA		
	AROUND NEMMA	ALL ANTIGUA
Stove	96.0%	96.7%
Refrigerator	92.6%	91.3%
Freezer	20.5%	17.2%
Microwave	38.4%	28.6%
Washing Machine	64.5%	57.8%
Water Pump	24.5%	17.6%
Water Heater	21.9%	14.6%
Radio	91.9%	89.6%
Television	93.6%	92.4%
Cable TV	38.0%	35.7%
VCR	61.5%	57.4%
Land Phone	76.4%	69.8%
Cell Phone	47.8%	46.5%
Home Computer	31.4%	24.3%

When comparing the residents around the NEMMA to Antiguan households in general, any difference less than three percentage points was ignored as statistically insignificant (survey error will often be greater). More NEMMA residents had eight of the thirteen household appliances than Antiguans as a whole (Table 5.2); there was no appliance more prevalent in Antigua than around the NEMMA. The data suggest that the residents adjacent to the NEMMA are better off than the average Antiguan. The implication is that the natural resources in the NEMMA might not be under much threat from poor persons seeking to survive. A greater threat would probably come from wealthy people seeking to "develop" the area by putting up concrete structures, altering the coastline, and even the benthos.

5.3 LIVELIHOODS IN NORTHEAST MARINE MANAGEMENT AREA

5.3.1 FISHING FOR FINFISH, LOBSTER AND CONCH

Fish are harvested in the NEMMA with fish traps, gill nets, handlines and trolling, and by diving. There are seven landing sites where catch from the NEMMA is landed: from northwest to southeast (See Figure 5.3) these are Beachcomber, Shell Beach, Fitches Creek Bay, Parham, Seatons, Willikies and Mill Reef. The following data, kindly provided by the Fisheries Department of the Ministry of Agriculture, Forestry & Fisheries, gives a good indication of the fishing activity taking place in the NEMMA.

Figure 5.2: Fish traps under construction at Parham

It must first be pointed out that there is no requirement in Antiguan law for fishers to be licensed, neither are they required to pay any sort of fee (resource rent) for the right to extract a valuable resource (fish) from the natural environment, nor to pay for the fish itself. The law does require fishing vessels to be licensed, and their annual license fee may be considered a resource rent, as may the fish landing fee which is collected based on the volume of fish landed. These costs are borne by vessel owners and not by each individual fisher. At the same time each registered vessel owner and fisher benefits from certain duty-free concessions on boats, engines and equipment, to a duty-free pickup truck, and to participate in any training offered.

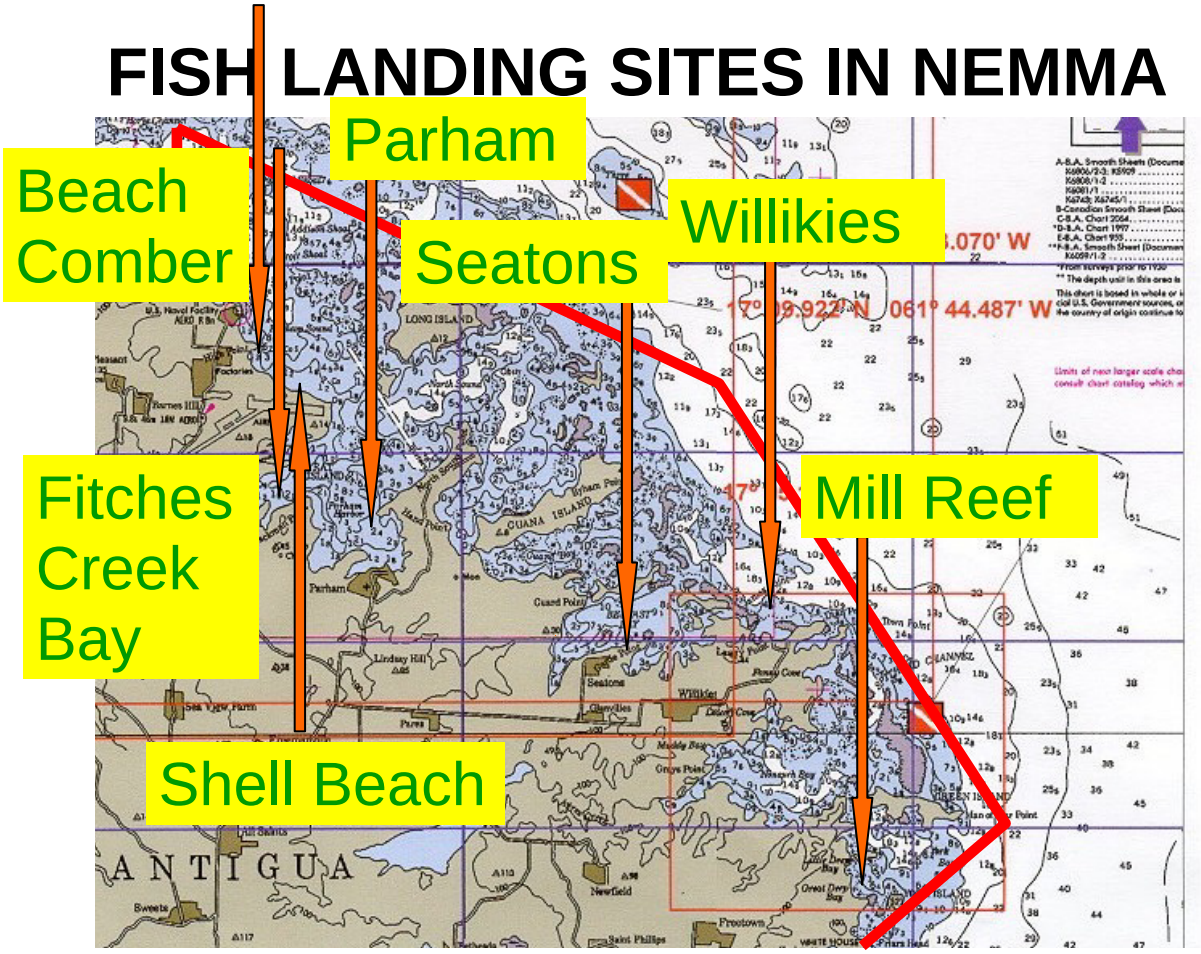


Figure 5.3: Fish landing sites in the NEMMA.

Table 5.3 gives the number of active fishing boats registered at NEMMA landing sites for 1992 and 2001. It must be pointed out that these boats fish both inside and outside of the NEMMA. Nevertheless, it is not unreasonable to suggest that their operators would prefer to fish as close to home as would be profitable.

The number of registered fishing boats based in the NEMMA is small; there may be more – but not many more, since fishers will tend to registered their boats to get subsidized fuel. The number of registered boats declined from 72 in 1992 to 53 in 2001, a 26.4% decrease. Only at Shell Beach and at Willikies is there an increase in registered fishing boats over the period.

TABLE 5.3:
ACTIVE FISHING BOATS OPERATING IN THE NEMMA, 1992, 2001

	1992	**2001**
Beachcomber	12	7
Fitches Creek	3	1
Shell Beach	5	9
Parham	20	11
Seatons	11	8
Willikies	10	13
Mill Reef	11	3
TOTAL	72	53

TABLE 5.4: PRIMARY GEAR IN NEMMA FISHING BOATS, 2001								
	Trap	**Hand Line**	**Gill Net**	**Troll Line**	**Long line**	**SCUBA**	**Free Dive**	**Unknown**
Beachcomber	4	-	1	2	-	-	-	-
Fitches Creek	1	-	-	-	-	-	-	-
Shell Beach	6	-	1	1	-	-	1	-
Parham	3	-	7	1	-	-	-	-
Seatons	3	2	2	1	-	-	-	-
Willikies	4	6	3	-	-	-	-	-
Mill Reef	2	1	-	-	-	1	-	-
TOTAL	23	9	14	5	0	1	1	-

The most common fishing gear used by fishers based in the NEMMA is fish traps, used at all landing sites (Table 5.4). Fish traps target reef fish, and at best are set in the sand channels in between reefs; at worst they are set on the reef itself, or so close that turbulence will rub them against the reef, scouring off the corals. The second most common fishing gear is gill nets, used at all beaches except Fitches Creek and Mill Reef[43]. Hand lines and troll lines follow in popularity. Diving for fish either free or with SCUBA was reported to be scarce; should this fishing method increase in popularity, it could lead to reef damage.

TABLE 5.5: ACTIVE FISHERS IN THE NEMMA, 1992, 2001		
	1992	**2001**
Beachcomber	19	17
Fitches Creek	5	3
Shell Beach	9	23
Parham	25	27
Seatons	21	20
Willikies	22	32
Mill Reef	19	10
TOTAL	120	132

Even though the number of registered fishing boats decreased, the total number of registered fishers increased by 10% (Table 5.5). Beachcomber, Fitches Creek, Seatons and Mill Reef showed absolute decreases in the number of registered fishers; only Shell Beach, Parham and Willikies showed an absolute increase. [Parham is the launching point for conch fishers who migrate there from the other side of the island during the conch season]. This researcher guided by fisheries officers, was unable to interview a single active fisher, as none could be found.

Except at Shell Beach and Willikies (the only landing sites to show increases both in registered fishers and boats), the fisheries sector in northeast Antigua is in slow but appreciable decline. It will be possible to reverse this decline, but not while absorbing large amounts of new entrants into the fishery. Efforts need to be made to reverse the decline by putting appropriate fisheries management strategies in place.

[43] Elsewhere in the Caribbean it is found that as fish trap piracy increases, fishers switch from traps to nets.

One of the factors causing persons to remain in the fishery is the introduction (west of the NEMMA) of Fish Aggregation Devices (FADs) in the last few years. These anchored floating objects attract large pelagic fish[44], making them more easily caught by fishermen using hook-and-line or gill nets. Optimists believe that they are the answer to the prayers of fishers for bigger catches; pessimists believe that they do not increase the number of fish in the sea – only the ease of catching the few fish left; pessimists believe that FADs will only increase the speed of overfishing, and are depleting in the long-term.

But it must also be pointed out that this discussion is interesting but irrelevant to this study, since the no FADs are inside the boundaries of the NEMMA; indeed the only finfish fishery in the shallow waters of the target area is a reef demersal fishery. Only a time series of reef demersals caught within the boundaries of the NEMMA can definitively indicate the sustainability of fishing as a livelihood in the NEMMA; and we don't have that information. The data showing a decline in the number of registered fishing vessels is only an indication.

The point needs to be made that another explanation of why fishing within the proposed PSMA is unsustainable is because the ecosystems which are the primary habitat for fish (sea grass, mangroves and coral reefs) are being slowly degraded by land-based sources of marine pollution. Until these are arrested, fishing in the NEMMA will never be sustainable; the capacity of these habitats to support fish will be constantly falling. No data on water quality was available, but the suspicion is that the nutrient load is significant.

The strategies which need to be employed to achieve a sustainable fishery are well known and discussed in the literature, and should be included in the management plan and regulations for the NEMMA. These include:

- the enforcement of a ban on destructive gear (including seine nets);
- the enforcement of a ban on small mesh in nets and traps;
- the enforcement of no fishing with SCUBA or hooka[45];
- the enforcement of no-take zones;
- the enforcement of closed seasons on certain species (like lobster and conch);
- the enforcement of a system of limiting new entrants into the fishery;
- the enforcement of effluent discharge standards which are friendly towards fish habitat.

In the Soufriere Marine Management Area in St. Lucia, fisheries management has caused the catch of each fisherman to triple. The same thing can happen in the NEMMA.

Even if a full suite of fisheries management measures is implemented, diversification into new sectors locally is desirable to employ young people who might expect to enter the fishing industry each year.

[44] Pelagic fish (from the Greek meaning "wanderers") are larger deep-sea ocean-going species like tuna, dolphinfish and wahoo which feed in the water column – sometimes on the surface. Coastal pelagics like herrings and sprats are smaller and operate in schools over a wide area in shallower water. These are contrasted by reef demersal fish which are bottom feeders exclusively on coral reefs.

[45] A hooka rig employs a compressor located in the boat feeding air down to a diver through a hose and mouthpiece; whereas with the use of SCUBA the diver has to surface when the tank is empty, the hooka diver can stay down as long as he likes until hunger bites, or until the supplies of fuel to run the compressor are exhausted.

5.3.2 SEAMOSS FARMING

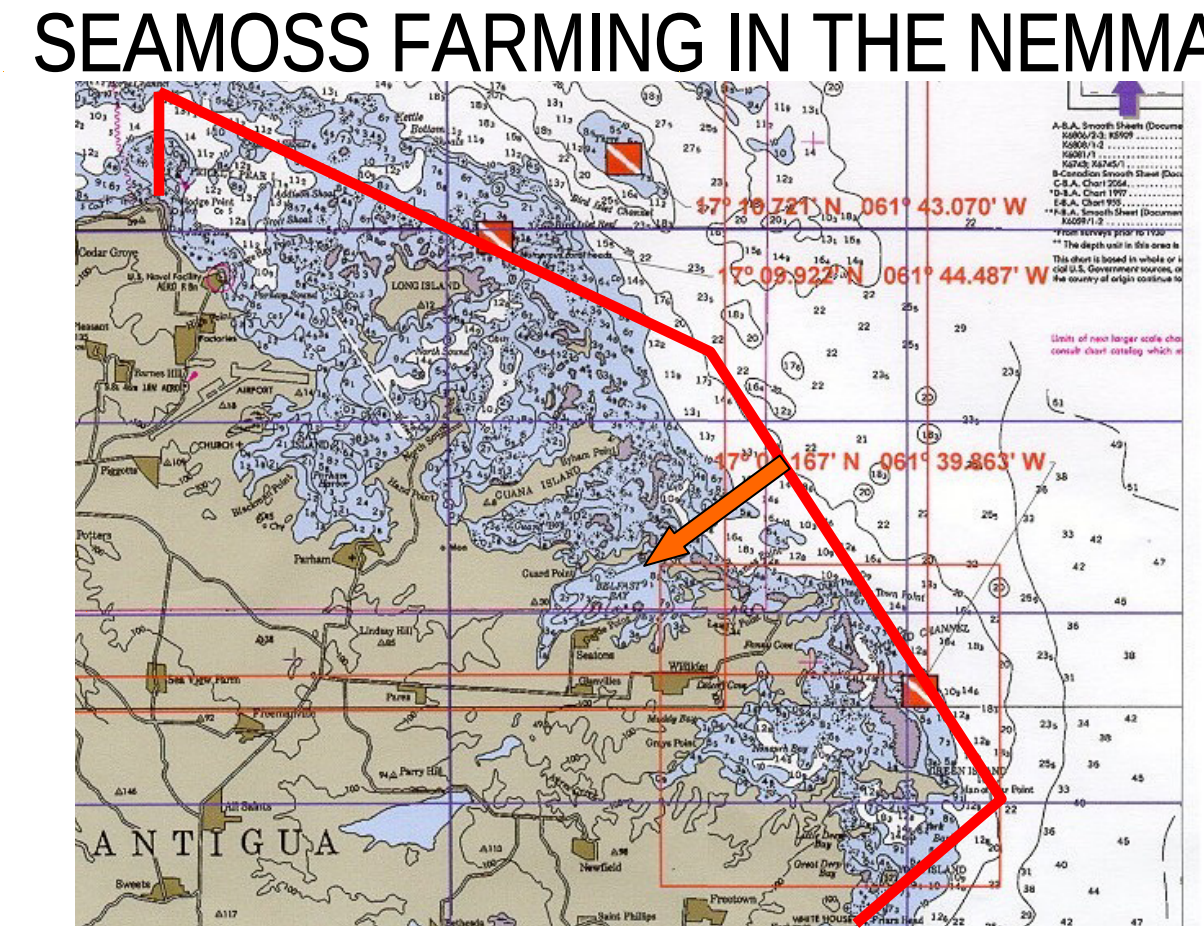


Figure 5.4: Map indicating the approximate location of the one seamoss farm in the NEMMA.

To take pressure off wild seaweed stocks (mostly *Glacilaria spp.*) harvested for the preparation of traditional "seamoss" drinks[46] the technology for the mariculture of seaweed was developed. Strain selection to encourage high-agar-yielding varieties of seaweed was developed in St. Lucia by Alan Smith of the Caribbean Natural Resources Institute (CANARI). The technology was successfully transferred across the Caribbean by CANARI, which offered ongoing technical support.

Strands of the seed stock are woven into the twisted strands of plastic rope many dozens of feet long, and tied in the shallows to grow. They require some attention as the strings have to be shaken free of accumulated sediment every few days. After a few weeks the bushy growth is removed for drying and packaging, and the rope re-seeded. There have been several publications describing the method[47]. Before it moved its operations to Trinidad, CANARI began to experiment with *Euchuma spp*[48]. as an improvement on *Gracilaria*.

During the survey, one seamoss farmer with about 60 untended strings was identified within the NEMMA. Presently the seamoss farmer is inactive, but his intention is to produce tons of seamoss to bottle a concentrate for export. To do this he will have to expand production to several hundreds – maybe thousands – of strings. Possibly other farmers might join him.

The issue here does not seem to be one of environmental sustainability but of economic sustainability. There is no effluent discharge from sea moss farming, and no apparent negative

[46] The active ingredient in *Gracilaria* is **agar**, a colloidal substance used as a thickener in the food industry.
[47] See, for example, Smith (1992).
[48] The active ingredient in *Euchuma* is **carrageenan**, a colloidal substance also popular a thickener in the food industry because it does not become as thick as agar.

environmental consequences. In fact, seamoss farming may help the lobster fisheries by promoting the recruitment of post-larvae. Sea moss farming involves some drudgery: the strings have to be shaken three times/week for some months. The problem would be to find a suitable location within NEMMA for such a large operation.

The main competition to sea moss farming are the harvesters of wild product, who pick up the sea moss on the beach and get an immediate return. Also competitive are seamoss farmers in the Philippines who produce much more cheaply than Caribbean producers, even when the shipping costs are included.

The main seamoss bottler in the Eastern Caribbean is in Dominica, who sources his raw material from Haiti (wild product) at a fraction of the cost and drudgery of mariculture.

Unless demand improves and the price increases or wild stocks decline, there does not seem to be much of a future in expanding seamoss farming. Just because seaweed mariculture is technically feasible does not make it an economically feasible operation[49].

5.3.3 RESIDENCES IN AND AROUND THE NEMMA

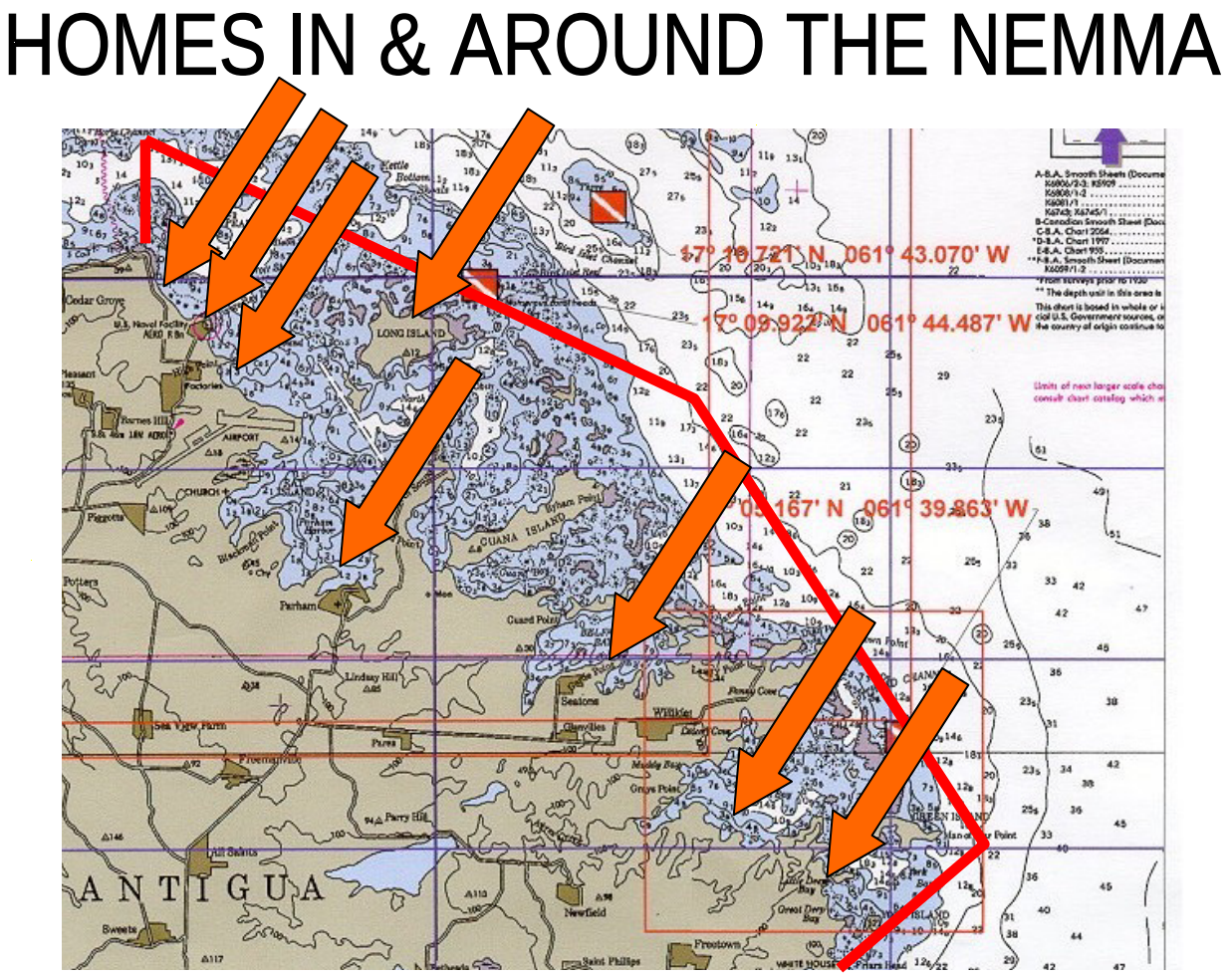


Figure 5.5: An indication of the locations of residences in and around the NEMMA.

There are a number of human settlements along the coastline of the NEMMA; in addition there is a hotel on Long Island and a house on Guana Island. Wherever there are human settlements, there are issues to do with the disposal of human waste (rich in nitrogen from urine) and domestic wastewater (rich in phosphates from dishwashing and laundry detergents) which

[49] See Espeut (1991) for a full treatment of these issues.

will affect the sustainability of these human settlements. These chemicals are plant nutrients and will cause algal blooms in a sea of coral reefs in which algal blooms are bad news[50].

Human settlements also imply building and road construction which produces waste earth which usually finds its way into the marine environment as silt and sediment. Sediments make the seafloor unpretty for snorkellers and SCUBA divers; further they cause the water column to become turbid, reducing visibility for snorkellers and SCUBA divers and blocking the light which coral reefs need. Silt also buries the coral reefs, killing them.

Figure 5.6: Some of the buildings on Long Island within the NEMMA (*Espeut photo****).***

Experience elsewhere would suggest that these human settlements are negatively impacting the marine environment in ways inappropriate for a marine management area. It is suggested that some people use wastewater to irrigate their lawns (which is a good practice), but it has also been confirmed that tons of fertilizer are applied to the lawns on Long Island which are exacerbating the nutrient pollution problem.

Different agencies of the government of Antigua and Barbuda do analyze water quality in the marine environment, but not within the NEMMA. What is required is a full series of water quality studies in both the wet and dry seasons to determine possible human impacts.

Figure 5.7: A structure built right against the boundary of the NEMMA (*Espeut Photo****).***

Ultimately, effluent discharge standards appropriate for a Marine Management Area need to be developed, implemented and enforced for the NEMMA.

Some of the structures built in the NEMMA appear to be too close to the water line (See Figure 5.7). Coastal planning standards usually establish rules about setbacks to avoid coastal erosion. These standards need to be incorporated into the regulations for the NEMMA.

One of the challenges of the 21st Century is to find a modus whereby human behaviour can be sustainable, where humanity and nature can co-exist without the one degrading the other. With help from the OPAAL Project the NEMMA could be on the cutting edge of this most modern of challenges.

[50] Feeding the algae with nutrients will cause them to grow faster than natural processes can remove them. The coral reefs will become overgrown with algae and will die.

5.3.4 THE MANY ASPECTS OF TOURISM

One of the attributes of the North-East Marine Management Area is that it is physically beautiful, possessing natural marine and terrestrial features which could support both traditional Caribbean tourism (sun, sand, sea, sex, etc.) and the newer types of visitor experiences, emphasizing nature attractions. This embodies the potential for expanding the tourism sector in northeastern Antigua which has not achieved its full potential. New livelihoods can be generated within the NEMMA, and with effort, it can be ensured that they are sustainable.

5.3.4.1 Beach Hotels, Beach Resorts and Beach Restaurants

LIVELIHOODS IN THE NEMMA

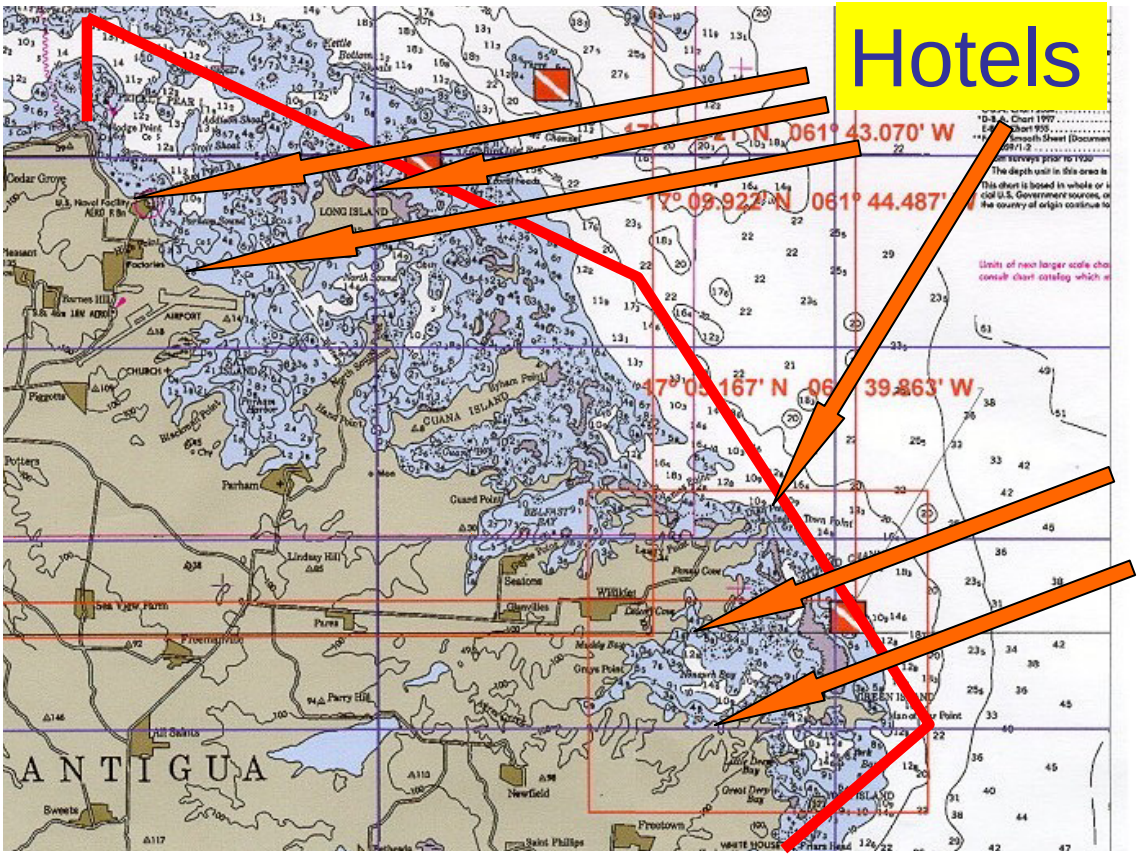


Figure 5.8: The locations of hotels within or bordering the NEMMA

Within the boundaries of the North-East Marine Management Area are a number of hotels and resorts (see Figure 8):

- Jumby Bay Resort (on Long Island)
- Lord Nelson's
- Beachcomber
- Dian Bay
- Occidental Pineapple
- Long Bay Resort
- Brown's Bay

Each of these has a restaurant, and there are also restaurants on the beach (Figure 5.9):

- Prickly Pear Island Restaurant
- Harmony Hall

LIVELIHOODS IN THE NEMMA

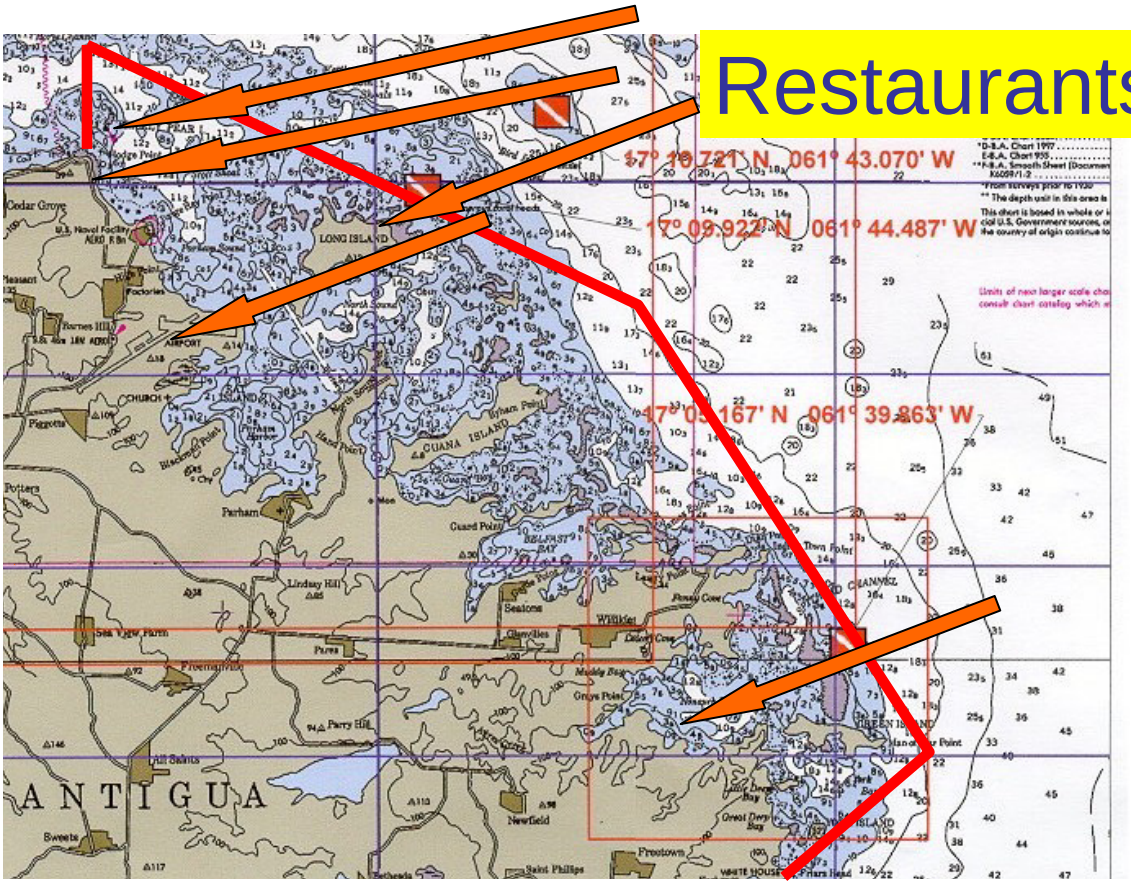


Figure 5.9: Locations of restaurants in the NEMMA not connected to hotels.

How sustainable are these hotels, resorts and restaurants? Are they built far enough away from the water line to prevent coastal erosion? It would appear that they dispose of their solid waste away from the area, for no piles of garbage were observed; but how do they dispose of their human waste, their kitchen and bathroom wash-water, and their kitchen waste (e.g. used stale cooking oil and grease)? No studies seem to have been done on their ecological footprint, including their discharges, and no easy way to estimate sustainability presents itself. More technical studies – especially on water quality – need to be done.

Fiaure 5.9: The restaurant on Prickly Pear Island

Before permits are given for new hotels, resorts or restaurants to be built, the cumulative impact of all the existing hotels, resorts and restaurants together with any new proposed entity should be investigated.

5.3.4.2 Beach Bathers

Beach bathing takes place across the NEMMA – on mainland Antigua and on the islands (see Figure 5.11) – wherever there is a sandy beach. The beach bathers themselves may not be doing anything unsustainable, but putting permanent facilities in place to facilitate them (change rooms and toilets) may cause problems if they are built too close to the shoreline, and if they discharge human waste such that it soaks away into the sand. Such structures should obey accepted norms concerning setbacks and discharges.

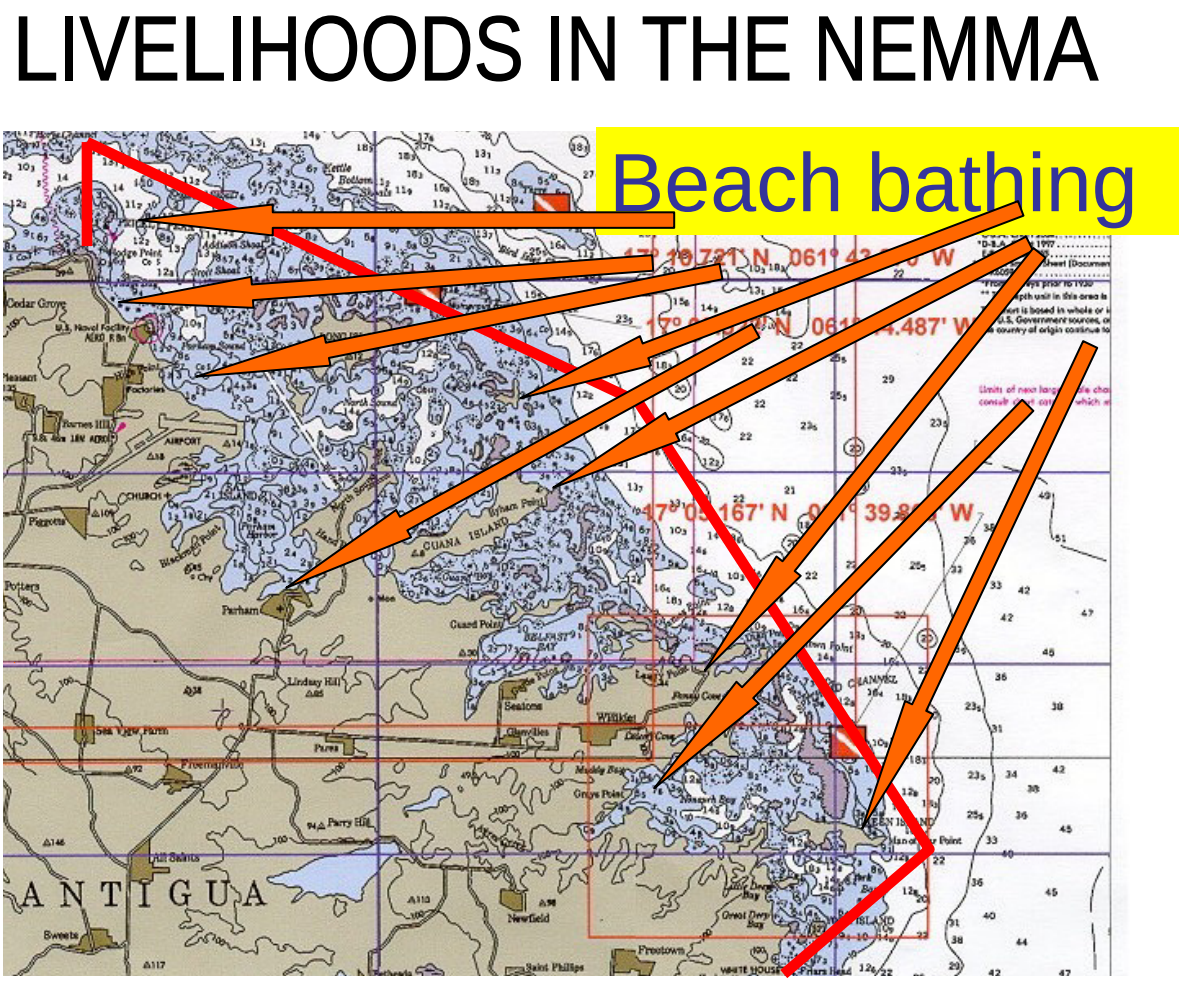


Figure 5.11: Location of bathing beaches within the NEMMA.

Sometimes seagrass is uprooted (especially by hotels) in order to make the beach "better" for swimmers. This should not be permitted.

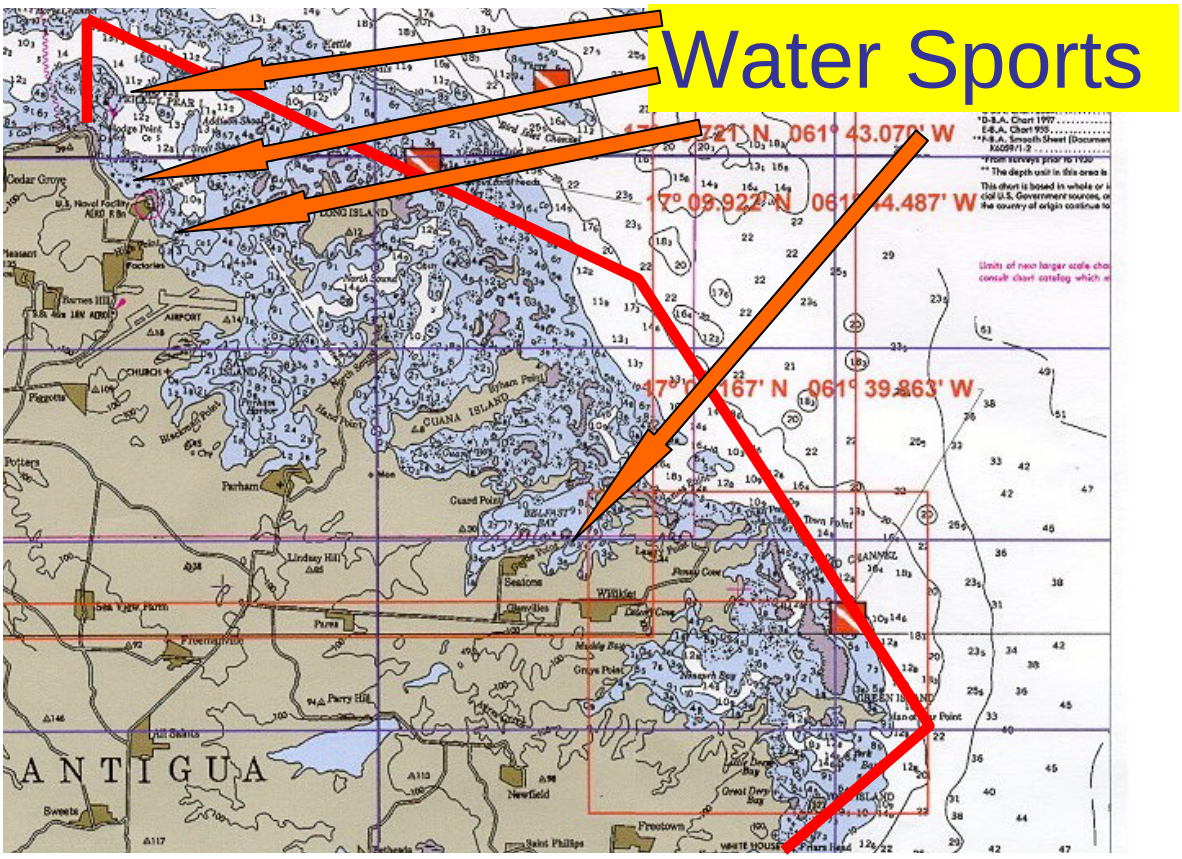
Sea Turtles have been seen nesting at Jumby Bay (on Long Island), on Green Island, and on the Antiguan mainland at Jabberwock in the north. Humans can disrupt this process. Lighting at night on or behind the beach may confuse nesting females, and removal of beach vegetation may render the area unsuitable for nesting. In addition, motor vehicles driving over the beach may compact the sand making it impossible for turtles to dig proper nests, and vehicles driving over nests under the sand may destroy the eggs. And of course, humans and their pets (e.g. dogs) may rob the nests of their contents.

Lighting on the beach should be restricted[51] and the regulations for the beach area should prescribe where motor vehicles may drive and park. The discovery of turtle tracks and nests could be an educational opportunity. There is the potential for user-conflicts (e.g. swimmers and jet skis), and the seaspace should be appropriately zoned.

[51] Lights should be shaded so as not to be visible from the sea.

5.3.4.3 Water Sports Operators, including SCUBA, Snorkelling and Wildlife Tours

LIVELIHOODS IN THE NEMMA



There are no dive shops within the NEMMA which offer SCUBA and Snorkelling Tours, but there are some outside the NEMMA which use dive and snorkel sites inside the NEMMA; in addition, private divers and snorkellers explore the waters of the NEMMA.

The sustainability of the activities of the divers is of concern; on previous trips to Antigua this writer heard pre-dive briefings encouraging divers not to be afraid to touch the corals; during the workshop one participant was quite disbelieving that touching a live coral reef could lead to reef death[52]. There is certain need for education efforts re sustainable reef use.

Figure 5.12: Boats for water sports at Seatons **(***Espeut photo***).**

It would appear that the volume of divers on the reef should not be an issue as long as they conform to best practices and reef etiquette. When the number of tourists increases such that more dive shops will be required, then an assessment of the cumulative impact should be undertaken to determine the maximum number allowable for sustainability.

[52] The surface of the stony coral heads is covered with live coral animals, which secrete a layer of mucous over themselves for protection against drifting algae seeking a place to settle and grow. Touching the reef surface can break the mucous coating, providing an opening for the encrusting algae to creep underneath; they can then take over the reef surface, killing the corals.

To best be able to monitor the reef usage, SCUBA and snorkel operators should be required to brief all their patrons best practices and reef etiquette as a part of their permit to operate, and should be required to report on the number of persons taken on the reefs per month.

In addition there are several water sports operations based within the NEMMA (and outside) renting speedboats, sailcraft, kayaks, wind-surfboards, kites and snorkeling gear for use within the marine management area:

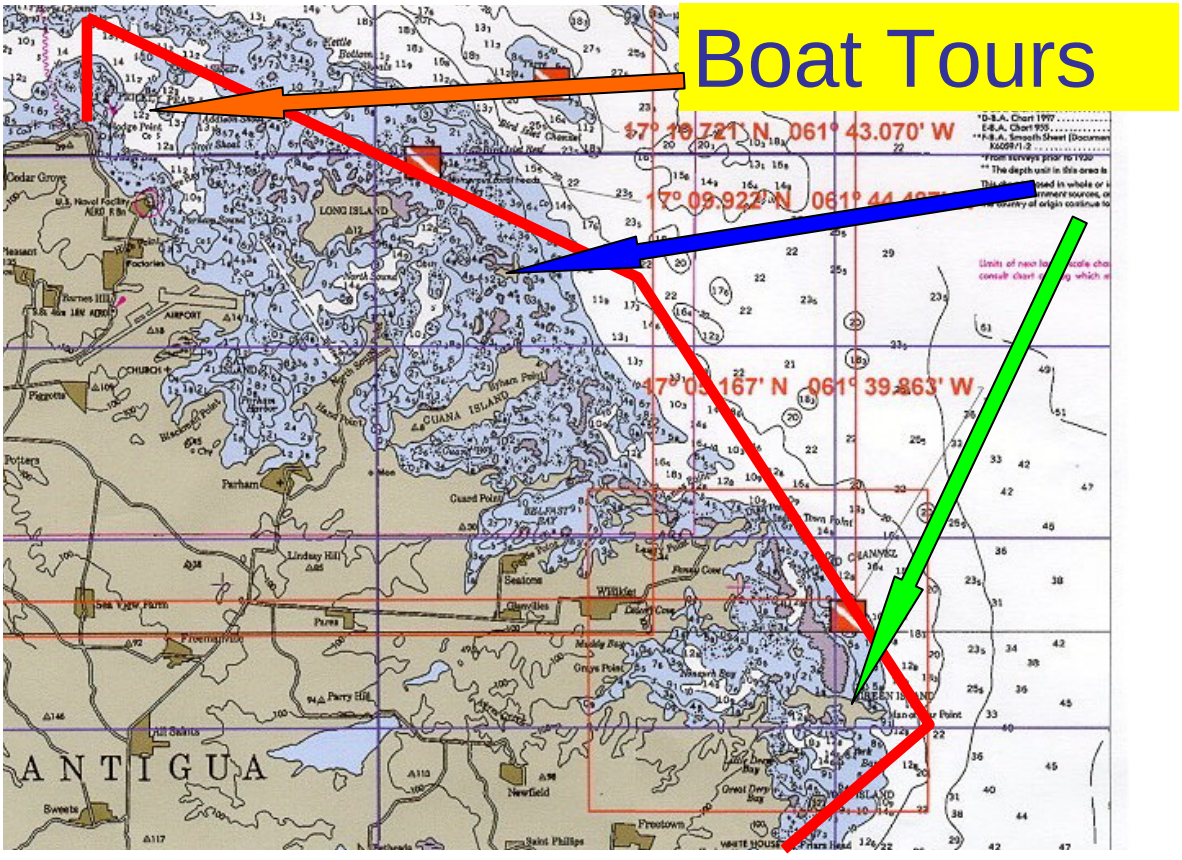
- H_2O (sunfish, parasailing)
- Sunsail/Club Colona (sunfish, paddle boats)
- Kite Antigua (kiting)
- Paddles (Kayaking, boating tours)

The NEMMA lacks coastal navigation marks, so persons unfamiliar with the location of the coral reefs could hit them, causing damage. A medium term goal for the managers of the NEMMA should be the putting down of navigational marks identifying – if not all – at least the reefs most likely to be hit by boaters and surfers. In the mean time, water sports operators must be required to distribute mini-charts showing the reefs and to caution those renting watercraft. They must also report to the management authority any collision incidents or scrapes.

It would appear that the volume of divers on the reef should not be an issue as long as they conform to best practices and reef etiquette. When the number of tourists increases such that more water sports operators will be required, then an assessment of the cumulative impact – including the number and type of incidents – should be undertaken to determine the maximum number to be allowed for sustainability.

5.3.4.4 Boat tours

LIVELIHOODS IN THE NEMMA



Boat tours regularly take bathers and picnickers to Prickly Pear Island (orange arrow), Great Bird Island (blue arrow) and Green Island (green arrow). On Prickly Pear – the smallest – there is a bathing beach and a restaurant which also rents snorkel gear. Great Bird Island has two bathing beaches, a picnic area with tables, and walking trails. Green Island – the largest – has a bathing beach and walking trails. There are no mooring buoys on any of the islands; tour operators are forced to anchor or run the boat up on the beach. Picnickers are required to take all their garbage with them; there are no sanitary conveniences on any of these island destinations, forcing visitors to use the bushes.

Figure 5.13: The big cats lining up off Great Bird Island (*Espeut photo****).***

There is the reality of overcrowding at Great Bird Island – in terms of boats and bathers. Sometimes the boats carrying tourists from the hotels are so numerous they have to anchor (there are no moorings) a good distance away from the island and ferry the passengers in. The boats may damage the reefs. The carrying capacity needs to be estimated and adhered to.

There are two beaches on Great Bird Island – North Beach and South Beach; the latter is the more popular and sometimes there is no space. Shadbolt (2000) reports finding a party of tourists wandering through the forest looking for the beach. Their tour boat had anchored on the southwest of the island because of overcrowding and they were hiking trying to find the North Beach. Shadbolt estimates the annual visitor count on the 9.9 Ha island as 3,300; this seems low considering that she counted 363 persons on Easter weekend alone. In Figure 14 the black arrow indicates the picnic area on South Beach, while the white arrow points to the start of the hiking trail. Some carrying capacity for the island itself needs to be estimated and enforced.

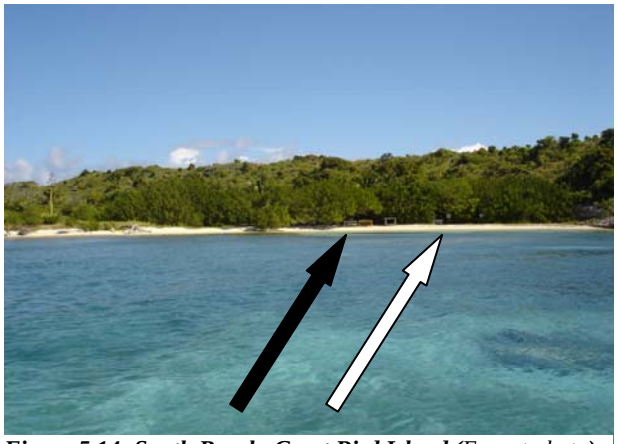


Figure 5.14: South Beach, Great Bird Island (*Espeut photo****).***

Interestingly, the sign at the start of the trail (Figure 5.15) suggests that hiking on the island – habitat for endemic flora and fauna which have disappeared from the Antiguan mainland – may be unsustainable: "*This island is home to some of Antigua's most endangered animals and plants. Please respect their home and our heritage, and tread carefully knowing that what you do may have an adverse effect on the flora and fauna of the island*". In fact, the suggestion is that maybe we shouldn't hike on the trail at all! I didn't after reading!

Figure 5.15: The start of the Great Bird Island hiking trail (*Espeut photo****).***

The Antigua Fisheries Division plans to designate Great Bird Cay as a zone for special protection within the NEMMA – a Wildlife Sanctuary. This certainly is necessary, and will

require the hard decision to be made whether the present level of visitor use is incompatible with the biodiversity present, i.e. whether the present livelihoods made there are unsustainable. Should the decision be made to reduce visitor use, then the present livelihoods made taking tours to Great Bird Island will be displaced.

Prickly Pear Island has been used for decades by a family who operate a restaurant *cum* water sports resort on Tuesdays, Thursdays and Saturdays. They remove all their garbage, and have built a toilet onto the restaurant; deposits are made into a drum which is carted off to mainland Antigua for disposal in the evenings. They also rent snorkeling equipment and provide some briefing and instruction.

Figure 5.16: The restaurant with toilets on Prickly Pear Island (*Espeut photo****).***

Certainly their tenure should be regularized through a lease, and conditions should be applied to encourage sustainability. The patch reefs seaward of the restaurant show signs of eutrophication, probably from washwater and in-water urination. The setting is charming and the operation can become sustainable with a little modification.

Prickly Pear Island is small, and is habitat for several species of birds. A trail leads from the left of the restaurant to the top of the islet where a light tower operated by the Antigua Port Authority once stood. It would not be difficult to permanently disturb its fragile ecosystems. Estimates of carrying capacity need to be made and adhered to, both in terms of boats anchoring (which might conflict with swimmers; the beach area is small) and persons who occupy the island for swimming, dining and liming.

Figure 5.17: The menu board of the Prickly Pear Restaurant (*Espeut photo****).***

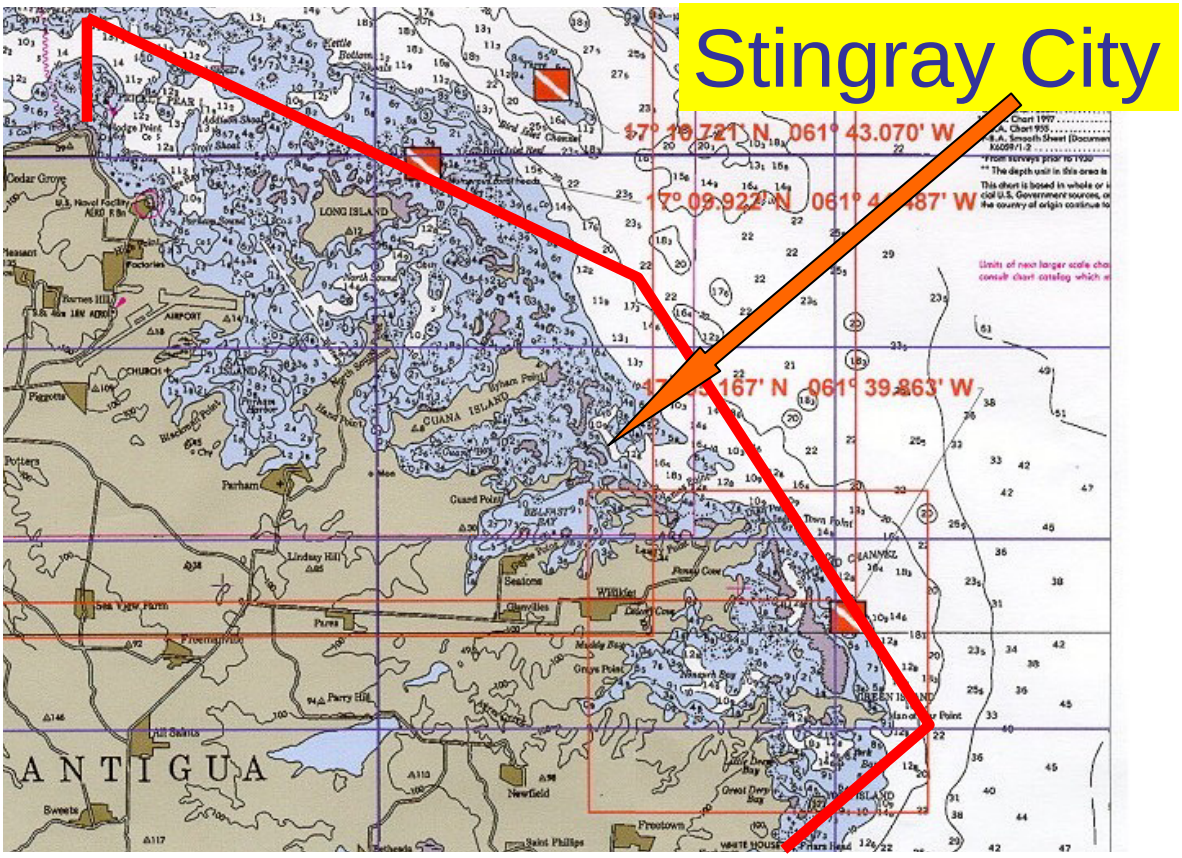
Green Island is privately owned – by the Mill Reef Club – whose owners have a reputation for being concerned about the quality of the environment. They allow its use by the public, but keep it in good condition (e.g. they do not allow fires). The quality of the conditions on the island probably attracts users who may feel that they are taking part in an environmentally sustainable exercise.

Figure 5.18: Bathers on Green Island (*Espeut photo****).***

At the moment the level of ordinary use these islands get is probably sustainable, once the necessary moorings and toilets are in place, and the trails are maintained. The problem comes on long holiday weekends when the number of visitors increases beyond the carrying capacity; and as overall the number of tourists increase, this will begin to happen in the high season, and then at ordinary times. There is no time like the present to set some maximum visitor loads, and stick to them.

5.3.4.5 Stingray City

LIVELIHOODS IN THE NEMMA



A private operator has fenced off an area of the seabed off Seatons and has placed a number of southern stingrays there for an in-water experience. Visitors are taken there by boat and enter the water in the fenced-off area to interact with the stingrays. It is immensely popular, and is based on its namesake in the Cayman Islands which is not fenced in any way.

Figure 5.19: Stingray City, Antigua. Note the high fence, the guard house and the floating dock (*Espeut photo****).***

The operator applied for and received a permit for a temporary enclosure not projecting above the water level, intended to acclimate the stingrays to remain in the general area. The height of the enclosure is well above sea level, and the operator has erected a guard-house where a security guard is based at nights. The operator claims this is necessary since once, he alleges, someone poisoned to death some of the stingrays in an effort to damage his business.

The operator employs 20+ people, and is a good corporate citizen. He has applied for a lease on the seaspace from which he operates. He is willing to remove the fence once the security issues are straightened out. This is reasonable, and with the fence down and the stingrays free to roam about, the operation will even more closely resemble its Caymanian progenitor and this livelihood for the 20+ people will meet the criteria for sustainability.

5.3.4.6 Craft Production.

Some craft production takes place in Antigua, but not using raw materials taken from the NEMMA. The leaves of coconut trees are harvested and woven into hats and other objects. This would affect the production of coconuts if the coconut trees were stripped of most of their leaves.

More disturbing was the harvesting of coral to make jewelery and ornaments, and the taking of turtles to make turtleshell ornaments. There is the potential for developing a craft industry without negatively impacting on the environment.

Should more visitors be attracted to the NEMMA, they may wish to purchase tokens to remember their visit, which will create a market for high quality art and craft items. Training in craft production is available in Antigua. It should be possible to operate a craft training programme by the NEMMA for unemployed young men and women who have the aptitude.

5.4 MANAGEMENT ISSUES CONCERNING THE NORTHEAST MARINE MANAGEMENT AREA

5.4.1 Water Quality Issues

In 1996 the Island Resources Foundation (IRF) conducted a Marine Resources Survey of the NEMMA and the Bird Island Marine Reserve and Wildlife Sanctuary for the Organization of American States (OAS)[53]. In some cases they were able to compare the findings of their survey with the 1988 survey by Weiss & Multer to indicate habitat change.

This is what they said about Great Bird Island: Bird Island "*is dominated by seagrass beds, dead fringing reef and scattered coral heads. The seagrass beds … are in healthy condition with the exception of the seagrass bed southwest of Great Bird Island where yachts typically anchor. The survey of this site revealed numerous 2' x 2' x 2' holes where anchors had apparently dug out the seagrass. … The shallow reefs consist of large, continuous areas of dead coral rock …; however (live) coverage is less than 5% at any site. High densities of seagrass and macroalgae … is* (sic) *common at the reef sites… In contrast to the shallow reefs, the deeper reefs have higher live coral coverage and moderate to high species diversity*".

This is what they said about Prickly Pear Island: "*The marine environment … primarily consists of fringing reef overgrown by seagrass and/or macroalgae ... Although the reef structure is primarily composed of dead coral … there are some patches of live stony coral heads … and live gorgonians … and fire coral. Compared to many areas in the [NEMMA] this spot provides reasonably good snorkelling sites. … The reefs have deteriorated to the point that the reef structure remains intact; however much of the coral is dead and overgrown by seagrass and/or macroalgae*".

This is what they said about Crabs Peninsula: "*The marine environment … is dominated by seagrass, muddy sand and highly deteriorated fringing reefs. Largely dead fringing reefs are evident along the east and north coasts of Crabs Peninsula. The reefs have deteriorated to the point that the substrate is relatively flat consisting of sand and dead coral, overgrown with seagrass and/or macroalgae … Strong sedimentation was also observed at the south end …". The water quality along the west coast was noted to be heavily affected in some areas. Oily water was observed southwest of the desalination plant … and unusually warm water was observed at the southern tip … Comparison … indicates … the seagrass beds … have maintained their habitat composition with the exception of four of the nineteen sites … which have shifted from seagrass to muddy sand. The fringing and patch reefs … have deteriorated significantly … Most of the areas they recorded as linear or patch reef are currently dominated by seagrass over dead coral and sand … have been reduced to scattered coral heads … or are seagrass …*".

What the IRF is describing is a serious problem of pollution of several kinds from the land into the NEMMA which is affecting its sustainability:

- nutrient pollution causing algal overgrowth
- sedimentation from soil erosion
- heat pollution from industry
- oil pollution from industry

Another study of the area was done in 2005 by scientists from the Rosensteil School of Marine and Atmospheric Science at the University of Miami for the Stanford Development Corporation, one of the private sector interests wishing to build a resort on one of the islands[54].

[53] See IRF (June 1996a).
[54] See Brandt et al (2005).

This is what they found: "*Results of the survey in the North Sound show a relatively healthy benthic community but an unhealthy and disturbed fish community. In comparison to other Caribbean sites in the AGRRA database, indicators of reef health of the benthic community of the North Sound rank relatively high. Live coral cover was high, the abundance of macroalgae (competitors with coral) was low, and the abundance of a major herbivore, the long-spined sea urchin (Diadema antillarum) was the second highest recorded in the AGRRA database. When compared to deeper sites located farther from shore on the west and southwest bank of Antigua, the habitat complexity of the North Sound would predict a more diverse and abundant fish community however, the opposite result was found. Overall, total fish abundance ranks comparatively high as well, but this is due to the relatively high abundance of very small herbivores on these reefs. Carnivores, specifically piscivores, and large herbivores were almost entirely absent from surveys, indicating a severely depleted and disturbed fish community.*

Despite the presence of large reef areas of the North Sound dominated by coral rubble and standing dead colonies, indicating significant mortality of coral in the past, all indicators of reef health from our survey suggest a healthy and diverse re-colonizing benthos with the potential for future recovery and growth. However, the fish community is severely under-populated relative to the potential provided by the amount of available habitat in the North Sound area. These low abundances could be due to multiple factors, including increased adult mortality due to fishing pressures, as well as potentially a lack of larval fish supply from nearby reef areas. … There were reef areas where seaweed levels were not as excessive as on reefs in some other countries, possibly indicating low nutrient levels".

The Rosenstiel researchers paint a rosy picture of the situation with coral reefs and a negative picture of the fisheries. Reading their report one would never believe that there was any serious pollution from the land! They entirely blame overfishing and the Antiguan fishermen for the decline in live coral cover[55].

What will settle this dispute is a series of water quality studies. I am advised that no water quality assessments have ever been done in the NEMMA – not even by the IRF or the Rosensteil School. I was advised that the feeling is that there are no water quality problems there. Public health authorities tend to be concerned with water quality only when it affects human health, and they call it "environmental health". Public health authorities tend to be insensitive to water quality issues affecting corals – the real "environmental health"[56]. Maybe there are few public health problems in the NEMMA, but there are certainly environmental health issues to do with nutrient pollution, industrial pollution and sedimentation. Management of the marine resources in the NEMMA will involve coming to grips with these matters.

5.4.2 Terrestrial and Marine Management issues

The full skill set required to manage the natural resources of the NEMMA is wide. The vast majority of the NEMMA is marine, and will demand that the managers possess skills in fisheries science, coral reef science, water chemistry and animal biology among others. A significant portion of the NEMMA (the 30 islands) is terrestrial, requiring skills in forest science, wetland science, terrestrial ecology and animal science, among others. And then there is the land-water interface. No one government agency possesses all these skills, and a team approach is going to be necessary, even though one agency or entity should drive the process.

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[55] This author has come across this outfit before in the Dominican Republic. In a study of the coral reefs off the Punta Cana resort they blamed the serious algal overgrowth of the reefs on the overfishing activities of about 20 fishermen from a nearby settlement rather than on the three golf courses which stretch to the waters edge and which are heavily fertilized. The latter were not even mentioned, and no water quality work was done.

[56] Coral reefs are affected by much lower concentrations of nutrient pollution than humans; adhering to public health standards will mean death to coral reefs.

The management of the NEMMA will not be effective if all the staff are part-time or time-share with government ministries. Staff who can place their full attention to the complex exercise of managing the NEMMA will be essential. The establishment of a regulatory framework, water quality testing capability and an enforcement arm are also essential to bring the NEMMA under an effective conservation regime.

Because of the very many different stakeholder interests involved in the NEMMA, employment of the co-management approach will be optimal. What is required is behaviour change on a large scale. Fostering this requires skills from the social sciences (e.g. sociology, social psychology) rather than from the natural sciences (e.g. chemistry, biology), although the latter are needed to assess the progress and effectiveness of natural resource co-management activities.

5.4.3 Funding from the OECS

Funding is available through the OPAAL Project for the implementation of many strategies which will improve the management of the natural resources in the NEMMA, as well as improve the sustainability of the livelihoods of the persons who live nearby. The establishment of a regulatory framework, water quality testing capability and an enforcement arm will be essential to bring the NEMMA under an effective conservation regime.

5.5 PROJECT IDEAS FOR ACCESSING THE OECS SMALL PROJECTS FACILITY (SPF) TO ACHIEVE SUSTAINABILE LIVELIHOODS IN THE NORTHEAST MARINE MANAGEMENT AREA

A workshop was held on February 24, 2006 with stakeholders in the North East Marine Management Area (NEMMA) to scope out project ideas which might be eligible for funding under the OECS Small Project Facility (SPF). The workshop was organized by the Fisheries Division of the Ministry of Agriculture, Lands, Marine Resources & Agroindustry, and held at their new Fisheries Complex in St. Johns. The following persons with the indicated affiliations attended:

PERSON'S NAME	AFFILIATION
Brian Cooper	Environmental Awareness Group
Donald Anthonyson	Environmental Awareness Group
Pickle Langlois	Antigua Safaris
Vere Ford	Mill Reef Club Marina
Andrew Moody-Stuart	Stingray City
Xabeli Ross	Wadadli Cats
Terrenco Tonge	Miguel's Holiday Adventure
Francis Loctar	Kokomo Cats
Adrian Shields	Sunsail Colonna
John Noland	Stanford Development Co.
Geoffrey Piddma	Harmony Hall & Antigua-Barbuda Marine Association
David Stubbs	Jumby Bay Island Services
Noel Jackson	Tropical Adventures
C. Hue	HOGTO
Foster Derrick	Seatons Development Organization
Dexter Nedd	Jumby Bay
Brian Meade	General Manager, Dian Bay Resort (Formerly Mango Bay)
Darien Nicholas	Potters
Juan Rodriguez	Skerritt's Pasture
Adelle Blair	Ministry of Tourism
Kiyode Straker	Development Control Authority
Reg Murphy	National Parks
Patrick Riley	Antigua-Barbuda Coast Guard
Adriel Thibon	Forestry Unit, Ministry of Agriculture
Everette Williams	Forestry Unit, Ministry of Agriculture
John Alexander Joseph	St. John's Fishermen's Co-operative
Kennedy T. Elien	Mill Reef Fishing Area
Robert Peters	Fisherman
Paget Joseph	Fisherman
James Morris	Fisherman
Winston Florient	Fisherman
Sherwin McIntosh	Fisheries Division
Steve Archibald	Fisheries Division
Tricia Lovell	Fisheries Division
Laurie Smith	Fisheries Division
Verlyn George	Fisheries Division
José Nelson	Fisheries Division
Hilroy Simon	Fisheries Division

Nikisha Frederick	Fisheries Division
Philmore James	Fisheries Division
Cheryl Jeffrey-Appleton	Chief Fisheries Officer, Fisheries Division (OPAAL NFP)
David T. Popo	OECS Secretariat – ESDU
Peter Espeut	Consultant to the OECS

The participants were organized into two groups – one focusing on fisheries and natural resources issues, and the other focusing on tourism issues – and were asked to come up with project ideas. Individuals were also encouraged to submit separately their individual ideas even if they did not come up in the group discussion. Below is a list of the project ideas which emerged (in no particular order). The suggested entity to implement the project idea is in red:

From the Fisheries Sector Group

1. A system of artificial reefs
2. Alternatives for fishers: e.g. training in use of other gear
3. Alternatives for fishers: e.g. diversification away from fishing to other sectors, like tourism, along with investment in equipment and business training
4. Alternatives for fishers: e.g. the feasibility of new sectors and new markets, like sea urchin harvesting
5. Feasibility studies on mariculture: e.g. seamoss farming, lobster farming, conch farming
6. Public awareness activities: education of fishers and general public
7. Public awareness activities: expansion of EAG's floating classroom
8. Best practice workshops; develop best practice guides for a variety of things, e.g. boat handling
9. Set up permanent moorings in places where boats regularly visit
10. Navigational markers for channels, and to identify where reefs are
11. A water quality monitoring programme
12. A habitat quality monitoring programme
13. Fish abundance surveys
14. Studies of threatened marine species
15. Provision of financing and training for large boats (to get the fishers out of the area)
16. Investment in new and different fishing gear
17. Training of fishers in the USE of GPS, in navigation, in seamanship
18. Establishment of a volunteer surveillance programme
19. Creation of new livelihoods (e.g. sea wardens)

From the Tourism Sector Group

20. Training programme for tourism workers within the NEMMA (crafts, tour operators, wardens **Fisheries Dept. & EAG**
21. Development of a system of permanent moorings **Fisheries Dept., Coast Guard & Fishermen's Co-operatives**
22. Study of the Carrying Capacity of the NEMMA **Fisheries Dept. & EAG**
23. Project to mark reefs with navigational aids **Fisheries Dept., Port Authority**
24. Development of walking trails on the islands **Forestry Department**
25. Development of underwater trails for divers/snorkellers **Fisheries & Forestry Depts.**
26. Development of legislation & regulations **Fisheries & Forestry Depts.**
27. Development of a system of fees and fines **Fisheries & Forestry Depts.**
28. The requirements for operating a boat in NEMMA **Fisheries & Forestry Depts.**
29. Biological & Biodiversity Research **Fisheries, Forestry Depts. & EAG**
30. Laboratory for ongoing monitoring of water quality **Fisheries & Forestry Depts.**
31. Reef ball and other artificial reefs **Fisheries Department**
32. Development of recreational areas within NEMMA, e.g. picnic areas, walking trails, wilderness areas. **Fisheries & Forestry Depts., locals**
33. Environmentally friendly restroom facilities in picnic areas on islands **Fisheries Dept., Tourism, community groups**
34. Bed & Breakfast accommodation encouraged as alternative livelihoods for residents **Tourism/Development Control Authority**
35. Fish Hatcheries (fish conch, etc.) **Fisheries Dept. & Fishermen's Co-operatives**
36. Baseline study of land-based sources of marine pollution within the NEMMA **Fisheries Dept. & EAG**

From an Individual

37. Navigational marks indicating hazardous reefs
38. Having designated anchorages
39. Having permanent moorings
40. Enhancement of Flashes
41. Eliminate double standards
42. Management of the aspects of the land which has effects on the marine area
43. Reafforestation of the islands
44. Removal of the goats and other stray animals from the islands
45. Planting coconut trees, maho and other plants sympathetic to the environment.

Consultant's Recommendations

New Sustainable Livelihoods

1. Estimate the carrying capacity of the NEMMA for tourism-related activities
2. Training in the production of high quality (sustainable) art and craft
3. Training in tour-guiding skills, including snorkeling
4. Development of walking trails on the islands
5. Certification of boat handlers
6. Establishment of glass-bottom boat tours
7. Market the NEMMA as a nature tourism site

Strengthening the Sustainability of Existing Livelihoods

1. To develop and implement a plan towards the sustainability of the fisheries sector
2. To estimate the carrying capacity of the NEMMA for existing livelihoods
3. Training of resource-users in environmental sustainability and business issues

Management Recommendations

1. The creation of a local stakeholder entity to guide the management process
2. The preparation of a management plan for the NEMMA with stakeholder participation
3. The preparation of a zoning plan for the NEMMA
4. The preparation of regulations for the NEMMA with stakeholder participation
5. The establishment of the capacity for the management entity to measure water quality
6. To estimate the carrying capacity of activities in the protected area
7. Establish mooring buoys where tour boats often visit, like Bird Island
8. Establish navigational markers to identify reefs
9. Environmentally friendly restrooms on islands
10. Removal of the goats and other stray animals from the islands

6.0 GRENADA COUNTRY REPORT THE (PROPOSED) ANNANDALE FOREST RESERVE

6.1 DESCRIPTION OF THE (PROPOSED) ANNANDALE FOREST RESERVE

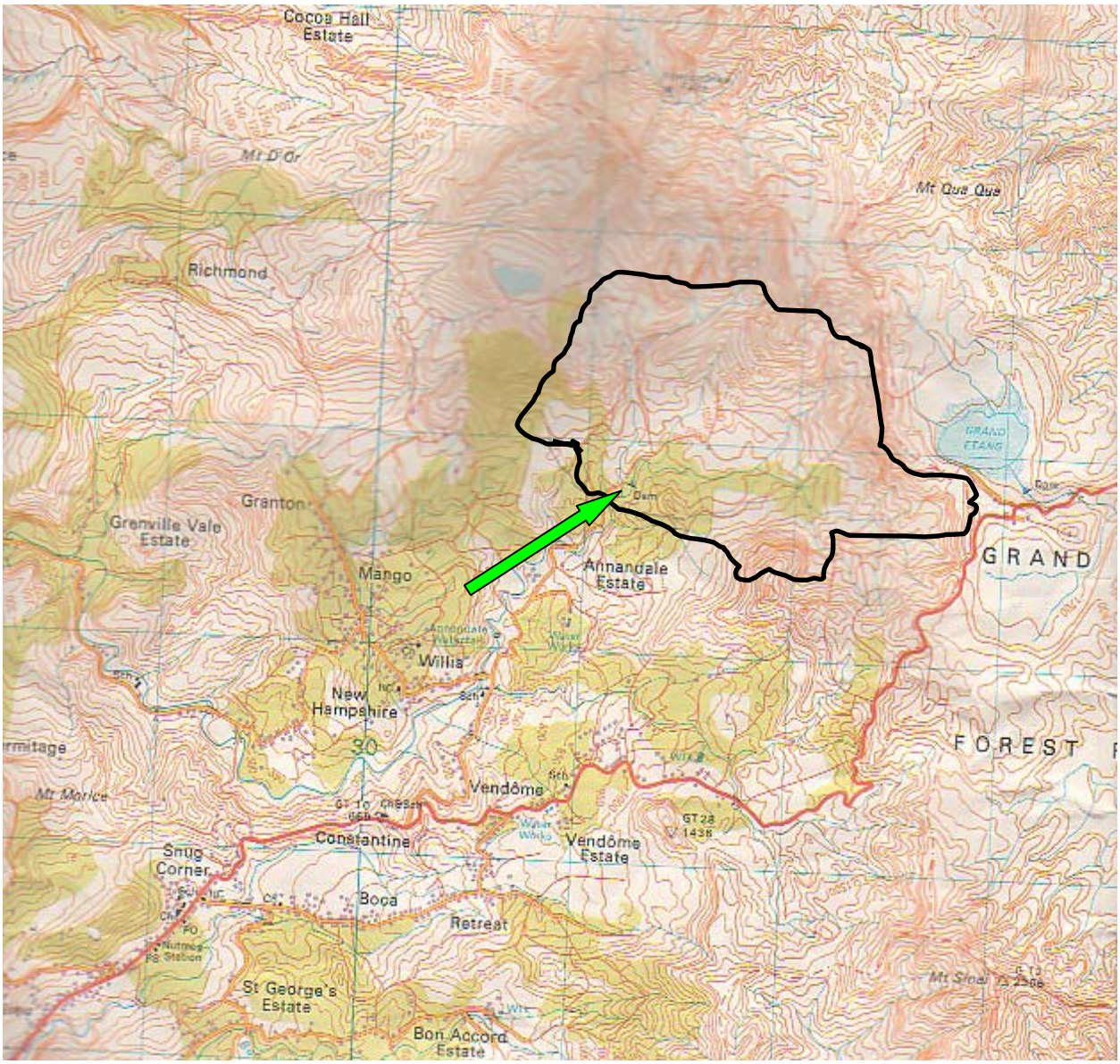

Figure 6.10: Approximate boundary of the proposed Annandale Forest Reserve to the west of the Grand Etang Forest Reserve. Note the position of the Annandale Dam (green arrow) and the surrounding settlements of Granton, Annandale, Mango, Willis, New Hampshire, Vendome and Constantine.

In 1801 the area now called Annandale was a series of properties (Figure 6.2) including *Lac Aymar* (68 & 69) and *Boisgerry* (56). In 1824 both were owned by W. Johnston; *Lac Aymar* was 338 acres (82 acres + 256 acres) and was woodland; in 1824 Boisgerry was 161 acres and was in sugar cane[57].

[57] This information is from the Gavin Smith map (1801) and property list (1824).

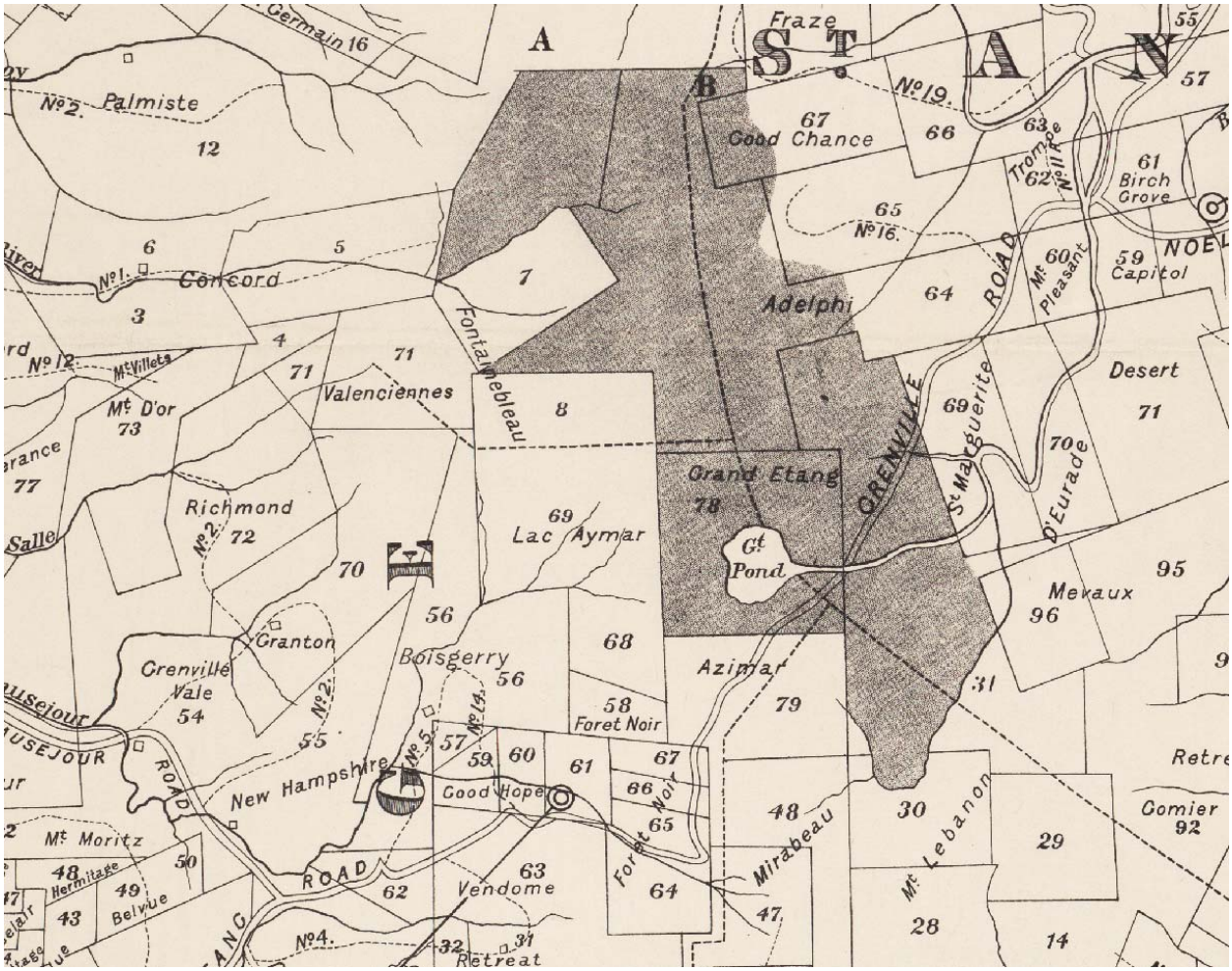

Figure 6.2: The Annandale area in 1801 (from Gavin Smith). Note the Grand Etang lake for reference (arrow).

Prior to 1955, much of Annandale was in commercial production: bananas, cocoa, nutmeg, citrus fruits and spices. It was managed as a watershed of the Annandale water catchment area (which falls within the Beausejour watershed) by private interests. Approximately 85% of the upper catchment (the area above the dam) is within the proposed Annandale Forest Reserve, and provides most of the potable water for the parish of St. George, the town of St. George's and the tourism belt in the south west of the island.

In 1955[58], the strong winds of Hurricane Janet devastated the crops grown on this private estate. As part of Grenada's Hurricane Rehabilitation Program, forest tree seedlings, mainly blue mahoe (*Hibiscus elatus*) imported from Jamaica, were distributed to farmers and some were planted in Annandale: as wind breaks and in the form of plantations.

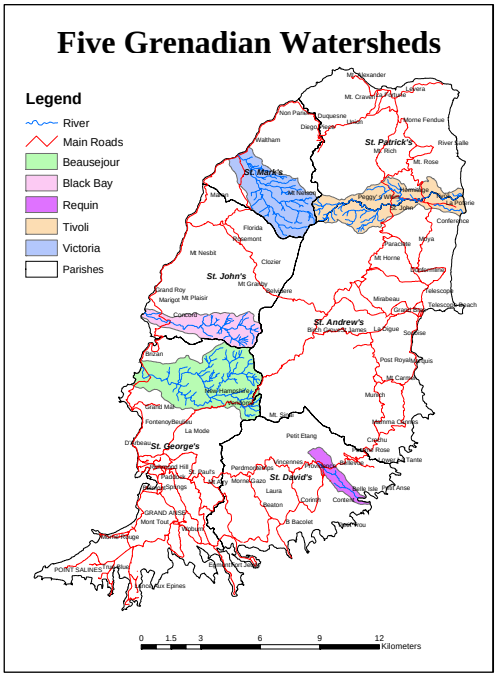

Figure 6.3: The Beausejour (Annandale) Watershed (in green).

[58] The following is drawn largely from the draft Annandale Management Plan [Dunn (2002)].

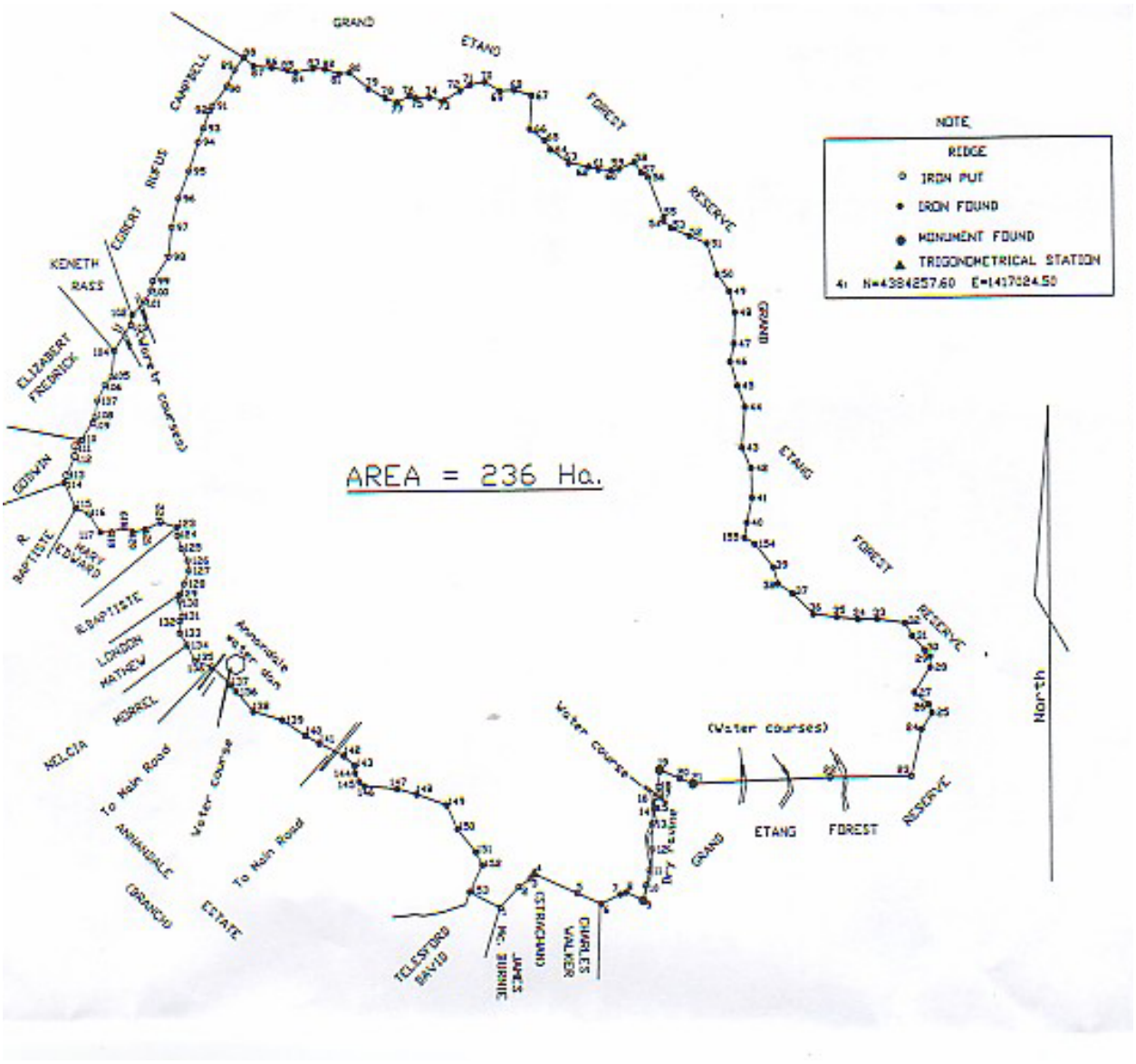

Figure 6.4: Survey of the Annandale plantation (1999).

Subsequent to Hurricane Janet, Sir William Branch purchased the north eastern portion of the Annandale catchment area. While the Annandale catchment was in private hands, the objectives of the owner were based on economic crop production. As a consequence, the intensive use of fertilisers and pesticides together with improper cultural practices caused sedimentation and pollution of the Annandale Dam, and reduced its storage capacity (i.e. it was unsustainable). With the importance of the Annandale Dam, the Government was forced to declare the area a Protected Watershed in 1964. This resulted in the ownership of this 236 Ha property being transferred to the Government of Grenada through compulsory purchase of the land from the Branch family.

Figure 6.5: Blue Mahoe trees on Annandale (Espeut).

As no immediate actions were taken by Government to manage the Annandale catchment, illegal cultivation, harvesting, animal grazing and charcoal burning by squatters and former estate workers took place. This led to greater environmental problems such as erosion, gully formation, surface soil compaction, water-logging, dam siltation and a reduction in water flow into the dam during the dry season.

In 1983 the responsibility for the management of Annandale Estate was transferred to the Forestry Development Corporation. After years of the area not being managed, the first step taken was the execution of a preliminary survey and description of the area, which formed the basis for an application for a grant to convert Annandale into an agro-forestry demonstration site. In 1985, an Agro-Forestry Management Project, funded by USAID/CDB, started with the displacement of the illegal squatters and prohibition of any harvesting, cultivation and grazing. Some of the illegal farmers were employed to work under the project. The preliminary survey and general description was intensified and a draft Management Plan produced.

Figure 6.6: the Annandale Dam (*Espeut photo****).***

The national forestry administration was changed from a Corporation to a Department within the Ministry of Agriculture, Lands, Forestry and Fisheries in 1985. The Forest Department's management objectives were to support the development of appropriate agro-forestry systems and the improvement of hydrological conditions that would have sustainable positive impacts on soil and water conservation[59].

The management plan developed by the Agro-Forestry Management Project gave many details for activities to be executed, including reforestation, crop rehabilitation, road repair and maintenance, infrastructure establishment, hydrological studies, monitoring, training and supervision.

Between 1995 and 1997 Annandale suffered some damage from pink mealy bug infestation in the Blue Mahoe plantations. Work was carried out in the area as part of the nation-wide mealy bug control programme which included pruning or felling infested trees and cutting and burning the underbrush in affected plantations.

In 1998 submission was made to Cabinet for the area to become a Forest Reserve. The proposed Annandale Forest Reserve has an area of 236.12 ha (590.30 acres) and is bounded by Grand Etang Forest Reserve on the north, west and south sides, and by the remaining lands of Annandale Estate and land belonging to private individuals on the east side. The area comprises montane rainforest, secondary tropical rainforest and deciduous forest. Cabinet took the decision to designate, and the order was executed just after the fieldwork was completed.

Fauna with habitats in the area include the protected manicou (*Marmosa robinsoni chapma*), the African mona monkey (*Cercopithecus mona*) [normally confined to the upper montane forest but presently with a broader range due to shortages of its natural food sources post Hurricane Ivan], the tree boa (*Corallus grenadensis*), and the nine banded armadillo (*Dasypus novemcinctus*) locally called "tattoo", threatened by over-hunting.

A new Management Plan for Annandale as a Forest Reserve is being prepared. In the opinion of this author this current draft has not yet fully made the transition from Annandale as a "Protected Watershed" in which agriculture is appropriate, to a "Forest Reserve" where it is not.

[59] This is entirely consistent with the status of Annandale as a Protected Watershed.

STRATEGIC OBJECTIVES OF THE FORESTRY AND NATURAL PARKS DIVISION (FNDP) USED TO DEVELOP THE MANAGEMENT PLAN FOR THE PROPOSED ANNANDALE FOREST RESERVE (TAKEN FROM THE 2002 DRAFT MANAGEMENT PLAN)

Strategic Objective 1:	Sustainably manage forest ecosystems, cultural landmarks and other key areas for social and economic development.
Strategic Objective 2:	Promote national public awareness and support advocacy programmes that will influence the management and use of forest ecosystems, cultural landmarks and other key areas.
Strategic Objective 3:	Strengthen the capacity of stakeholders to effectively manage forest ecosystems, cultural landmarks and other key areas.
Strategic Objective 4:	Develop an efficient and productive Department to fulfil its Mission.

The FNPD also has responsibility for heritage sites in Grenada, which is why there is constant reference to "cultural landmarks". In fact, there are ruins of an old fort on the Annandale property, although no one could tell me exactly where.

Agro-forestry as part of the mission of the FNPD is not specifically mentioned; the above objectives properly focus the mission of the FNDP on "forest ecosystems"; presumably agro-forestry creeps in under "other key areas". One hopes the FNPD does not include agro-forestry under "forest ecosystems".

The 2002 Management Plan for the proposed Annandale Forest Reserve contains some fourteen (14) Management Activities, as follows:

Activity 1: Cattle Grazing: The plan says that cattle grazing on Annandale is illegal, and outlines how cattle grazing above the dam causes compaction of the soil and might affect water quality; but does not come out and say that cattle grazing is to be forbidden on the forest reserve and enforced. It would be appropriate to make a clear statement on the matter.

Activity 2: Boundary Lines: It is appropriate to mark the boundaries of the Forest Reserve.

Activity 3: Management for Conservation of Natural Vegetation: This sounds like an entirely appropriate activity – supporting the growth of vegetation natural to Grenada rather than introduced species; but is this what the FNPD understands by the term "natural vegetation"? Here is a quote: "*It should also be noted that conserving natural vegetation contributes to sustainable livelihoods for some local stakeholders in the neighboring villages of Willis, Annandale and Vendome such as bamboo harvesters and artisans, and manicou / tattoo hunters*". This quote is curious for two reasons: first, it lists bamboo, an Asian migrant to Grenada in the 18th Century (and an invasive species) as "natural vegetation" to be conserved in a forest reserve; (if bamboo is "natural" vegetation, then what qualifies as "un-natural"?) Secondly, it refers to the (illegal) hunting of the protected manicou and the over-hunting of tattoo as "sustainable livelihoods". I suppose the phrases roll off the tongue!

Activity 4: Management of forestry plantations: The plan to manage for profit the plots of native timber trees and the exotic Blue Mahoe is appropriate for a forest reserve, as would be other commercial efforts at silviculture.

Activity 5: Christmas tree production: The plan to cultivate Christmas trees is a type of forest plantation (under Activity 4) and is entirely appropriate for a forest reserve.

Activity 6: Nutmeg cultivation: This is farming – agro-forestry – and is inappropriate in a forest reserve. It would be appropriate, however, in a managed watershed.

Activity 7: Clove cultivation: This is farming – agro-forestry – and is inappropriate in a forest reserve. It would be appropriate, however, in a managed watershed.

Activity 8: Citrus plantation: This is farming – agro-forestry – and is inappropriate in a forest reserve. It would be appropriate, however, in a managed watershed.

Activity 9: Wildlife management: It is appropriate to conserve wildlife in a forest reserve.

Activity 10: Research: It is appropriate to conduct research in a forest reserve.

Activity 11: Recreation: It is appropriate for recreation to take place in a forest reserve.

Activity 12: Heritage: It is appropriate to conserve and interpret any heritage sites which may be present in a forest reserve.

Activity 13: Maintenance of roads: It is appropriate to maintain existing forest roads.

Activity 14: Non-Timber Forest Product use: It is appropriate to harvest non-timber forest products, although the management plan does not explain the arrangements.

Score: Appropriate - 11

Inappropriate - 3

Even the OPAAL Site Assessment is unclear about Annandale as a farm or as a forest, as the quote below demonstrates:

> "*Annandale borders the Grand Etang Forest Reserve. Habitats within Annandale, like all other forested areas in Grenada, have been severely affected by Hurricane Ivan (2004). Storm damage also compromised areas of agroforestry (nutmeg, clove, cinnamon and citrus) as well as bamboo stands which were utilized for the production of handicraft. Loss of these livelihood opportunities has negatively affected nearby communities. Currently the demand for spices far exceeds local supply and there is an urgent need to reestablish cultivated areas in appropriate locations. In the case of bamboo, further stress is being placed on populations within the area as a result of increased collection for use as props in construction in the aftermath of the hurricane. Annandale is used by the Forestry Department for cultivation of evergreen trees for sale on the local market as Christmas trees. An additional threat comes from unauthorized grazing of cows. Climax hardwood species such as the gommier* (Dacryodes elcelsa), *Crappo* (Carapa guianensis), *Maruba* (Simarouba amara) *and Galba* (Calophyllum antilianum) *have been considerably affected as a result of the hurricane and are presently in a state of recovery*.

The Forestry Department must be careful that with the new draft management plan it is not accused of taking Annandale back into the production of economic crops similar to the private property owner, Sir William Branch, which the earlier watershed management plan had condemned as unsustainable. In creating the final draft of the new Management Plan for Annandale with OPAAL funds, it should be easy to make the appropriate changes.

A 1½-2 hour loop (walking) trail and interpretation center were recently established by the FNPD with assistance from the French Government and DFID, but these were severely damaged by Hurricane Ivan. The trail has been cleared but requires repair, including the replacement of a footbridge. The interpretation center, while still being used, remains without a roof. This has affected the ability of the area to be fully utilised for tours by local tour companies and has reduced the ability of nearby communities to gain associated economic benefits (e.g., provision of snacks, handicrafts) from the area.

There is potential to establish some sort of user fee for tours within the protected area and the refurbished interpretation center could act as a depot for fee collection, handicraft and souvenir sales, etc. A herbal garden had been established by the FNPD as an added attraction within the trail, but remains to be renovated after the hurricane. There are also the ruins of an earth rampart fort constructed in 1795 to guard the approaches to Fedon's Camp and Mount Qua Qua; there are also thought to be two cannons present on the site. The ruins are fairly inaccessible as they are located on a steep slope which is not served by any roads or tracks.

The site is suitable for educational activities for schools and other target groups due to its proximity to the main urban centers and its ease of access. It also has scope to become an area for public leisure activities (e.g., bird-watching, camping) within a natural setting.

6.2 THE SOCIOECONOMIC CONTEXT OF ANNANDALE

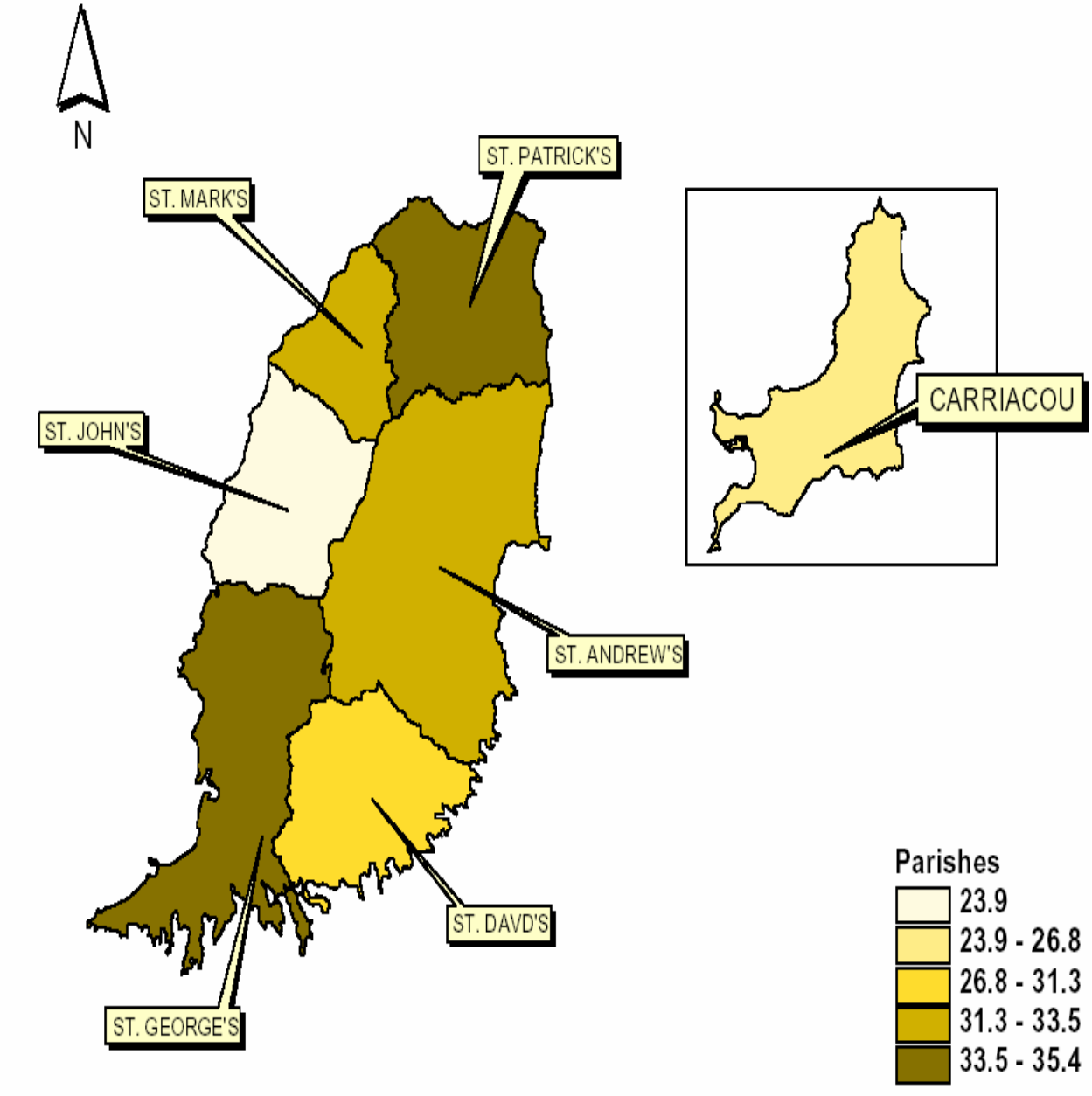

Figure 6.7: The Distribution of Poverty in Grenada by Parish (from Kairi, 1999).

A poverty study of Grenada was published in 1999 by Kairi Consultants Ltd. setting a poverty line[60] of EC$3,262/annum and an indigence line[61] of EC$1,430.80/annum; 32.1% of individuals and 28.8% of households in Grenada were determined to be poor, while 12.9% of all individuals and 10.5% of households in the country were found to be extremely poor or indigent.

Annandale falls in the parish of St. George, which has the second highest poverty rate among all the parishes (34.4%), second only to St. Patrick (35.4%). The poor in St. George parish are 31.7% of all the poor in Grenada, and the indigents are 36% of all indigents.

Our interest in poverty (and unemployment) grows from experience in other countries where poverty leads to stress on and degradation of the natural environment. In some countries the poor either head for the hills (with saws and axes to cut themselves some timber or firewood,

[60] Persons living below the poverty line are unable to meet their minimal food and non-food requirements.
[61] Persons living below the indigence line are unable to meet their minimal food requirements.

or to burn some charcoal) or the coral reefs (to catch themselves some fish, by fair means or foul) to survive. This does not mean that the wealthy are not a threat to the natural environment. They possess bigger bulldozers and chain saws and have a much greater capacity to do damage; but the poor are in greater numbers, and we focus on them here.

The proposed forest reserve is near to the following settlements: Mango, Willis, New Hampshire, Vendome, Granton, Constantine, Annandale. The socioeconomic context of the Annandale Forest Reserve is assumed to be the situation in these communities.

The Grenada Central Statistical Office was very helpful in making their census data available. This author was able to select the census enumeration districts[62] for the communities around Annandale and run tables which allowed the socioeconomic context of the area to become apparent compared with the rest of Grenada.

TABLE 6.1:
AGE-SEX DISTRIBUTION IN THE ANNANDALE AREA AND GRENADA 2001

	ANNANDALE AREA			GRENADA		
	Male	**Female**	**Total**	**Male**	**Female**	**Total**
Under 15 years	552	519	1,071 (33.8%)	16,900	16,572	33,472 (32.5%)
15-64 years	901	898	1,799 (56.9%)	30,393	29,800	60,193 (58.4%)
65+ years	103	191	294 (9.3%)	4,085	5,393	9,478 (9.2%)
TOTAL (N=)	**1,556**	**1,608**	**3,164**	**51,378**	**51,765**	**103,143 (%)**

The age-sex distribution in the Annandale area and Grenada is typical of a developing country: about one-third under labour force age, about 57-58% of labour force age, and 9% over labour force age. The age dependency ratio[63] for Annandale (0.759) is slightly higher than for Grenada (0.714) as a whole. There is a slight excess of females over males in Annandale (male:female::1:1.03) and in Grenada (male:female::1:1.01) which is quite normal.

TABLE 6.2:
HIGHEST SCHOOL ATTENDED – PERSONS 15 YEARS AND OVER
ANNANDALE AREA AND GRENADA 2001

	ANNANDALE AREA			GRENADA		
	Male	**Female**	**Total**	**Male**	**Female**	**Total**
None	0.3%	0.3%	**0.3%**	5.5%	5.2%	**5.4%**
Pre-School	-	-	**-**	6.2%	6.1%	**6.2%**
Primary Low	7.0%	6.2%	**6.6%**	8.6%	8.5%	**8.5%**
Primary High	58.2%	53.4%	**55.7%**	51.0%	44.3%	**47.6%**
Secondary	25.8%	32.5%	**29.3%**	20.4%	27.4%	**23.9%**
Pre-University	4.1%	5.9%	**5.0%**	4.1%	5.7%	**4.9%**
University	0.9%	0.4%	**0.6%**	2.3%	1.7%	**2.0%**
Other/Not Stated	3.7%	1.4%	**2.5%**	1.9%	1.2%	**1.6%**
TOTAL (N=)	**1,001**	**1,090**	**2,091**	**51,382**	**51,757**	**103,139**

Educationally the residents of the Annandale area are better off than Grenadians as a whole, although in absolute terms the standard is low. Proportionally, more project area residents had been to primary and secondary school than Grenadians as a whole, but less than 30% had been to high school. Fewer had been to university; it is also possible that university graduates in the Annandale area have moved out nearer to the capital.

[62] The EDs selected were 1601 (Vendome), 1703 (Constantine, Boca), 1901 (Annandale, Vendome), 1902 (Mango, Willis), 2001 (Vendome), 2002 (New Hampshire), 2100 (Granton, Greenville Vale).

[63] The Age Dependency Ratio is an indication of the number of persons each person of labour force age would have to support other than themselves (if they were working).

Unemployment is higher in the Annandale area (12.7%) than in Grenada as a whole (9.9%); this is especially so for females. On the other hand, labour force participation was much higher (63.1%) in the Annandale area than in Grenada as a whole (40.6%), which explains the higher unemployment rate. Persons fall out of the labour force when they stop looking for work, or becoming unwilling to work. Persons in the Annandale area – men and women – appear more industrious than the ordinary Grenadian, being committed to the world of work (even when they are not working) long after others have given up seeking.

The absolute number of unemployed persons is small in the Annandale area. Should the OPAAL project be able to generate new sustainable livelihoods, this will have a disproportionately large impact on the welfare of the communities – especially on the women.

TABLE 6.3:
LABOUR FORCE DATA – PERSONS 15 YEARS AND OVER
ANNANDALE AREA AND GRENADA 2001

	ANNANDALE AREA			GRENADA		
	Male	**Female**	**Total**	**Male**	**Female**	**Total**
Employed	662	490	**1,152**	22,487	15,253	**37,740**
Unemployed	86	81	**167**	2,336	1,801	**4,137**
Labour Force	748	571	**1,319**	24,823	17,054	**41,877**
Out of Labour Force	253	519	**772**	26,558	34,703	**61,261**
TOTAL	**1,001**	**1,090**	**2,091**	**51,381**	**51,757**	**103,138**
Unemployment Rate	**11.5%**	**14.2%**	**12.7%**	**9.4%**	**10.6%**	**9.9%**
Labour Force Participation	**74.7%**	**52.4%**	**63.1%**	**48.3%**	**33.0%**	**40.6%**

Grenada is a peasant society, with a high level of land (72.3%) and house (81.8%) ownership. The Annandale area, being itself an agricultural community, has an even higher level of land (80.8%) and house (88.1%) ownership; concomitantly, the levels of rentals, leases and squatters are lower. This is not an economic but a cultural issue.

TABLE 6.4:
OWNERSHIP OF HOUSE, LAND ON WHICH HOUSE IS BUILT
ANNANDALE AREA AND GRENADA 2001

	ANNANDALE AREA		GRENADA	
	House	**House Spot**	**House**	**House Spot**
Owned	531 (88.1%)	487 (80.8%)	21,255 (81.8%)	18,787 (72.3%)
Rented	29 (4.8%)	54 (9.0%)	2,907 (11.3%)	3,249 (12.5%)
Leased	-	6 (1.0%)	33 (0.1%)	408 (1.6%)
Rent-Free	32 (5.3%)	7 (1.2%)	1,268 (4.9%)	1,123 (4.3%)
Squatter	1 (0.2%)	7 (1.2%)	110 (0.4%)	603 (2.3%)
Other	10 (1.7%)	42 (7.0%)	416 (1.6%)	1,813 (7.0%)
TOTAL	**603**	**603**	**25,989**	**25,989**

The type of fuel used for cooking in the neighbourhood is a good indicator of the local pressure put on a forest area. High levels of charcoal and firewood use would suggest that wood is being cut from the forest for fuel or to be converted into charcoal. What is interesting about the 1991 census data is that firewood use in the Annandale area is lower than in Grenada as a whole, and the use of charcoal is not significantly different (Table 6.5). The data indicates that almost all Grenadians have made the transition from firewood and charcoal to liquid petroleum gas (LPG). No-one in the Annandale area cooks with an electric stove. The slight use of kerosene suggests that the incidence of deep poverty is slight. The general conclusion to be drawn is that the residents of the Annandale area are not much threat to the proposed forest reserve in terms of the cutting of timber or the production of charcoal.

The census data allows a comparison between the Annandale area and Grenada as a whole in terms of the ownership of certain consumer goods, which can give an indication of the poverty in the communities surrounding the proposed forest reserve relative to the rest of Grenada (Table 6.6). To eliminate survey errors, no difference less than three percentage points was considered statistically significant.

TABLE 6.5:
TYPE OF FUEL USED FOR COOKING
ANNANDALE AREA AND GRENADA 2001

	ANNANDALE AREA		GRENADA	
	Households	**%**	**Households**	**%**
Charcoal	18	3.0%	748	2.9%
Firewood	7	1.2%	1,018	3.9%
LPG	560	92.9%	23,764	91.4%
Kerosene	4	0.7%	156	0.6%
Electricity	-	-	47	0.2%
Other	**14**	2.3%	258	1.0%
TOTAL	**603**		**25,989**	

Households in the Annandale area have more television sets than Grenada as a whole. On the other hand they have less VCRs and cable television than the average Grenadian household. In terms of consumer goods, the Annandale residents have about the same access as the rest of the country.

TABLE 6.6:
POSSESSION OF HOUSEHOLD APPLIANCES
ANNANDALE AREA AND GRENADA 2001

	ANNANDALE AREA		GRENADA	
	Households	**%**	**Households**	**%**
Water Heater	54	9.0%	2,675	10.3%
Television Set	484	80.3%	18,953	72.9%
Cable Television	144	23.9%	8,043	30.9%
VCR	151	25.0%	7,547	29.0%
Radio	522	86.6%	22,265	85.7%
Refrigerator	439	72.8%	18,226	70.1%
Microwave Oven	57	9.5%	2,958	11.4%
Stove	561	93.0%	23,929	92.1%
Telephone Land Line	419	69.5%	17,508	67.4%
Cellular Telephone	25	4.1%	1,443	5.6%
Washing Machine	125	20.7%	5,417	20.8%
Water Pump	10	1.7%	1,277	4.9%
Computer	25	4.1%	1,688	6.5%
Internet Connection	15	2.5%	1,064	4.1%
TOTAL	**603**		**25,989**	

Overall, there is very little data to definitively claim any great difference in poverty levels between the Annandale area and the rest of Grenada.

Since Hurricane Ivan in 2004 the situation is probably worse in terms of unemployment and poverty, but as yet there is no data on the Annandale area to quantify this.

6.3 LIVELIHOODS ON THE ANNANDALE PROPERTY

6.3.1 THE HARVEST OF WATER

As stated above, the Beausejour watershed provides most of the potable water for the parish of St. George, the town of St. George's and the tourism belt in the south west of the island; approximately 85% of the Beausejour watershed is within the proposed Annandale Forest Reserve (the area above the dam). As the dam (Figure 6.6) can only store water for about two day's demand, it is crucial to have a healthy watershed which provides gradual groundwater flow throughout the dry season when demand for water is the highest. Clearly the Annandale watershed is crucial to the quality of life of thousands in Grenada. Watershed Management on Annandale is therefore a priority!

Figure 6.8: A rivulet on the Annandale property (*Espeut photo).*

Some livelihoods are involved in maintaining the water works, but not many; and those livelihoods appear sustainable and not under threat. There is no evidence that water is being over-harvested.

6.3.2 THE ANNANDALE PLANTATION

The Forestry Department employs 13 workers in Annandale in field operations, doing planting, weeding, harvesting drainage works and road maintenance. In addition, the Forestry Department employs a Forest Ranger and Forest Officers who supervise the Annandale operations. These workers are on the establishment of the Forestry Department and are paid from the government budget.

Even if Annandale does not continue as a commercial working plantation, these workers will still be needed to operate the forest reserve. Their jobs appear sustainable.

6.3.3 HUNTING IN ANNANDALE

In the past, the Annandale property has been the locus for the hunting of wildlife, namely the armadillo (locally called "tattoo"), the manicou, the African monkey and the pigeon locally called "Ramier".

Although both the tattoo and manicou are protected under Grenadian law, both are openly hunted in Annandale and across Grenada – for food and for sale. Although no scientific studies have been done, by all accounts both are overhunted.

My advice is that monkey hunting has declined considerably. During the Revolution they retreated into the mountains away from the gunshots. Hunting has not much resumed after the Revolution.

My advice is that the hunting of Ramier takes place all year round (i.e. there is no hunting season), but that the birds "move around" (i.e. are often not seen). This may, in fact, be evidence of over-hunting.

The draft Management Plan sets a goal of conserving wildlife on Annandale. Studies need to be done to determine how effective a wildlife habitat Annandale is; by all accounts the wildlife is there, but in unknown quantities. Should Annandale become a forest reserve all hunting will have to cease. Should Annandale remain as a farm, the monkey could damage the fruit crop, becoming "vermin". It is possible that there could be a profound conflict between Annandale as a wildlife habitat and Annandale as a farm, which is further argument for Annandale to become a forest reserve.

6.3.4 WOODCUTTING AND CHARCOAL BURNING ON ANNANDALE

My advice is that the use of charcoal and wood for fuel in the Annandale area is largely a thing of the past. The census data above confirms this.

Woodcutting was stopped by the forest rangers about 10 years ago, some time after management of the property was shifted to the FNPD. The forest rangers tell me that it was not easy; they seized the product and the tools of the intruders and disposed of them. Some people in the Annandale area still produce charcoal for home use and for sale, but on private lands.

Some local people may cut poles from Annandale to build a hut or a garage, but not many, and not often.

The Forestry and National Parks Department sells trees from Annandale to sawmillers. Sometimes the sawmillers come in, cut the trees and take them away; other times the FNPD will fell the trees and sell them. The business of sustainable forestry is well developed, and there is no reason to believe that timber production on Annandale is not sustainable.

6.3.5 FOOD CROPS ON ANNANDALE

No longer do people plant fields of food crops on the Annandale property. The Forest Rangers put an end to squatting about 10 years ago, some time after management of the property was shifted to the FNPD.

Figure 6.9: Nutmegs on Annandale (*Espeut photo****).***

However people will walk into the property and take the citrus and nutmegs planted on Annandale to eat and sell. There are 15-20 different access trails into the property and the one or two rangers assigned to Annandale have been unable to patrol these effectively to put a stop to praedial larceny.

In addition, workers on the property will take the citrus and nutmegs on Annandale to eat and sell. I question whether there is a policy to prevent this, and whether any effort is being made by FNPD staff to police theft by FNPD staff.

Institutionally enforcement is made difficult by the fact that Forest Rangers work on daylight business hours: 8:00am to 4:00pm. Praedial thieves know that they only have to wait until 4:01pm and they will be safe. If the FNPD intends to continue in agricultural production they must find some means either to have round-the-clock patrols, or irregular spot checks outside regular working hours.

6.3.6 THE HARVESTING OF "WILD" YAMS

It is likely that yams (originally from Africa) have been planted on the Annandale property since the 18th Century by slaves (originally from Africa). The slave-owners gave them bamboo (which is now growing wild in the area) as props for the yam vines. After Emancipation

the workers on the estate continued to plant crops (including yams) to feed themselves and to take to market. In the early part of the 20th Century about 120 persons were employed on the Annandale estate.

Some years ago when squatters overtook the Annandale property, they took over the yam cultivations, and augmented them. When the squatters were removed from Annandale, their yams were not, and these have been growing "wild" ever since. People regularly enter Annandale to harvest these "wild" yams along with the other crops on the estate. I place the word "wild" in inverted commas since yams require some care, and there is no doubt that the yam harvesters provide this attention to protect their source of income and food. To this extent, squatting on the Annandale property to plant food crops, continues and indeed, never stopped.

As far as I can tell, the harvest of these "wild" yams is an accepted practice, and the reapers are not molested. The unwritten permission to harvest of these "wild" yams gives persons an excuse for being found on the estate when accosted by the Forest Rangers, probably to also reap tree crops and forest products.

When Annandale becomes a forest reserve and the focus on the property shifts away from agriculture, these food crops will need to be removed, displacing the squatters and removing the excuse for being found on the property.

An estimate of the extent of "wild" yam cultivation on Annandale and the number of harvesters who will be displaced has not been available; indeed the availability of "wild" yams elsewhere in the area also needs to be known to complete the picture. A study needs to be done on this and the wider agricultural situation to determine the sort of remediation which might be required.

6.3.7 THE CULTIVATION OF MARIJUANA

It has been reported that people plant marijuana on the Annandale property to sell. Their fields are rarely found for one reason or another. Any kind of agriculture is incompatible with the concept of a forest reserve, and clearing land to plant marijuana will cause damage to the forest.

6.3.8 THE PASTURING OF CATTLE

Over many years local persons have been in the habit of pasturing of cows and goats on the Annandale property. Once the FNPD assumed responsibility for the property they have made efforts to stop this practice; the forest rangers report that this is "almost under control"; but the practice continues. To this extent, squatting on the Annandale property as pasture continues and indeed, never stopped. There are few animal pounds in Grenada, and the arrangements are weak for dealing with trespassing stock.

6.3.9 THE HARVEST OF ORCHIDS

It is reported that people remove orchids from the forest to sell. No one sees them because the Forest Rangers only work during the day, Monday to Friday. For the FNPD to properly be in control of the property they must have a round-the-clock presence in Annandale.

6.3.10 RIVER FISHING ON THE ANNANDALE PROPERTY

People do not catch finfish in the river (no food fish are found there), but they do catch crayfish to eat and sell. There are five types of crayfish in the river: *cacadoo, ling* (*guaghe*), *bon til* (red tail), mammee lung (long claw), wiley (willy walla). There are three catching methods: with crayfish hooks (using worms as bait), with baskets (functioning as traps), and by hand (feeling under rocks and in detritus). Fishing is done both by children and adults. The folklore is that crayfish soup gives males a "strong waist"[64] which creates a non-food demand for them.

[64] A euphemism for sexual stamina.

No fishing is allowed in Annandale above the dam (i.e. in the watershed area). Although it takes place and is illegal, no one has ever been arrested; it may take place after working hours. The legislation is perceived to be weak.

No studies have ever been done on the abundance of crayfish in the rivers, or on the sustainability of fishing. Studies should be done.

6.3.11 THE HARVEST OF ROOTS

People harvest ***Bois Bande*** in the forest and use it as an aphrodisiac. It was much harvested before Hurricane Ivan in 2004; less so now because the forest is "tied up"[65]. There is a lot of it, so the perception is that there is no danger of over-harvesting.

People harvest ***Zebba Pik*** in the forest and use it against fever & cold. It is also used to abort the foetus early in the term[66]. There is a lot of it, so the perception is that there is no danger of over-harvesting.

It is also likely that other roots and herbs may be harvested for medicinal purposes, but no studies have been done. No studies have been done on the amounts harvested, and no easy way to estimate sustainability presents itself. No assessment is available on the demand for forest products, especially those used for non-market purposes. Should it be determined that sufficient demand exists, it might make an interesting project to culture these culturally important plants, and to transfer the technology to suitable community members.

6.3.12 THE HARVEST OF RAW MATERIALS FOR CRAFT PRODUCTION

There is no wicker on the Annandale property to use for craft production. People harvest **bamboo** from the property to make baskets, cups, curtains, hats and shirts. People are free to use the bamboo with permission, but usually they don't ask; this property is being treated as an open access resource. Certain areas overtaken with bamboo should not be cut since they prevent erosion.

Figure 6.10: Hiking on the Annandale property (*Espeut photo****).***

Also present is **Galba** and **Donkey Eye** suitable for craft, but no one uses it. They can be used along with spices like nutmeg to make necklaces which carry a pleasant aroma. Perhaps the Galba and Donkey Eye are plentiful elsewhere.

Some people also harvest the wild palm (*palmiste*) to use for craft.

All this use of bamboo and *palmiste* is without charge. If persons wish to harvest from the reserve they should be asked to pay a fee which will go towards the cost of management of the reserve.

[65] Overgrown with creepers such that ingress to the forest is difficult.
[66] This use is illegal.

6.3.13 HIKING TOURISM

At one time there were hiking trails through the Annandale forest to the Grand Etang lake and to the Concord waterfalls which were used by locals, including schoolchildren. These trails are now blocked by fallen trees and landslides.

Figure 6.12: Fungi of the Annandale forest (*Espeut photo****).***

One option for new livelihoods is hiking tourism in and through the Annandale forest. Trails need to be developed through the Annandale forest, and the trails to Grand Etang and Concord need to be reopened. This will open up the possibility of the employment of local people as tour guides, and create ancillary occupations such as craft vending. This is also an opportunity for nature study and environmental education, not just about the trees and large wildlife, but also about the smaller shrubs and insects and fungi. This will require training for the tour guides, which will provide an opportunity for local youth to become experts in identifying the local flora and fauna.

A danger to be avoided is that the trails would become overused such that they would become eroded. The carrying capacity of a hiking trail is a function of the frequency and quality of maintenance provided. The point of unsustainability will quickly be reached if there is little or no trail maintenance. Hikers must be encouraged not to discard their litter along the trails, but whatever litter is left must be removed quickly. Hiking tourism as a business demands that the quality of the product must be maintained. Some estimate of carrying capacity for each trail must be made, and an effort made not to exceed it.

6.3.14 CABIN TOURISM

Another possibility for sustainable use of the forest which will provide additional employment is the construction of cabins for short-term rent to visitors. With modern sanitation arrangements this should be quite sustainable. This will also fund a 24-7 presence in the forest by the cabin attendants, which will help with security.

Figure 6.13: Hikers on the Annandale forest about to cross a small stream (*Espeut photo****).***

More of the benefits of cabin tourism will flow to the surrounding communities if the cabins are located in the communities and are owned and managed by community people. This model would also support bed-and-breakfast accommodation. This will also require training in housekeeping, hospitality and food preparation.

6.4 THE IMPERATIVE FOR THE ESTABLISHMENT OF THE ANNANDALE FOREST RESERVE

Because of the importance of the Beausejour watershed and the role the Annandale dam plays in the Grenada's water supply system, the protection of the watershed functions of the Annandale property is an imperative. To this end, the Government secured the Annandale property by compulsory purchase and declared the area a Protected Watershed in 1964.

Watershed functions are preserved by managing the property in sustainable agriculture or by maintaining a forest. Should the former be selected, then the present declaration is quite adequate and further designation as a Forest Reserve is unnecessary. The only questions which might then arise are first, whether the agrochemicals which will have to be used will compromise Annandale's function as a watershed; and second, whether the Forestry and National Parks Division is the most appropriate agency to manage the property as a farm.

Declaring Annandale as a Forest Reserve will strengthen the hand of the FNPD within the property, but it means changing the focus of the activities there away from crop farming to forest tree farming, which in any case, better performs the watershed function.

The decision has been taken (at Cabinet level) that Annandale should become a forest reserve, and funding is available through the OPAAL Project for the implementation of strategies which will improve the management of the Annandale property as a Forest Reserve, as well as improve the sustainability of the livelihoods of the persons who live nearby. These funds only become available when the Annandale Forest Reserve becomes a reality in law. This took place just after the fieldwork for this consultancy was complete.

It is hoped that the government of the Grenada will complete the arrangements for the declaration of the Annandale Forest Reserve as soon as possible so that the country-specific funds under the OPAAL Project can flow.

6.5 MANAGEMENT OF THE ANNANDALE FOREST RESERVE

The FNPD has been engaging local stakeholders in discussions concerning the Annandale property over many years. They are committed to involving them in the management of the forest reserve. This approach – properly done – has the best chance of success, and the FNPD are to be applauded.

Some sort of User-Fee can be collected from users of the resources (including hiking tourists) to contribute to the cost of natural resource management. Some sort of "Service Charge" can be collected from the national water company representing a resource rent for the water captured by the forest and made available for public consumption[67].

[67] At the moment the users of public water are only paying for the service of treatment and distribution by the water company, and not for the service of the capture of the water by the forest from rain.

6.6 PROJECT IDEAS FOR ACCESSING THE OECS SMALL PROJECTS FACILITY (SPF) TO ACHIEVE SUSTAINABLE LIVELIHOODS IN THE ANNANDALE FOREST RESERVE

A workshop was held on March 17, 2006 with stakeholders in the Annandale Forest Reserve to scope out project ideas which might be eligible for funding under the OECS Small Project Facility (SPF). The workshop was organized by the Forestry and National Parks Division, and was held at the community centre in New Hampshire. The following persons with the indicated affiliations attended:

PERSON'S NAME	AFFILIATION
Anthony Jeremiah	Forestry & National Parks Dept. [OPAAL NPC]
Augustus Thomas	Forestry & National Parks Dept.
Aden Forteau	Forestry & National Parks Dept.
Wilan Hamilton	Forestry & National Parks Dept.
Imhotep Mawauto	Forestry & National Parks Dept.
Christopher St. Louis	Forestry & National Parks Dept.
Desmond Mc-Queen	Forestry & National Parks Dept. [Project Assignee]
Anthony Mc-Burnie	Forestry & National Parks Dept. [Squatting Assignee]
Standhope Smith	Forestry & National Parks Dept. [Squatting Assignee]
Carlson Griffith	Forest Ranger [FNPD]
Gerald Mc-Meo	Forest Ranger [FNPD]
Cecelia Samuel	Ministry of Tourism [Parks]
Noel Niles	Sawmiller, New Hampshire
Agatha Sector	The Nature Conservancy
Tyrone Buckmire	RARE Grenada
Halim Brizan	Ministry of Finance [Central Statistical Unit]
Rachel Jacobs	Ministry of Finance [Central Statistical Unit]
Joseph Baptiste	Waterfall Entertainer
Germaine Peterson	New Hampshire Preschool Teacher
Allan Neptune	National Water and Sewage Authority (NAWASA)
Elizabeth Ross	Vendor
Calista Jules	Teacher
David T. Popo	OECS Secretariat – ESDU
Peter Espeut	Consultant to the OECS

The participants broke into two groups to discuss project ideas. Below is a list of the project ideas which emerged (in no particular order):

Group 1

1. Trail Development on Annandale
2. Development of historical sites on and near Annandale to enhance the tourism product
3. Cabins below the dam on private property
4. Training – Capacity Development
5. Research – Awareness
6. Reforestation of Annandale
7. Landscaping – beautification
8. Education in the schools and villages re forests and conservation
9. Enhancement of existing facilities, e.g. the visitor centre

10. Interpretation – signs
11. Repaving of roads to the area
12. Development of the Great House
13. Development of the area surrounding the small falls, e.g. roads, flowers, product marketing
14. Rehabilitation of the herbal garden – herbal products
15. Building of a restaurant around the visitor centre to sell local foods and juices.

Group 2

16. Cultivated and managed plot of wild yams and other crops on the outskirts of the forest
17. Develop trails and signage
18. Nursery for wild animals
19. Tour Guide training for persons in the area
20. Public awareness programmes
21. Develop a demonstration plot for *Bois Bande, Zeba Pik* and *Pois Douk.*

Consultant's Recommendations

New Sustainable Livelihoods

1. To estimate the carrying capacity of the AFR for tourism-related activities
2. Training in the production of high quality (sustainable) art and craft
3. Repair of the visitor centre with a craft vending area
4. Training in tour-guiding skills
5. Development of nature trails through the AFR
6. Opening the old trails to Grand Etang and Concord
7. Development of historical sites within the AFR as tourism attractions
8. Placing of interpretive signs
9. Cabins in the Annandale forest with full sewage treatment
10. Cabins below the dam on private property

Strengthening the Sustainability of Existing Livelihoods

1. To estimate the carrying capacity of the AFR for existing livelihoods
2. Training of resource-users in environmental sustainability and business issues
3. Marketing of the tourism attractions in the AFR
4. Replanting of the forest

Management Recommendations

1. The OECS to use its influence towards the creation of the Annandale Forest Reserve
2. The creation of a local stakeholder entity to guide the management process
3. The preparation of a management plan for the AFR with stakeholder participation
4. The preparation of a zoning plan for the AFR
5. The preparation of regulations for the AFR with stakeholder participation

7.0 COUNTRY REPORT FOR ST. VINCENT AND THE GRENADINES: THE TOBAGO CAYS MARINE PARK

7.1 DESCRIPTION OF THE TOBAGO CAYS MARINE PARK (TCMP)

The five (5) Tobago Cays fall in the southern portion of the Grenadines of St. Vincent just east of the island of Mayreau (Figure 7.1). Four (Petit Rameau, Petit Bateau, Jamesby and Baradal) are enclosed within a horseshoe-shaped reef (Figure 7.2) and the other (Petit Tabac) lies outside it but is enclosed by World's End Reef. Locally Petit Rameau is called North Cay, Petit Bateau is called Middle Cay and Jamesby is called South Cay.

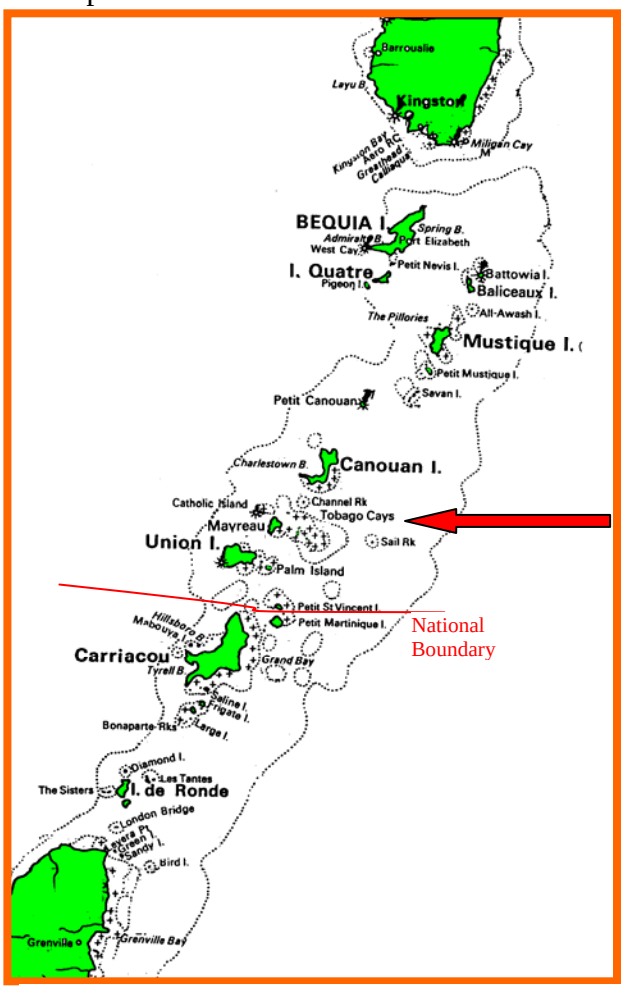

Figure 7.11: The position of the Tobago Cays (red arrow) in the Grenadine archipelago.

All the Grenadines and indeed most of the Leeward and Windward Islands are a mecca for yachting enthusiasts who sail around, stopping where it suits their fancy to spend a day or two. One of the most popular anchoring spots where often more than 100 yachts at a time may be seen is the Tobago Cays, and this floating town is an important source of income for residents of the nearby islands of Mayreau and Union island. The Tobago Cays are actively marketed by travel agents in Martinique, St. Lucia and Barbados. A 1995 survey by the French estimates that about 50,000 persons visit annually. In 1997 the SVG government declared the Tobago Cays to be a Marine Park.

Historically the Tobago Cays were part of the Mayreau Estate of the Marquis de L'Isle (of Isle de Ronde in the Grenadines of Grenada) who by 1776 had 6 tenants with 66 slaves living on Mayreau producing about 20,000 lbs of cotton/year from both Mayreau and the Tobago Cays.

It is uncertain when they were acquired by Paul Henry Cotocheau de Saint Hilaire (of Carriacou), but his Last Will and Testament written in 1822 gives Mayreau and the Tobago Cays to his Mayreau "friend" Marie Madlain Lucas and his nine children with her. By 1842 Mayreau and the Tobago Cays were owned by three of the St. Hilaire children – Paul, Henry and Victorie – of whom Paul appears to have been the survivor; and he had two children: Henry Paul and Jane Rose. Henry Paul St. Hilaire and his six or seven children then inherited the estate.

After emancipation, the slaves living on Mayreau were not given any property but were allowed to cultivate as much land as they cared, as long as they gave half of their produce to the owner. The estate – now impoverished – forced most of the St. Hilaire family to emigrate. One of those remaining, Beatrice St. Hilaire, married Lambert Eustace (father of Sir Lambert Eustace); she purchased the shares of her brothers in 1942 and Mayreau and the Tobago Cays became the sole possession of the Eustace family.

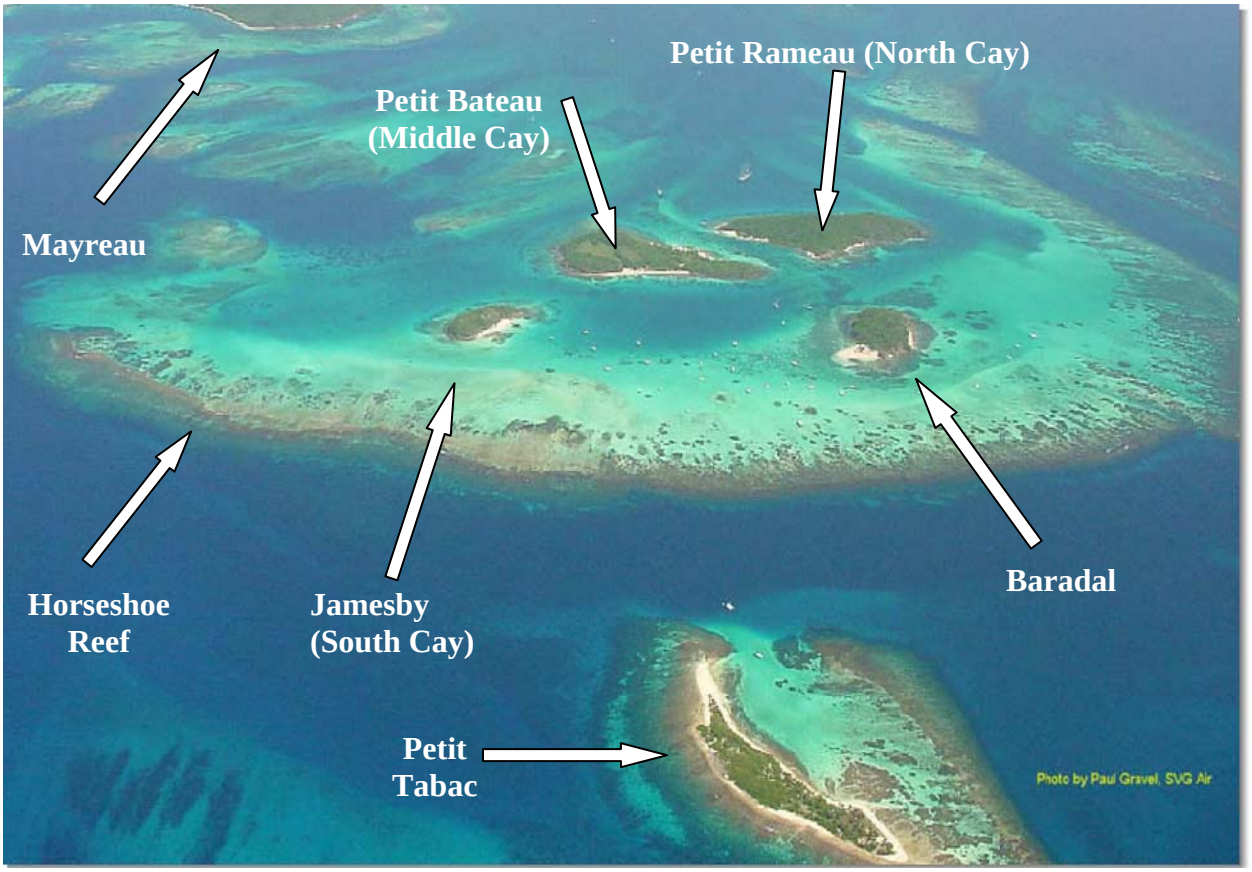

Figure 7.2: The Tobago Cays and the eastern portion of Mayreau (*Paul Gravel photo****).***

In 1957 the Eustace family began negotiations to sell Mayreau (for EC$120,000.00) and the Tobago Cays (for EC$48,000.00) to an American, Mr. Nicholas Fuller. Only the Tobago Cays were eventually sold (in 1960) to a Mr. Fuller of the Tobago Cays Holding Company Ltd. of Antigua.

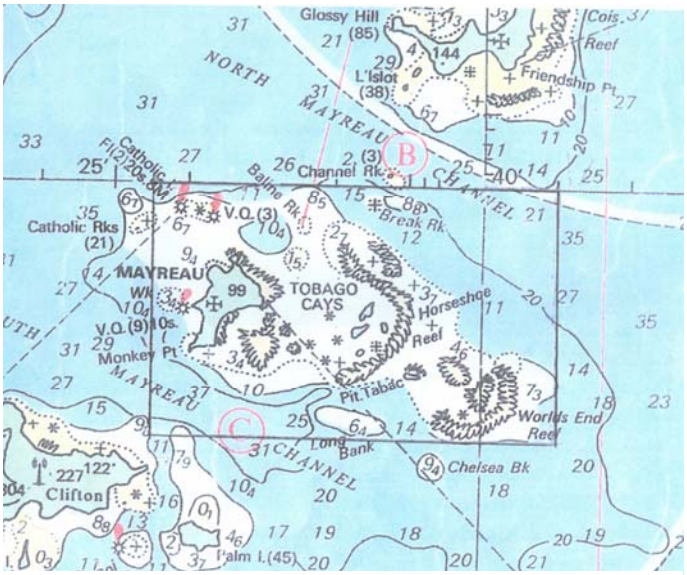

Figure 7.3: The approximate boundaries of the Tobago Cays Marine Conservation Area.

Moves to conserve the natural resources of the Tobago Cays began in 1987 with the creation of the **Tobago Cays Marine Conservation Area** by order under the Fisheries Regulations 1987 of the Fisheries Act 1986. The TCMCA encompassed Latitudes 12^{o} 36.5' N and 12^{o} 39.5' N, and Longitudes 61^{o} 19.5' W and 61^{o} 24.0' W, an area of approximately 50 Km^2 reaching to the western side of Mayreau including the shipwreck lying there as well as Catholic Island. But the long-term goal was to create a marine park.

In September 1993, the governments of France and St. Vincent and the Grenadines signed and launched the **Tobago Cays Marine Park Project**. In 1995 while the Tobago Cays were still under private ownership, Cabinet approved a proposal to establish the **Tobago Cays Marine Park** (TCMP) in the Tobago Cays. On the 25th of November 1997, the Government enacted the **Marine Parks Act** which enabled the creation of a **Marine Parks Board** that was to oversee the management and conservation of all marine parks in the SVG.

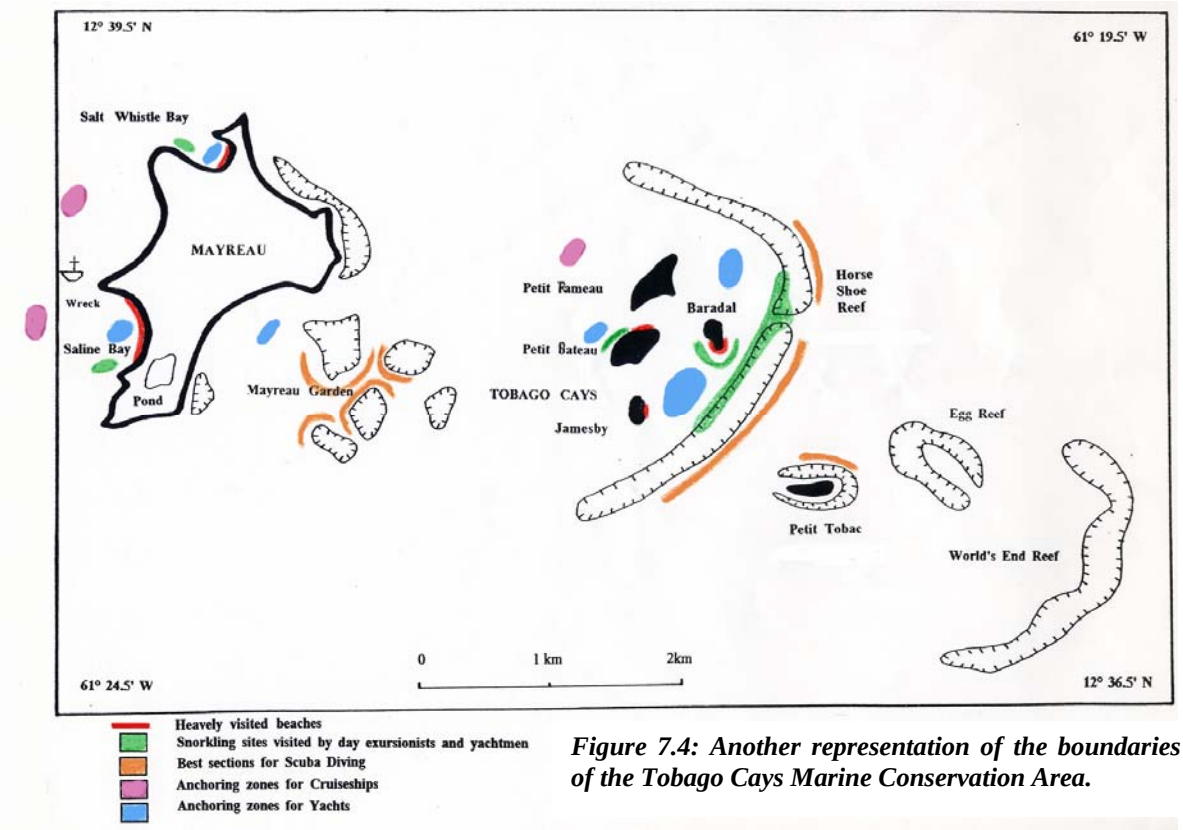

Figure 7.4: Another representation of the boundaries of the Tobago Cays Marine Conservation Area.

The Tobago Cays were declared a **Marine Park** by order published in the Official Gazette 1997 No. 40 dated December 23, 1997 under Section 5 of the Marine Parks Act 1997 (Figure 7.6). Cabinet appointed the first **Marine Park Board** comprising of ten members in May of 1998. On the 8th of July 1998, the Government gazetted the **Marine Parks (Tobago Cays) Regulations**. In August 1998 a draft copy of the Tobago Cays Management Plan was submitted to the **Marine Park Board**.

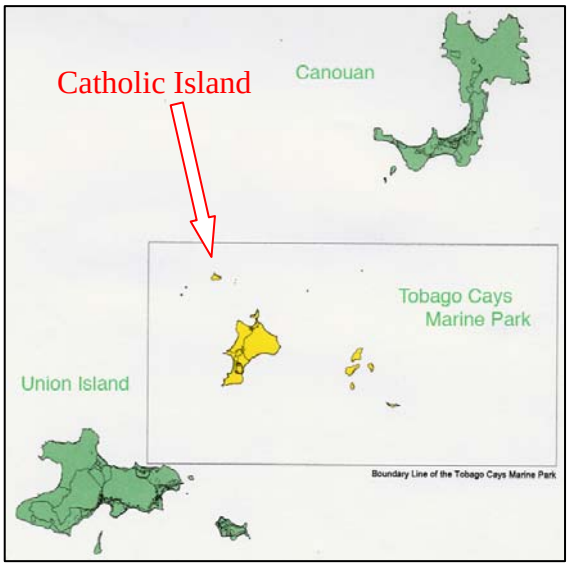

Figure 7.5: Putative boundaries of the TCMP.

After long and very difficult negotiations and the threat of compulsory acquisition, on April 12, 1999 the SVG Government eventually acquired the Tobago Cays from the Tobago Cays Holding Company Ltd. for the sum of US$1,025,000.00. The acquisition agreement contained a most relevant and significant clause "*… that henceforth the Tobago Cays will be dedicated to use in perpetuity as a National Park and that the sole purpose of the acquisition was for the declared purpose of the establishment of a National Park within which no buildings structures fixtures or construction of any form or any commercial activity whatsoever will be permitted save in pursuance of the objectives of and in furtherance of the maintenance of a National Park*". Clearly the park status of the Tobago Cays formed an essential part of the purchase/sale agreement (although they seemed to confuse National Park and Marine Park; the Tobago Cays were already a Marine Park before the agreement was signed).

The Order declaring the Tobago Cays Marine Park contains a major flaw: there is no marine area in the Marine Park! The Declaration Order (Figure 7.6) clearly states that the five islands comprise the Marine Park, not any of the sea surrounding them! This point seems to have been overlooked for the last decade by all concerned! Most people – including the **Marine Park Board** and the park staff believe that the boundaries of the **Tobago Cays Marine Park** are the same as the boundaries of the **Tobago Cays Marine Conservation Area** created in 1987.

SAINT VINCENT AND THE GRENADINES

STATUTORY RULES AND ORDERS

1997 NO. 40

Gazetted 23rd December, 1997

IN EXERCISE of the powers conferred by section 5 of the Marine Parks Act, 1997, the Minister makes the following Order:-

MARINE PARKS (TOBAGO CAYS) DECLARATION ORDER, 1997.

1. **Citation:** This Order may be cited as the Marine Parks (Tobago Cays) Declaration Order, 1997.

2. **Declaration:** All that group of islands known as the Tobago Cays and more specifically described in the Schedule hereto is hereby declared to be a Marine Park pursuant to section 5 of the Marine Parks Act, 1997.

SCHEDULE **(paragraph 2)**

The islands of Petit Rameau, Petit Bateau, Petit Tobac, Baradal and Jamesby situate approximately one mile East of Myreau and approximately thirty seven miles from Saint Vincent.

Dated this 19th day of December, 1997.

ALLAN CRUICKSHANK
Minister of Agriculture
and labour.

Printed by the Government Printer at the Government Printing Office, Kingstown, St. Vincent and the Grenadines.

Figure 7.6: Facsimile of the Order creating the Tobago Cays Marine Park.

This error needs to be corrected urgently[68]. Confusion about the boundaries will impact on enforcement and on the collection of user fees.

The Regulations for the Tobago Cays Marine Park – including the provisions for the collection of user fees – have not yet been implemented.

During this study, the boundaries of the Tobago Cays Marine Park are taken to be a smaller area referred to as the Tobago Cays Recreational Area (Figure 7.7).

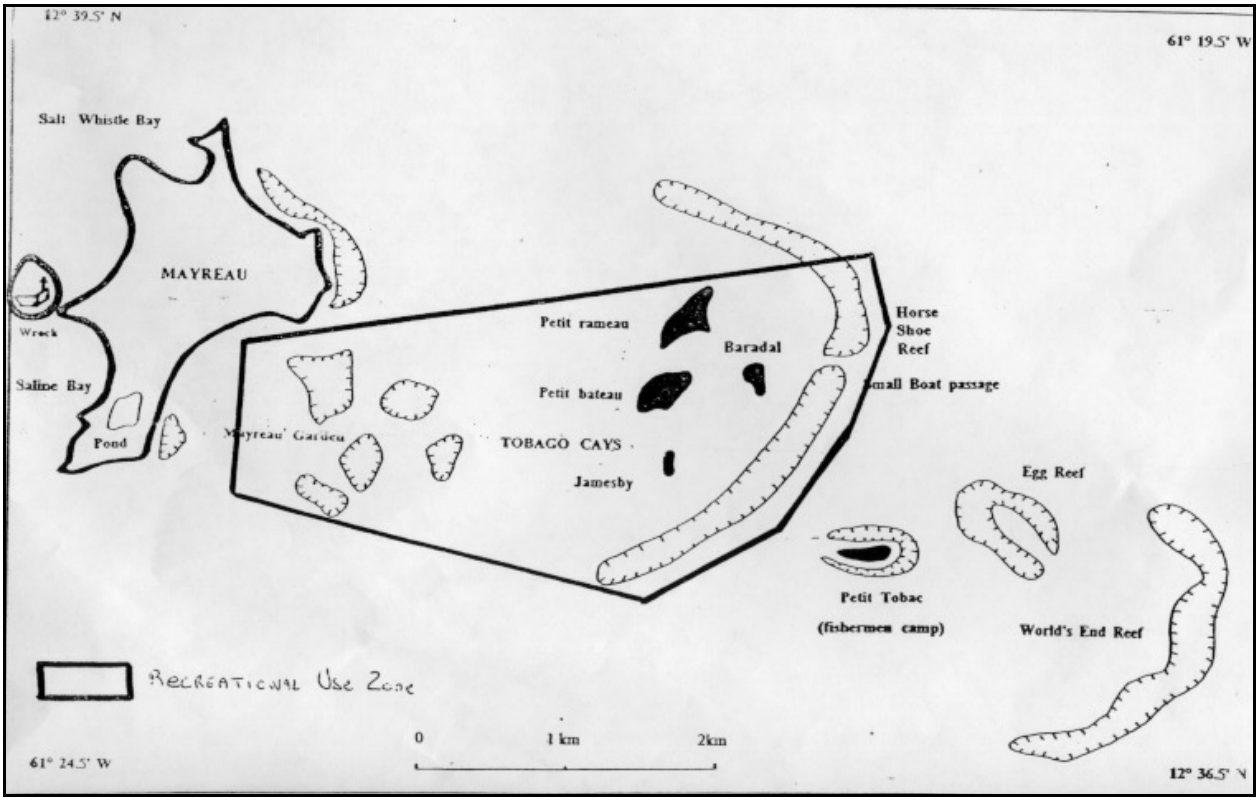

Figure 7.7: The Tobago Cays Recreation Area, the probable boundaries of the Tobago Cays Marine Park.

The Tobago Cays has recently been involved in further controversy. The Prime Minister announced that the day-to-day management of the Tobago Cays was to be contracted to the (foreign) owner of the Palm Island Resort on nearby Prune Island[69] who would hand over to the government half of the profits made (after expenses were fully subtracted). The plan advanced for the Tobago Cays would have seen several structures being erected there which would have changed the character and ambience of the cays. This caused a public outcry.

A local NGO – the Mayreau Environmental development Organization (MEDO) – submitted a counter-proposal to the **Marine Park Board** for its consideration. The government backed off the Palm Island Resort deal, but has not accepted the MEDO management proposal, choosing instead to manage the Tobago Cays Marine Park itself. The Marine Park Board created to oversee the management and conservation of all marine parks in the SVG, now functions as the Board of Management for the Tobago Cays Marine Park, overseeing day-to-day operations. This is not sustainable, especially if the SVG creates several other marine parks.

[68] The terms of reference of this consultancy require this author to consider sustainable livelihoods within the Tobago Cays Marine Park, which legally at the moment is just the land. Considering the boundaries as the Tobago Cays Marine Conservation Area created in 1987 would encompass all of Mayreau. The area actually considered is in between these two, a smaller area referred to as the Tobago Cays Recreational Area (Figure 7.7).

[69] Even though the official name for the island is Prune Island, some persons have begun to call it Palm Island because of the hotel and resort of that name located on Prune Island.

7.2 SOCIOECONOMIC CONTEXT: TOBAGO CAYS MARINE PARK

It is important to know the socioeconomic context in which the TCMP is located. The levels of unemployment and poverty in the immediate surroundings of any area with abundant harvestable natural resources can be an indicator of the threats and challenges its managers will face. At the same time at the other end of the economic scale, the presence of investors flush with money may present threats and challenges of a more serious kind.

The Caribbean Development Bank (CDB) funded a study of poverty in St. Vincent & the Grenadines in 1996. For whatever reason, the SVG government rejected the findings. The consultants drew the Poverty Line[70] at EC$101.29/month and the Indigence Line[71] at EC$88.53/month. They found that 35.1% of households and 41.9% of individuals in SVG were poor, and that 30.5% of households and 36.2% of individuals were indigent. This puts SVG as having the second highest poverty rate in CARICOM after Guyana; Belize is third, and Jamaica fourth.

Poverty in SVG was higher in rural areas (the Grenadines are considered to be rural). Poor households had few earners and more children. They had higher unemployment and lower labour force participation.

Sadly, the SVG poverty assessment does not disaggregate enough to be able to say anything meaningful about absolute poverty in the Southern Grenadines; but we still want to be able to say something about the socioeconomic context of the TCMP. The Central Statistical Office in Antigua was able to generate data from the 1991 and 2001 Censuses which allow us to compare the Southern Grenadines with the SVG as a whole.

TABLE 7.1
Households/Population in the Southern Grenadines 2001

	Households	Population		
		Male	Female	Total
Union Island	631	877	899	1,776
Canouan	509	642	484	1,126
Mayreau	66	129	116	245
Prune Island	24	28	25	53
Petit St. Vin.	12	14	12	26
TOTAL	**1,242**	**1,689**	**1,537**	**3,226**

The population of the islands of the Southern Grenadines is small (Table 7.1). The largest is Union Island (where the office of the Tobago Cays Marine Park is located) with 1,776 residents; Mayreau, the closest inhabited island to the Tobago Cays has only 245 residents.

TABLE 7.2
Households/Population in the Southern Grenadines
1980, 1991, 2001 Censuses

	Households	Population
1980	570	2,505
1991	776 (+36.1%)	2,853 (+13.9%)
2001	1,242 (+60.1%)	3,226 (+13.1%)

Accounts of the Union Island uprising of 1979, and current local assessments suggest that the population of Union Island was/is just under 4,000; this figure is most certainly legend. A look back at the census populations of the whole Southern Grenadines does not reveal such a

[70] Persons living below the poverty line are unable to meet their minimal food and non-food requirements.
[71] Persons living below the indigence line are unable to meet their minimal food requirements.

figure (Table 7.2). The number of households is increasing very much faster than the number of individuals; mean household size is decreasing: from 4.4 in 1980, to 3.7 in 1991, to 2.6 in 2001. This is usually an indication of prosperity, as young people are able to branch out on their own to start new households. In the case of the Southern Grenadines this may be happening, in addition to in-migration of Vincentians coming to take advantage of the boom in tourism.

TABLE 7.3
Labour Force data for the Southern Grenadines/SVG
1991, 2001 Censuses

	Southern Grenadines			St. Vincent and the Grenadines		
Census	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**
1991						
Unemployment rate	19.0%	20.0%	19.4%	18.4%	22.1%	19.8%
Lab Force Participation	85.9%	52.8%	70.4%	80.8%	44.3%	62.3%
2002						
Unemployment rate	15.0%	10.1%	13.2%	22.6%	18.6%	21.1%
Lab Force Participation	83.0%	58.2%	71.5%	74.1%	44.5%	59.4%

Whereas unemployment in SVG as a whole slightly increased between 1991 and 2001 (from 19.8% to 21.1%), it made a big decrease in the Southern Grenadines (from 19.4% to 13.2%). Whereas labour force participation in SVG as a whole decreased between 1991 and 2001 (from 62.3% to 59.4%), it made a slight increase in the Southern Grenadines (from 70.4% to 71.5%). These data suggest that the economy in the Southern Grenadines is on the up relative to the SVG economy.

Whereas for males unemployment in SVG increased between 1991 and 2001, it decreased for females; in the Southern Grenadines unemployment decreased for both males and females, but decreased dramatically for females by half (from 20.0% to 10.1%). Labour force participation increased substantially between 1991 and 2001 (from 52.8% to 58.2%). This suggests that the employment situation for females in the Southern Grenadines has much improved relative to males, and other SVG women.

The fact that the absolute number of unemployed is small means that it will take only a small intervention aimed at increasing sustainable livelihoods (say by the OPAAL Project) to make a big difference in the overall numbers.

TABLE 7.4
Ownership of Media Access for the Southern Grenadines/SVG
1991, 2001 Censuses

	1991 Census		2001 Census	
	SG	**SVG**	**SG**	**SVG**
Radio	84.7%	75.7%	83.1%	83.8%
TV	45.6%	51.2%	64.6%	71.7%
VCR	-	-	35.5%	36.1%

SG = Southern Grenadines; SVG = St. Vincent & the Grenadines

The rate of ownership of all media access units in the Southern Grenadines lagged behind ownership of the same in SVG as a whole. The percentage of households in the Southern Grenadines with radio sets decreased slightly between 1991 and 2001, while it increased across SVG as a whole. Whereas the ownership of television sets increased by five (5) percentage points between 1991 and 2001 in the Southern Grenadines, it increased by seven (7) points across SVG; this apparent difference may not be significant. Were it significant, this picture might suggest that the standard of living in the Southern Grenadines is below that on the mainland, contrary to the above data.

TABLE 7.5: Possession of Selected Household Appliances in the Southern Grenadines and in St. Vincent and the Grenadines		
	SG	**SVG**
Stove	84.9%	90.6%
Refrigerator/Freezer	62.2%	66.0%
Microwave	11.0%	13.3%
Washing Machine	10.5%	14.5%
Water Pump	17.0%	3.2%
Water Heater	8.8%	12.9%
Cable TV	19.2%	21.7%
Land Phone	53.3%	53.3%
Cell Phone	5.0%	4.2%
Home Computer	8.3%	8.2%
Internet Connection	4.2%	5.2%

SG = Southern Grenadines; SVG = St. Vincent & the Grenadines

When comparing the residents in the Southern Grenadines to SVG households in general, any difference less than three percentage points was ignored as statistically insignificant (survey error will often be greater). Only in the incidence of water pumps (which are much more needed on the dry islands) did the Southern Grenadines have comparatively more of any appliance. For six of the eleven appliances the difference between the Southern Grenadines and SVG is less than three percentage points. The data suggest that the residents in the Southern Grenadines slightly worse off than the average Vincentian. The best interpretation to the data is that the situation has been improving, and that possession of consumer goods is just catching up.

TABLE 7.6: Type of Toilet Facilities in the Southern Grenadines and in St. Vincent and the Grenadines		
	SG	**SVG**
Flush Toilet	598 (48%)	15,884 (52%)
Pit Toilet	633 (51%)	13,484 (44%)
Other	2 (0.2%)	73 (0.2%)
None	9 (0.7%)	1,077 (4%)
TOTAL	1,242	30,518

SG = Southern Grenadines; SVG = St. Vincent & the Grenadines

Very few households in the Southern Grenadines have no toilet facilities at all (0.7%), compared to 4% in SVG as a whole, suggesting that the former are better off economically.

More than 95% of households have soak-away pits, where sewage soaks away into the aquifers and ultimately into the marine environment where it can contribute to eutrophication.

The data on the relative economic situation in the Southern Grenadines is not conclusive and even contradictory on the relative welfare situation in the Southern Grenadines.

7.3 LIVELIHOODS IN THE TOBAGO CAYS MARINE PARK

7.3.1 THE MANY ASPECTS OF TOURISM

One of the attributes of the Tobago Cays Marine Park is that it is physically beautiful, possessing natural marine features which could support both traditional Caribbean tourism (sun, sand, sea, etc.) and the newer types of visitor experiences, emphasizing nature attractions. This embodies the potential for expanding the tourism sector in the Southern Grenadines which has not achieved its full potential. New livelihoods can be generated within the Southern Grenadines based on the TCMP, and with effort, it can be ensured that they are sustainable.

7.3.1.1 SCUBA and Snorkel Diving

Roedale's Scuba Diving Magazine has voted the Tobago Cays the ***Top Small Animal Destination in the Atlantic and Caribbean***. The official tourism magazine **The Ins and Outs of St. Vincent & the Grenadines** has gone further: "*Without doubt, by virtue of its crystal clear, shallow water, abundant marine life and flourishing corals, it is a superb location for snorkelling*"[72]. Before this assignment, the word most often heard referring to the Tobago Cays was "pristine".

Figure 7.8: Dive shop on Union Island (*Espeut photo****).***

This author SCUBA dived twice in the TCMP area (once outside horseshoe reef and once in Mayreau Gardens) and found the reefs to be among the worst in terms of algal

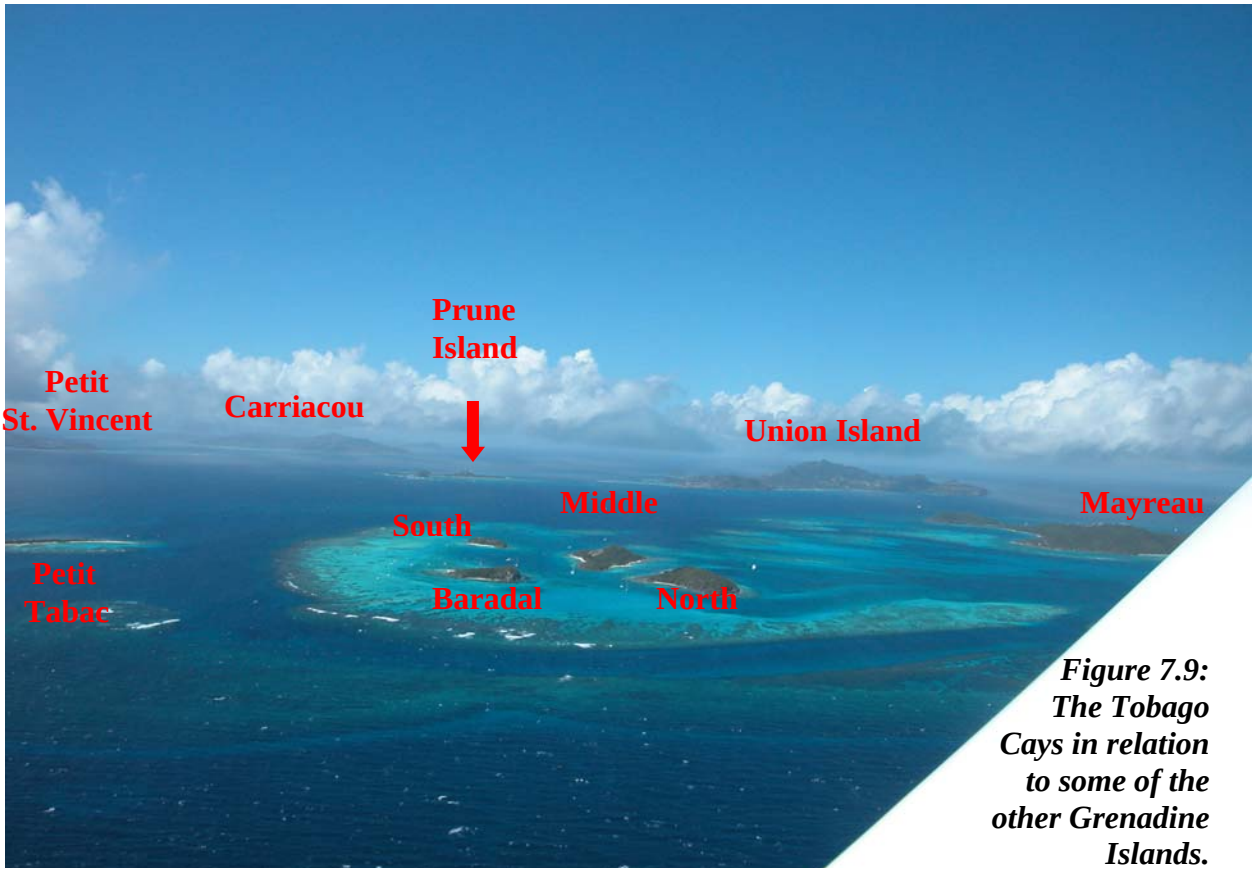

Figure 7.9: The Tobago Cays in relation to some of the other Grenadine Islands.

[72] St. Vincent Ministry of Tourism & Culture. **The Ins and Outs of St. Vincent & the Grenadines**. 2006. Page 130.

overgrowth – even worse than Jamaica which is supposed to be "the basket-case of the world"[73]. All the corals were dead (except for fire coral), and most of the reef space was taken up with algal overgrowth. The only reefs this author has seen which are definitely worse are at Punta Cana in the Dominican Republic, where three well-fertilized golf courses come right down to the water's edge.

What I was looking at was "Eutrophication" or nutrient pollution: the presence of plant food (nitrogen and phosphorus) causing marine plants to bloom. This level of plant growth could only come from serious pollution due to fertilizer runoff from agriculture, or from sewage (a good source of nitrogen) and washwater (detergents are a good source of phosphorus). All the sewage from Mayreau and Union Island ends up in the sea (Table 7.6). Neither Mayreau nor Union island are known for agriculture, and they are a good distance away; sea currents will dilute runoff from the land and move it away quickly. Some other source of nutrient pollution must be found other than the inhabited islands.

I am advised that no water quality assessments have been done in the TCMP; perhaps no one thinks nutrient pollution is a serious problem. Following is a quote from a CERMES 2005 study:

> "*It was pointed out that discharges from vessels (e.g. sewage, garbage, fuel) were most likely to cause the water quality in the park to be worse than the surrounding sea, and that this difference may not be significant or persistent. However, given the importance of the Cays as an international nautical tourism destination, it was felt that the park ought to be able to make some informed statements about water quality even if it was not a very important issue for the TCMP*.[74]"

By their own admission "*discharges from vessels … were most likely to cause the water quality in the park to be worse than the surrounding sea*", and they want "*to be able to make some informed statements about water quality*" but without doing any water quality analysis they have decided that "*it was not a very important issue for the TCMP*" for "*this difference may not be significant or persistent*". So much for informed statements!

An essential part of managing the TCMP for biodiversity conservation – for sustainable tourism – will be to manage nutrient pollution; otherwise the TCMP has no future. The present situation is unsustainable! The pollution, wherever it is coming from, is too great![75]

There used to be two dive shops on Union Island, but now there is only one (Grenadines Dive). Some yachters snorkel and SCUBA dive on their own without going through the dive shop. Even with this, it would seem that the volume of divers in the TCMP is fairly low, and over-diving should not be an issue as long as divers conform to best practices and reef etiquette.

When the number of tourists increases such that more dive shops will be required, then an assessment of the cumulative impact should be undertaken to determine the maximum number allowable for sustainability.

To best be able to monitor reef usage, SCUBA and snorkel operators should be required to brief all their patrons on best practices and reef etiquette as a part of their permit to operate, and should be required to report on the number of persons taken on the reefs each month.

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[73] Said by Dr. Jeremy Jackson, head of the Smithsonian Tropical Research Institute, in the Keynote Address at the Coral Reef Conference in Panama, 1996, attended by the author.

[74] CERMES (2005).

[75] On my two dives (one outside the horseshoe reef and one in Mayreau Gardens) I saw very little marine life to deserve the ranking by Roedale's Scuba Diving Magazine. The dive operator was trying to impress, and promised to deliver the best dives in the Tobago Cays. In terms of small animals I saw no lobsters, no eels, no live crabs (I did see and handle a dead coral crab), no picturesque fish (no drums, no angelfish, no trunkfish, no hogfish, etc.), and no sharks. I did see small fish (blue chromis, squirrelfish, doctorfish, blue-headed wrasse), one medium-sized yellow-tail snapper, a turtle, two stingrays, and lots of sponges. One has to question the sustainability of SCUBA and snorkeling tourism in the Tobago Cays with these low-quality dives.

7.3.1.2 Yachting Tourism

The Tobago Cays are a favourite spot for pleasure yachts to anchor and for the visitors to relax and enjoy some water sports. I am told that on a slow day there could be 60 yachts anchored in the TCMP, and maybe 120 on a busy day. Each of these yachts might have 6-10 occupants, and some many more; it is proposed to restrict pleasure craft to no more than 25 passengers.

Figure 7.10: Yachts anchored off Baradal (*Espeut photo from Petit Bateau*).

Figure 7.10 shows 30 yachts anchored off Baradal on one day the author visited[76]. Assuming 6-7 persons per yacht, there could be 200 or more people out there; and each is eating 2-3 times every day, generating garbage, washing up, and going to the toilet. That's a lot of nutrient pollution in this vista alone! Consider the number of yachts anchored off the other islands. Consider those days when 120 boats (with about 800 people) are anchored among the Tobago Cays: already that is more than three times the 1991 census population of Mayreau! That's equivalent to a small town, dumping its sewage directly into the sea. This looks like it could be the source of the eutrophication.

In 1995 the SVG Ministry of Foreign Affairs and Tourism and the French Mission for Cooperation published a report of a survey of yachting in the Tobago Cays. Below are extracts:

"*The greatest problem faced by yachtsmen in the Tobago Cays proves to be the overcrowding of boats…. This issue seems to be particularly critical in the Tobago Cays since the figure is twice higher than it is for the whole Grenadines. More than 100 yachts can be found at one time in the Tobago Cays during the high tourist season. Considering that the lagoon, the only safe anchoring zone, is less than 1Km^2 in area, one can understand the frustration of tourists who sailed so far to find tranquility and unspoilt wildlife.*

Moreover, the presence of so many boats has dramatic consequences on the environment (sewage and garbage are dumped in the lagoon). The International Marine Research of Key Largo, Florida, estimated in 1987 that more than 50 boats in the lagoon at one time exceeds the carrying capacity of the site. Except for few weeks in autumn, this number is always exceeded. Overcrowding of boats is certainly a serious issue in the Tobago Cays. However, the results of the survey must be stated carefully since this latter was conducted during the high season, i.e. when the overcrowding of yachts is at its maximum.

Next comes the degradation of the environment which is also the first problem identified by the sailors in the Grenadines. As a fact, the environment in the Tobago Cays show evidences of serious degradation: corals and fish are vanishing, garbage is dumped on the beaches, coconut trees are covered with tee-shirts and out board boats speed through the lagoon… The visitors who considered the Tobago Cays as "the natural place to be" may be disappointed and worried. One of the largest day-charter companies no longer schedules the Tobago Cays in half of its programmes because of the degradation of the environment…

"Harassment by local people" ranks third for the Tobago Cays, but second for the whole Grenadines. All day long, yachtsmen are approached to buy all kinds of items: bread, fruits, vegetables, souvenirs and lobsters. Vendors are local people who come from Union, Mayreau or Canouan everyday by boat. Although these vendors are rarely violent, this constant solicitation is irritating to the tourists."

How sustainable is yachting tourism in the Tobago Cays at the present? There are several issues to consider:

7.3.1.2.1 Garbage Disposal

[76] The photo was blown up and the boats counted.

The arrangements for removing the garbage to Union Island seem satisfactory. The yachties pay water taxi operators to take it away. But what happens when the garbage gets to Union Island? First, the water taxi operators put it in a dumpster or skip (the ones in Figure 7.11). And then it is placed on the Union Island dump, which burned night and day during this author's first visit of a week (Figure 7.12). This only transfers the unsustainability from the Tobago Cays to Union Island.

Figure 7.11: Harbour skips on Union Island (*Espeut****).***

This demonstrates an important principle: it is a chimera to believe that one can achieve sustainability within a protected area without also achieving it in the surrounding areas. Nature is interconnected.

7.3.1.2.2 Sewage Disposal

Some arrangements have to be put in place to remove the sewage from the yachts without them discharging it in the Marine Park on to the reefs. Should the yachts be required to have holding tanks? Should a shore facility be built to receive sewage waste? St. Vincent and the Grenadines has ratified MarPol and is bound to deal with ship-generated waste.

Figure 7.12: The Union Island garbage dump ablaze (*Espeut****).***

7.3.1.2.3 Anchoring

I am told that every year there are dozens of incidents where vessels slip their anchors and damage the reefs in the TCMP.

Requiring yachts to tie onto fixed moorings rather than anchoring on the substrate good way to limit the number of yachts[77]; but it mooring break free with a million dollar (US$) yacht on the other end. Entrants to the park must be required to sign indemnification waivers, similar to what SCUBA divers sign when they go diving with a shop.

The park should be able to assess, claim and collect fines for damage from boat collisions with reefs.

Visitors must be encouraged to be careful with the reefs.

7.3.1.2.4 Repeat Visitors

I am told that every year, fewer and fewer yachts come to the TCMP. Something is wrong! Are these visitors – mostly environmentally-aware Europeans – aware that their beauty spot is not so beautiful any more? Or is it that many yachts anchored in Grenada were damaged in Hurricane Ivan? Or is it just a general down-turn in yachting?

Some survey needs to be done to try to find out why repeat business to this beauty spot is down, and why new business is down.

7.3.1.3 Other Water Sports

Boats and parachutes are available for rent in the Tobago Cays for boating and parasailing. The TCMP lacks coastal navigation marks, which means that small boaters and

[77] If there are no unoccupied moorings then they will know to go somewhere else (like Union island or Mayreau).

parasailors unfamiliar with the location of the coral reefs could hit them, causing damage. A medium term goal for the managers of the NEMMA should be the putting down of navigational marks identifying – if not all – at least the reefs most likely to be hit by boaters and surfers. In the mean time, water sports operators must be required to distribute mini-charts showing the reefs and to caution those renting watercraft. They must also report to the management authority any collision incidents or scrapes.

The present number of water sports operators need to be licensed, and be required to report on their level of use of the PCMP.

When the number of tourists increases such that more water sports operators will be required, then an assessment of the cumulative impact should be undertaken to determine the maximum number to be allowed for sustainability.

Figure 7.13: Small beach on Petit Rameau (*Espeut****).***

7.3.1.4 Beach Bathers

The beaches on the Tobago Cays are small, and have a limited carrying capacity. A study needs to be done to estimate the carrying capacity for each beach. The beach bathers themselves may not be doing anything unsustainable, but putting permanent facilities in place to facilitate them (change rooms and toilets) may cause problems if they are built too close to the shoreline, and if they discharge human waste such that it soaks away into the sand.

Figure 7.14: Note the piles of conch shells (red arrows) on the small Petit Rameau beach (*Espeut photo****).***

The beach on Petit Rameau is the smallest, and even though fishing is illegal in the Tobago Cays, the beach has been taken over by fishermen[78]. Note the piles of conch shells, the telltale sign or previous heavy harvesting of conch. Because it is now a fishing camp[79], it is largely unavailable for tourism, although beach barbecues sometimes take place here.

The beach on Baradal was the most crowded (Figure 7.10). Beach barbecues also take place here (Figure 7.15). Note the picnic benches and the metal "pan" barbecue.

Figure 7.15: Picnic area on Baradal (*Espeut photo****).***

According to the agreed zoning of the islands, beach barbecues and T-shirt vending are restricted to Petit Bateau, but there is no evidence that this is being honoured. Indeed the well made picnic benches tell a different story.

Sea turtles congregate in the sea around Baradal and have become quite an attraction for locals and visitors. They are quite tame, and several persons were seen swimming among them in that area, and our boat had to be careful to avoid a turtle and swimmers. Locals use the presence of these sea turtles as evidence of the success of conservation in the Tobago Cays. It certainly is an indication of the congregation of sea turtles around Baradal.

No doubt sea turtles nest on the beaches of the Tobago Cays. Humans can disrupt this process. Lighting at night on or behind the beach may confuse nesting females, and removal of beach vegetation may render the area unsuitable for nesting. And of course, humans and their pets (e.g. dogs) may rob the nests of their contents.

Figure 7.16: Some sunbathers on Baradal (*Espeut****).***

Lighting on the beach should be restricted during the turtle nesting season, and the regulations for the beach area should prescribe where persons may pull up boats, vend and set up charcoal fires. The discovery of turtle tracks and nests could be an educational opportunity. There is the potential for user-conflicts (e.g. swimmers and boats), and the beaches should be appropriately zoned.

The beach on Jamesby was the least crowded (Figure 7.17). There were a few bathers (to the left out of the picture). Note the eroded hiking trail towards the top of the island (orange arrow). Note the T-Shirt Vendor sitting at the base of the coconut tree (yellow arrow). Note the lines strung out for hanging T-Shirts (red arrows).

Again, the zoning of this island for swimming only is not being obeyed and is not being enforced. The lines for hanging T-shirts appear to be a permanent fixture.

[78] No fishers should camp on any of the four Tobago cays inside horseshoe reef; Petit Tabac has been reserved for fishers to camp.

[79] Note the beached boat, the blue igloo and the green gas/water canister.

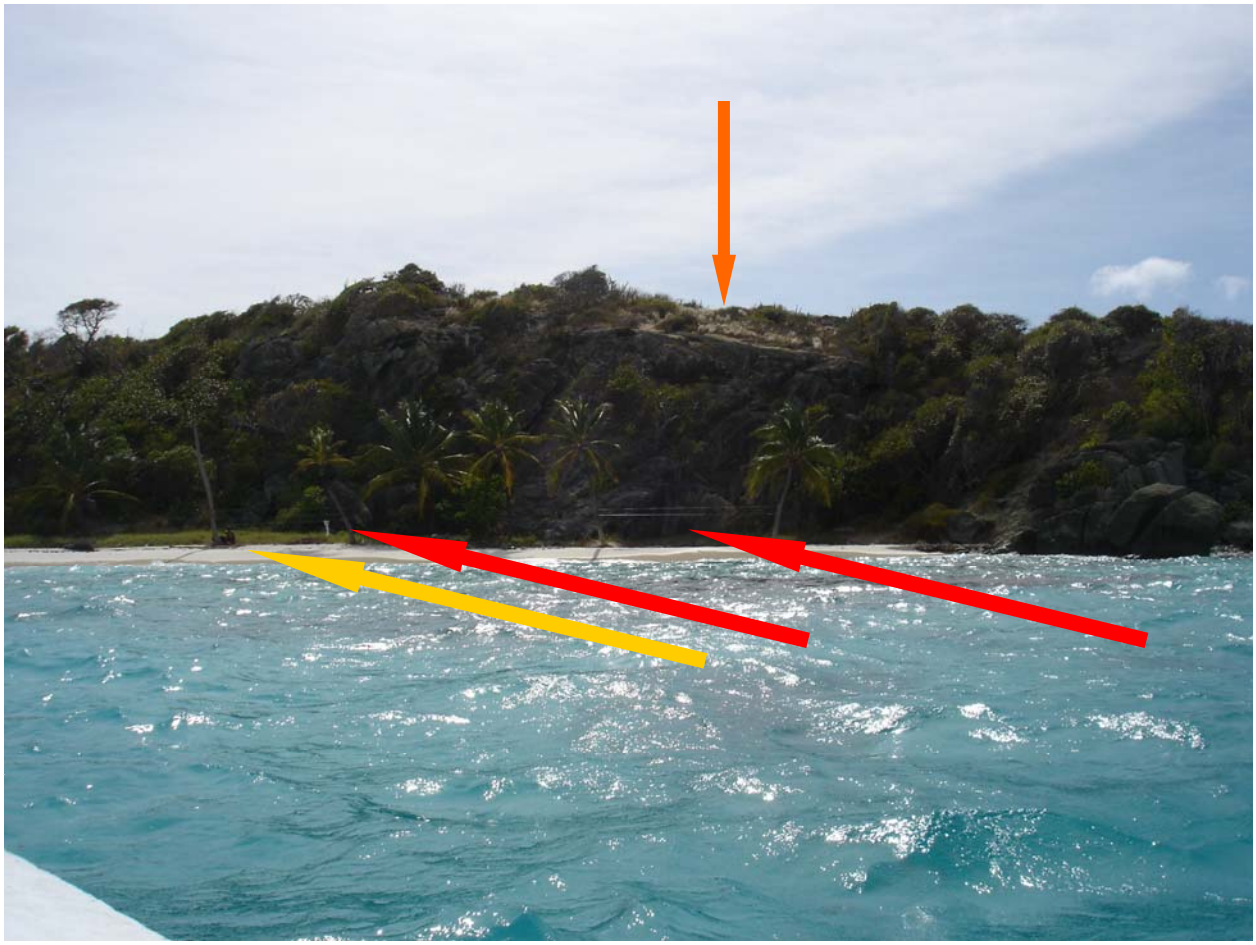

Figure 7.17: The almost empty beach on Jamesby (*Espeut photo****).***

None of the beaches on the Tobago cays appeared crowded to this writer during the visits, but on holidays or during the high tourist season the situation could be different. At the moment the level of ordinary use these islands get is probably sustainable. Some estimate of carrying capacity of the beaches needs to be conducted, and regulations (and enforcement) put in place not to exceed it.

7.3.1.5 Boat tours

Tour boat tours regularly take bathers and picnickers to the Tobago Cays – mostly to Petit Bateau which is zoned for vending and beach barbecues (but has no benches for eating). Petit Bateau has two bathing beaches and walking trails. There are no mooring buoys by any of the islands; tour operators are forced to anchor, or run the boat up on the beach. There are no garbage bins on any of the islands; picnickers are required to take all their garbage away with them. There are no sanitary conveniences on any of these islands, forcing visitors to use the bushes.

Figure 7.18: A tour boat run up on the beach on Petit Bateau (*Espeut photo****).***

At the moment the level of ordinary use these islands get from boat tours is probably sustainable, once the necessary moorings and toilets are in place. In the absence of any estimation of beach carrying capacity, and data on beach use during the high season, no definitive statement can be made about overcrowding.

There are no coastal navigation markers around the Tobago Cays, and although few tour boats hit the reefs (the captains know the area) it would be safer for the reefs and the tourists if markers were put in place.

7.3.1.6 Hiking on the Tobago Cays

Figure 7.19: Hiking on Petit Bateau. The two obvious trails are tracked in red.

Some of the yachters and others who come to the Tobago Cays enjoy exploring the terrestrial area. Well-worn walking trails are visible on all of the cays. Note in Figure 7.17 the eroded hiking trail on Jamesby; Figure 7.19 shows two trails on Petit Bateau, one from beach to beach on the lowands, and the other across the hill.

How sustainable is hiking on these trails? At the moment the trails receive no maintenance, and those leading up the island slopes are quite eroded. Note the large area adjoining the hill trail which had (some time ago) been burnt; was this due to the act of a hiker? Figure 7.20 shows walkers almost sliding down a steep trail on Petit Bateau (the island zoned for the most use) in the area burnt by fire. It is not hard to imagine how a smoker could start a fire while negotiating the trail.

Figure 7.20: Negotiating a difficult part of the hill trail: Petit Bateau (*Espeut*).

Hiking tourism on the Tobago Cays is sorely in need of management; without trail maintenance it does not appear sustainable. Some trails have become little better than gullies, and a drainage plan needs to be prepared.

Should hiking on the islands become restricted under present arrangements, few livelihoods would be affected since terrestrial tour guiding is rare. On the other hand, putting trained local tour guides in place along with trail management would increase the available sustainable livelihood options. Brochures showing the trails, describing the biodiversity, and discussing safety issues (like how to avoid setting fires by not smoking while hiking) would be an asset.

7.3.1.7 Vending on the Tobago Cays

As has been mentioned before, although T-shirt vending is allowed only on Petit Bateau, it is easily observable on others as well. But it is most diverse on Petit Bateau. In addition to the sale of T-shirts and wraps (Figure 7.21), craft and handmade curios are also available – some made from the shells of turtles (Figure 7.22).

Figure 7.21: T-shirts and wraps on sale: Petit Bateau (*Espeut photo****).***

Whether or not it is legal to catch turtles in SVG – and for locals to make bracelets etc. from the shells – it is illegal for persons to cross international borders with products made from turtles under the United Nations Convention on the International Trade in Endangered Species (CITES). Tourists from countries who have ratified CITES (and most European countries have) who purchase turtleshell products commit a crime when they take them home. Also, many environmentally aware tourists might take offence seeing these products offered for sale, and may choose not to return to the Tobago Cays in protest. They may also spread the word to their environmentally-friendly friends, and reduced numbers of visitors will affect the livelihood sustainability of the vendors.

Figure 7.22: Craft on sale: Petit Bateau (*Espeut photo****).***

In addition, a vendor on Petit Bateau was found to be selling conch shells and fan coral (Figure 7.22). The Queen Conch (*Strombus gigas*) is listed on Appendix II of CITES, which means that international trade may only take place with a valid permit from the local CITES authority; the same is true for all corals. Again, any tourist found at the border with a conch shell or a piece of coral bought anywhere in the world – including the Tobago Cays – is guilty of a crime and is liable for prosecution. Even though conch shells are widely available in SVG – although not as much as in the past (Figure 7.14) – and it is not illegal to sell them, it is counter-productive to offer them for sale, and this should be discontinued. The same goes for sea fans, even if they washed up (dead) on the beach after a storm.

Figure 7.22: Corals (sea fans) and conch shells offered for sale on Petit Bateau (*Espeut photo****).***

If SVG wants to cement the reputation of the Tobago Cays as an eco-tourism destination, they would do well to ensure that whatever is offered for sale is consistent with CITES.

Should more visitors be attracted to the TCMP, they may wish to purchase tokens to remember their visit, which will create a market for high quality art and craft items. It should be possible to operate a craft training programme in the Southern Grenadines for unemployed young men and women who have the aptitude using raw materials that are environmentally appropriate.

These vendors hang their wares on string strung between trees. No damage is done to the trees because the string is looped around the trees rather than on nails driven into the trees. It is difficult to see how vending done in this way could be unsustainable, even if it were done on all the islands. Whatever the regulation is, it should be enforced and obeyed.

The prices of these T-shirts, wraps and curios are very high, which must be a deterrent to some would-be purchasers. This author was offered one T-shirt for US$20.00! An economic study could be done to determine whether the profits to the vendors would increase (because of increased volume) if they reduced their prices somewhat.

7.3.1.7 Beach Barbecues on the Tobago Cays

Beach barbeques are only allowed on Petit Bateau, but take place on all of them. The chefs take home their garbage (none was observed on the cays), but what do they do with used (stale) cooking oil and grease? Do they use any detergents for washing up[80]? Do they use any firewood, and if so, do they gather it on the cays or bring it from Union Island or Mayreau?

No sanitary facilities are provided on any of the cays, not even on the one where beach barbecues are officially allowed; people visit the bushes to make deposits. This is not appropriate for a world-famous marine park.

No studies have been done on their ecological footprint, including the discharges, and no easy way to estimate sustainability presents itself. More technical studies – especially on water quality – need to be done. It would be a good thing to continue the restriction of beach fires to one island only.

7.3.1.8 Water Taxis on the Tobago Cays

What are called "water taxis" (Figure 24) are really "water hucksters[81]", providing essential services to the yachties. All the yachts have their own dinghies and do not need a taxi service, although visitors to the Tobago Cays who arrive on Union Island by air or ferry will need to be transported there and collected later in the day at an appointed time.

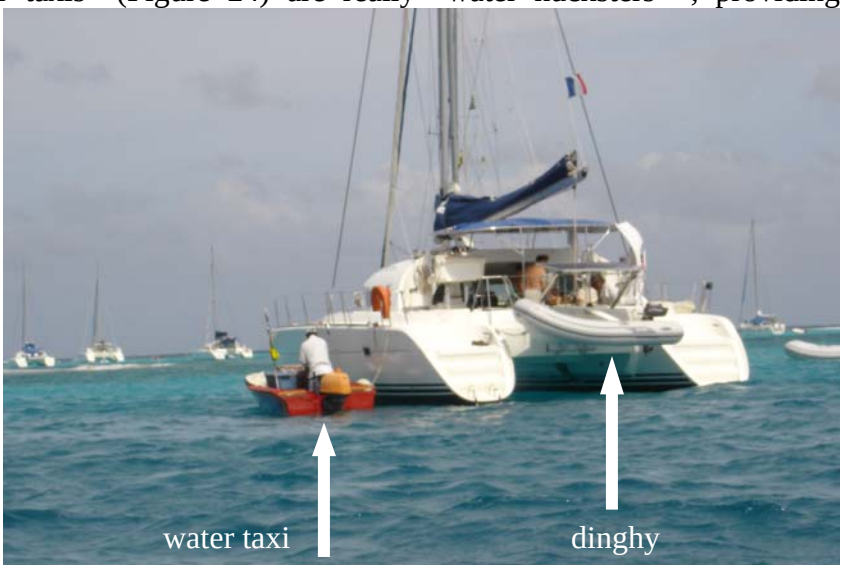

Figure 7.23: A "water taxi" doing business with a yacht (*Espeut photo****).***

The "water taxis" collect a shopping list from yachts and obtain for them items such as ice, drinks, groceries and vegetables on Union Island. They buy at wholesale prices and sell to the yachts at what were described as "war prices". This cannot be encouraging to the persons who use this service. The water taxis also remove garbage from the yachts to Union Island for disposal (for a fee).

As long as yachts overnight in the TCMP there will be need for these "water hucksters". What they do on the water seems environmentally sustainable; the high prices they charge are probably economically unsustainable, and might chase visitors away; it is how they dispose of the garbage on Union Island that is environmentally unsustainable (Figure 7.12).

[80] A source of (phosphate) nutrient pollution.
[81] A "huckster" is a person who buys and sells in small quantities to make a profit; basically a vendor.

7.3.2 FISHING FOR FINFISH, LOBSTER AND CONCH IN THE TCMP

Fishing in the TCMP has been illegal since 1987, but the TCMP is still fished with gill nets and seine nets, with handlines and trolling, and by diving. The fishers who fish in the TCNP come from both the northern and southern Grenadines. The following data, kindly provided by the Fisheries Department, gives a good indication of the fishing activity taking place in the Grenadines; some of it takes place in the TCMP.

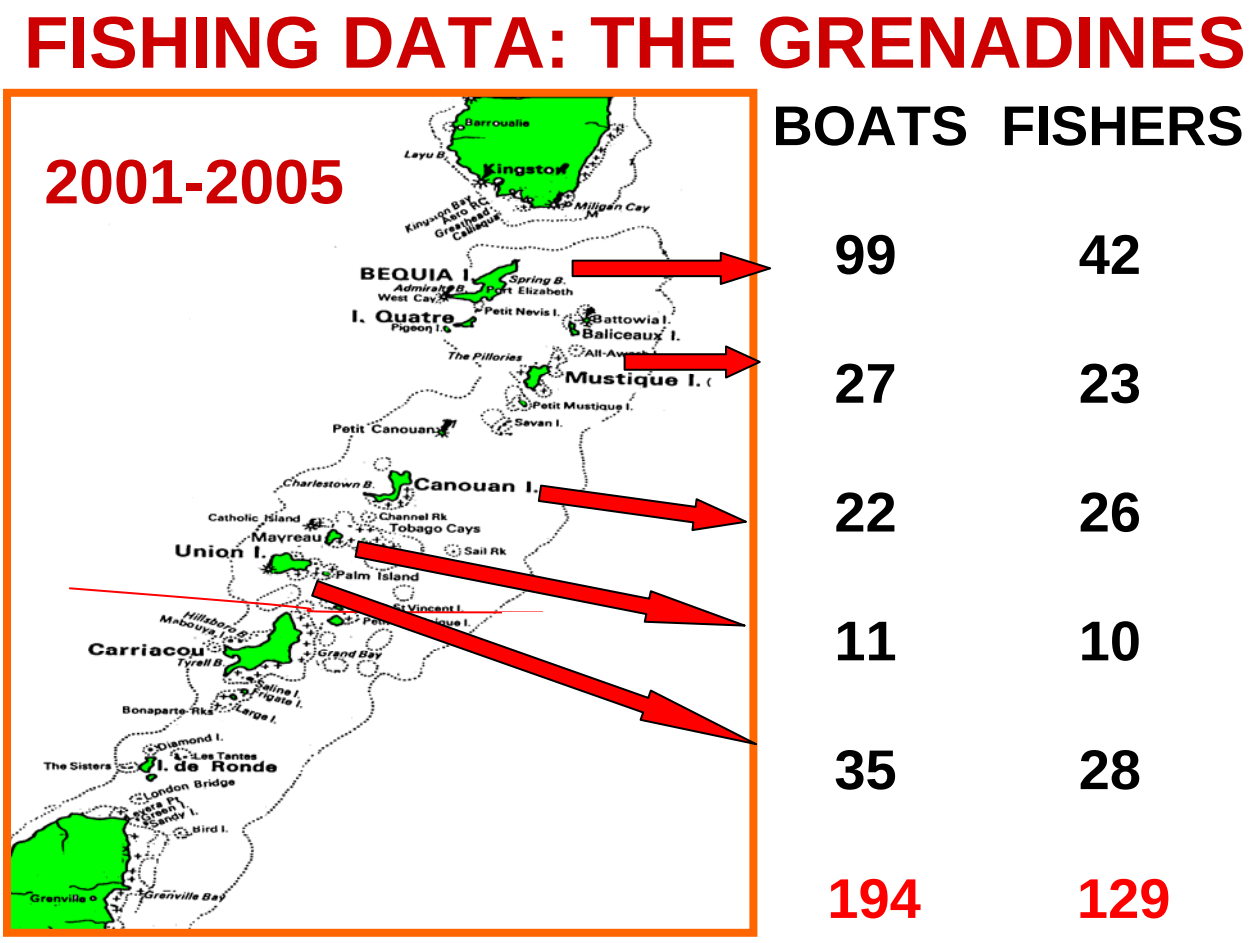

Figure 7.24: Fishing activity in the Grenadines of St. Vincent.

It must first be pointed out that there is no requirement in SVG law for fishers to be licensed, neither are they required to pay any sort of fee (resource rent) for the right to extract a valuable resource (fish) from the natural environment, nor to pay for the fish itself. The law does require fishing vessels to be licensed, and their annual license fee may be considered a resource rent, as may the fish landing fee which is collected based on the volume of fish landed. These costs are borne by vessel owners and not by each individual fisher. At the same time each registered vessel owner and fisher benefits from certain duty-free concessions on boats, engines and equipment, to a duty-free pickup truck, and to participate in any training offered.

Figure 7.25 gives the accumulated number of active fishing boats and fishers registered in the Grenadines of St. Vincent between 2001 (when data collection began) and 2005. It must be pointed out that these boats and fishers operate both inside and outside the TCMP. Nevertheless, it is not unreasonable to suggest that those in the Southern Grenadines would prefer to fish as close to home as would be profitable.

The number of registered fishing boats based in the Grenadines is larger than the number of registered fishers, suggesting that the number of fishers is under-reported, probably by as

much as 200%[82] or more. The number of boats is likely to be accurate, since fishers will tend to register their boats to get subsidized fuel from the fisheries department (which is then used to operate the boat as a water taxi).

How sustainable is fishing in the Southern Grenadines? Catch data for 1995 and 2005 was available for Union Island.

CATCH DATA

1995	
Ashton	**160,351 lbs**
Clifton	**64,362 lbs**
2005	
Union island	**51,138 lbs**

The data indicate that over the last decade the catch landed on Union Island (Ashton and Clifton are the two landing sites on Union Island) declined by more than 75%. Some locals posit that some fish caught by SVG fishers is being landed and sold on the French islands (Martinique, Guadeloupe) for a higher price, which explains the decline; in other words, there is no overfishing. There is no way of knowing the extent to which this is true.

On the face of it, however, the fisheries around Union Island – once the mainstay of the island economy – appear to be in decline. Licensing of fishers, adjustments to fishing methods, and zoning are fisheries strategies which will lead to medium to long term increases in catch. Zoning already in place forbids fishing in the TCMP, although it is being ignored. Diversification into new sectors (like tourism) is desirable to employ the many young people who join the labour force each year.

Figure 7.25: A Venezuelan fishing vessel pulling into

Fishers have advised me that they do not intend to stop fishing in the TCMP until the government stops poaching by foreign vessels which affects their income. Figure 7.26 is a Venezuelan fishing vessel stacked with fish pots (red arrow) openly sailing into Clifton Harbour during the author's visit. Information received is that, in fact, this vessel does no fishing (the traps are camouflage), but sells contraband fuel in Union Island (which it obtained at a subsidized price from the Venezuelan government to go fishing). To continue the camouflage it must return to Venezuela with fish.

When the ban on fishing in the TCMP is enforced and obeyed, a number of fishers will be displaced. They will either have to fish elsewhere (already overcrowded) or will have to diversify into tourism (which seems to have already happened). The livelihoods of those who continue fishing will not be sustainable until the right fisheries management measures are put in place, implemented and enforced.

[82] Each fishing boat contains 2-3 fishers.

7.4 MANAGEMENT ISSUES CONCERNING THE SUSTAINABILITY OF THE TOBAGO CAYS MARINE PARK

7.4.1 Water Quality Issues

Following on Section 3.11 and 3.12 this author expresses the strong suspicion that nutrient pollution from the visiting yachts is a major factor on the deterioration of the marine environment. The CERMES report states that pollution from yachts "*is not an important issue*". What will settle this dispute is a series of water quality assessments (chemical and microbiological) during both the high season and the low season[83].

Public health authorities tend to be concerned with water quality only when it affects human health, and they call it "environmental health". Public health authorities tend to be insensitive to water quality issues affecting corals – the real "environmental health". With the allegation of sewage-related nutrient pollution from the yachts, the possibility exists that there might be a public health issue here also, hence the need for microbiological (bacterial) studies.

Management of the marine resources in the TCMP will involve coming to grips with these matters.

7.4.2 Boundary Issues

Following on Section 7.1 it is clear that the legal boundaries of the Tobago Cays Marine Park (which enclose no marine space) are deficient. This needs to be clarified and regularized as soon as possible. All it requires is an amendment to the original declaration order (Figure 7.6).

For clarity of management and ease of enforcement the agreed-upon boundaries of the TCMP need to be clearly marked such that no one will be in any doubt at any time whether they are in or out.

7.4.3 The Marine Park Board and Day-to-Day Management

The Marine Park Board established under the Marine Parks Act to oversee the management and conservation of all marine parks in the SVG, now functions as the Board of Management for the Tobago Cays Marine Park (the only Marine Park in SVG), overseeing day-to-day operations. This is not sustainable, especially if the SVG creates other marine parks.

The original idea of contracting another entity (an NGO, or a private sector firm) as local managers is appropriate. This will allow the Marine Park Board to perform its oversight functions. At the moment, with the Marine Park Board directing day-to-day operations, there is an inherent conflict of interest, with no effective oversight taking place[84].

What is required is for the Marine Park Board to advertise for contractees to manage the TCMP along co-management lines. Such a sensitive area should not be managed with only the maximization of financial profit in mind. Biodiversity conservation is always a primary issue in marine parks, and the entity contracted should have a good environmental track record.

Top-down management of natural resources has proven to be sub-optimal; unless the resource-users feel they have a stake in the health of the resources, they will think nothing of disobeying any regulations which reduce their income; they will not be prepared to make sacrifices for the good of the park and to ensure future income. Because of the very many different stakeholder interests involved in the TCMP, the co-management approach will be optimal. Even though one entity will be contracted, they should be required to employ an approach which fosters participation of all stakeholder groups – including the government (which is a major stakeholder). This should begin with drafting regulations and penalties.

[83] If the author's hypothesis is valid, nutrient pollution should be higher during the yachting high season.
[84] The Marine Park Board cannot be expected to objectively oversee its own management activities.

What is required is behaviour change from all concerned on a large scale. Fostering this requires skills from the social sciences (e.g. sociology, social psychology) rather than from the natural sciences (e.g. chemistry, biology), although the latter are needed to assess the progress and effectiveness of natural resource co-management activities.

Clearly no entity has all the staff and resources necessary for management waiting to be contracted. What is important in selecting an entity is **vision** – a good plan to obtain the staff and resources necessary for management, and a sound natural resource management methodology.

7.4.4 Staffing and Equipment Issues

The full skill set required to properly manage the natural resources of the TCMP is wide. The vast majority of the TCMP is marine, and will demand that the managers possess skills in fisheries science, coral reef science, water chemistry and animal biology among others. The Tobago Cays themselves are terrestrial, requiring skills in forest science, wetland science, terrestrial ecology and animal science, among others. And then there is the land-water interface.

Figure 7.26: Park manager Vibert Dublin (right), Office Assistant Meritha Small (middle) and at left is ranger Hyron Joseph (*Espeut photo****).***

Staff who can place their full attention to the complex exercise of managing the TCMP are essential; five are already in place – a manager, an administrator and three rangers (Figure 7.26). Some functions (like biophysical and socioeconomic analysis) might not require full-time staff. It is not enough to have the rangers patrol between 8:00am and 4:00pm on weekdays; this will be known, and miscreants will simply limit their activities to between 4:00pm and 8:00am, and on weekends.

At the moment the park management effort is under-staffed and under-equipped; there are not enough rangers to maintain a 24-7 patrol, and the two park boats are both out of service. In addition, at the time of the fieldwork, the staff had not been paid their salaries for two months, after an extended period of late payments. The park headquarters on Union Island appears adequate, although bare. The establishment of a water quality laboratory with the necessary analytical equipment and reagents is also recommended.

The staff would benefit from extensive training in the environmental laws of SVG, the specific regulations for the TCMP, in how to take statements from witnesses, how to caution accused persons, how to make an arrest, how to preserve physical evidence, how to give evidence in court, in conflict resolution, in environmental education techniques, in water quality analysis, etc.

The financial arrangements for funding the management of the TCMP must be clear. With so many yachts and other visitors visiting daily and weekly, the TCMP could fund its recurrent costs without external funding by charging user-fees; there is also the opportunity to license tour boats, water-taxi operators and vendors. The park staff should collect these fees directly, issuing appropriate receipts, and should be accountable for every penny. Grants should only be needed for capital needs.

It will take time to put arrangements for user-fees in place; in the mean time, some budgetary support should be provided.

7.4.3 Funding from the OECS

Funding is available under the OPAAL Project through the OECS Small Projects Facility (SPF) for the implementation of many strategies which will improve the management of the natural resources in the TCMP, as well as improve the sustainability of the livelihoods of the persons who live nearby. The establishment of a regulatory framework, water quality testing capability and an enforcement arm will be essential to bring the TCMP under an effective conservation regime.

7.5 PROJECT IDEAS FOR ACCESSING THE OECS SMALL PROJECTS FACILITY (SPF) TO ACHIEVE SUSTAINABILE LIVELIHOODS IN THE TOBAGO CAYS MARINE PARK

A workshop was held on March 23, 2006 with stakeholders in the Tobago Cays Marine Park (TCMP) to scope out project ideas which might be eligible for funding under the OECS Small Project Facility (SPF). The workshop was organized by the staff of the TCMP, and was held at a restaurant in Clifton, Union Island. The Chairman was Vibert Dublin, manager, TCMP. The following persons with the indicated affiliations attended:

PERSON'S NAME	AFFILIATION
Vibert Dublin	Manager, Tobago Cays Marine Park (Workshop Chairman)
Rev. Fr. Andrew Roache	Chairman, Marine Parks Board, SVG.
Meritha Small	Office Assistant, Tobago Cays Marine Park
Hyron Joseph	Ranger, Tobago Cays Marine Park
Jason Alexander	Ranger, Tobago Cays Marine Park
Albert Hanson	Ranger, Tobago Cays Marine Park
Miranda Hutchinson	Office Attendant, Tobago Cays Marine Park
Nicole Clouden Delpeche	Ministry of Tourism
Tyler Thomas	Fisher, Union Island
Felix Browne	
Matthew Harvey	Friends of the Tobago Cays
Mary Webb	Vendor, Tobago Cays
Kathleen Nanton	Vendor, Tobago Cays
Elroy Laborde	Vendor, Tobago Cays
Julia Naundorf	Intern with the Sustainable Grenadines Project
Cristoph Rohde	German Tourist
Vernalyn Blencowe	Concerned citizen
David T. Popo	OECS Secretariat – ESDU
Peter Espeut	Consultant to the OECS

The participants were organized into two groups and were asked to come up with project ideas. Individuals were also encouraged to submit separately their individual ideas even if they came up in the group discussion. Below is a list of the project ideas which emerged (in no particular order).

Group 1

1. To provide meaningful boundaries for the TCMP.
2. Education for citizens of the Grenadines concerning the maintenance of the TCMP
3. Education for citizens of the Grenadines on the rules and regulations of the TCMP
4. A programme of water quality studies
5. More rangers to be able to have 24-hour security
6. More training for the staff of the TCMP concerning the maintenance of the TCMP
7. Provide proper human waste disposal on at least Petit Bateau
8. Provide proper human waste disposal for the yachts

Group 2

9. Remove the conch shell mountains; make some use of them, maybe to make white lime
10. Equip a water quality laboratory and train park staff to monitor water quality
11. Portable sanitary facilities on the Cays
12. Portable facility for the extraction and removal of human waste from the yachts
13. Fish farming for displaced fishers
14. Provision and equipping of a boat to allow displaced fishers to travel into the deep sea to catch fish
15. Training of local tour guides
16. To plant on the cays trees suitable to be in a park
17. To maintain walking trails to minimize soil erosion
18. To mark the trails with suitable signs
19. To label the native and endemic vegetation
20. To train the staff of the TCMP to better be able to manage the park

Ideas from individuals

21. Campaign for awareness-building about the Tobago Cays from Bequia to Carriacou; start in the schools so pupils will take it home to their families; campaign should focus on what goes on in the Tobago Cays and what could go on there; need posters, flyers, etc.
22. Only one of the islands should be used by the tourists for barbecues, and maybe one other for tourism; all the others should be closed
23. The cay used for barbecues should have an area allocated for barbecues, and sanitary conveniences should be provided nearby
24. The rules concerning the Tobago Cays need to be enforced by the rangers
25. The rangers need to be trained to give nature guidance on certain of the islands
26. The carrying capacity of the TCMP needs to be estimated and a limited number of yachts allowed in there at any one time; the rangers should monitor this
27. Yachts should book in advance to be sure of berthing space in the Tobago Cays
28. Only some places in the Tobago Cays should be available for berthing, not everywhere
29. There should be good signage on all the islands with information about the island and what is allowed there
30. The park authorities should work together with the university for continuous studies about water quality and water tourism
31. The park manager should have a good overview, a vision of the potential for the Park and an adequate ranger crew
32. The park needs an office where visitors can get information about the Tobago Cays, and hire a guide; also to get permission to berth, and the exact place to berth.

Consultant's Recommendations

New Sustainable Livelihoods

1. To estimate the carrying capacity of the TCMP for tourism-related activities
2. Training in the production of high quality (sustainable) art and craft
3. Development of a craft area where zoning permits (on Petit Bateau)
4. Training in tour-guiding skills, including species identification
5. Place signage on the Tobago Cays, including labeling of species

Strengthening the Sustainability of Existing Livelihoods

1. To develop and implement a plan towards the sustainability of the fisheries sector (outside the TCMP)
2. To estimate the carrying capacity of the protected areas for existing livelihoods
3. Training of resource-users in environmental sustainability and business issues
4. Briefing of the SCUBA and snorkeling operators on sustainable diving issues
5. Reforestation of the Tobago Cays, especially the burnt-out area
6. Maintenance of the trails on the Tobago Cays, including drainage
7. Establishment of a barbecue and picnic area where zoning permits (on Petit Bateau)
8. Establishment of sanitary facilities on Petit Bateau
9. Portable facility for the extraction and removal of human waste from the yachts
10. Coastal navigational buoys put in place, especially to mark reefs

Management Recommendations

1. The boundaries of the TCMP to be redefined to meaningfully include marine area
2. The contracting of an entity to manage the TCMP under the oversight of the SVG Marine Park Board
3. The creation of a local stakeholder entity to guide the management process
4. The preparation of a zoning plan for the TCMP
5. The preparation of a management plan for the TCMP with stakeholder participation
6. The preparation of amendments to the TCMP regulations with stakeholder participation
7. To implement the TCMP regulations, including the collection of user-fees
8. Public education on the management arrangements in the TCMP
9. The preparation of brochures on the TCMP
10. The establishment of the capacity for the management entity to measure water quality
11. To estimate the carrying capacity of the activities within the TCMP
12. To create a sanitary landfill on Union Island
13. Water taxis to be licensed
14. To place permanent yacht moorings in the area zoned for anchorage

8. CONCLUDING REMARKS

8.1 Declaration of the Protected Areas

At all the demonstration sites, the process of the creation of the protected areas employed by the government was problematic – controversial at best.

St. Lucia: The Pointe Sable Management Area (PSMA) has been in the making for a decade and more; there does not appear to be the political will to create it. The problem seems to be that tourism interests are eyeing the area for what is being called "development" – in particular, a golf course – and they feel that designation of the PSMA will prejudice their plans. Golf courses require huge amounts of fertilizer which will negatively impact the coral reefs on the southeast coast, whether there is a protected area or not. Even though the government of St. Lucia has signed the OPAAL agreement – which commits them to create the PSMA – no discernable steps are being taken to advance its designation, and all the government persons interviewed were skeptical at best. Hopefully the OECS can work through diplomatic channels to make it happen soon, otherwise St. Lucia will not be able to draw down on the country-specific OPAAL funds.

Dominica: The Cabrits National Park (CNP) – 80% marine – was created in 1986 by the Forestry Department with little prior consultation with the Fisheries Division which falls under the same ministry. In the intervening decade the terrestrial portion has been developed as a heritage tourism site, and not even a management plan has been prepared for the marine portion. The Forestry Department treats the Cabrits forest as a no-take zone, and has expressed the view that the marine portion should be similarly treated. This has met with the total disagreement of the Fisheries Division who believes that the fishery should be managed for sustainable use. Hopefully the discussions which took place during this consultancy will be the start of a meeting of the minds between Fisheries and Forestry, and OPAAL can fund the preparation of a management plan which meets with the agreement of all the stakeholders.

St. Kitts: The Central Forest Range is crucial to St. Kitts' water supply, and needs to be managed as a watershed. Its very remoteness is its best protection, and because of that there are few human impacts, and there seems little urgency to complete the designation paperwork, or to commit any budgetary funds towards management. Hopefully the OECS can work through diplomatic channels to make it happen soon, otherwise St. Kitts will not be able to draw down on the country-specific OPAAL funds.

Antigua: During the early period of the fieldwork (December 2005), the Northeast Marine Management Area (NEMMA) was created under Antigua's fisheries legislation. No regulations yet exist, and discussions to this end have not yet begun. Even though the area is mostly marine, there are 30+ islands, most of which are uninhabited; but one hosts a luxury hotel, others are visited by day-trippers, and still others are being eyed by investors for what is being called "development". Management plans for the terrestrial portions of the NEMMA need to draw on the expertise of the Forestry Department, which is focused on the use of the islands for tourism. OPAAL funds should be used to develop a management plan for the NEMMA which does justice to the conservation of both terrestrial and marine biodiversity. The devil will be in the details of the NEMMA regulations. Designation of the NEMMA is one important hurdle, but the powerful investor lobby could neutralize this by preventing meaningful regulations.

Grenada: The Annandale property – already a protected watershed since 1964 – was designated as a Forest Reserve just after the above fieldwork was complete. OPAAL funds could be used to engender a paradigm shift from the previous trajectory of managing part of the property as a nutmeg and citrus farm towards management as a forest reserve.

St. Vincent & Grenadines: The legal status of the Tobago Cays Marine Park (TCMP) is blurred because its extent is unclear. Diagrams variously show the boundaries of the TCMP just off the coast of Mayreau, or just off the coast of Union Island including all of Mayreau; while the declaration order designates only the land on the cays as the marine park. Hopefully through the OPAAL project, a balance can be struck between biodiversity conservation and revenue generation, and the day-to-day management and oversight arrangements will reflect this balance.

The OPAAL project intends that the lessons learnt in-country from the interventions in the demonstration sites will be transferred to other protected areas in-country. Some of the actual demonstration sites selected will make this difficult.

8.2 Harmonization of Protected Areas Legislation and Practice

The above observations bring to the fore problems surrounding the planning and designation of protected areas across the OECS – both political and methodological. Some years ago, OECS member states came together and agreed on harmonized fisheries legislation, which would promote future integration. The same procedure would seem to be called for with protected area legislation.

The classification of protected areas varies widely, as do the legal and management arrangements. Best practices call for oversight – quality control – to be performed by a different entity than the one doing day-to-day management, for an arm's-length relationship.

St. Lucia: Following the Soufriere Marine Management Area, Point Sable – which has both marine and terrestrial segments – will be called the Pointe Sable **Management Area** and the plan is to created it under the Physical Planning Act. A stakeholder committee needs to be formed to manage it. It is unclear who will provide oversight.

Dominica: The Cabrits **National Park** – 80% marine – was created by the Forestry Department with little consultation with the Fisheries Division, and it's management is legally in the hands of the Forestry and National Parks Division of the Ministry of Agriculture. It is unclear who will provide oversight.

St. Kitts: The Forestry Department in St. Kitts is defunct, and it is unclear under which legislation the Central Forest Range National Park will fall, who will manage it, and who will provide oversight.

Antigua: The NEMMA – both terrestrial and marine areas – was created under the Fisheries Act, and its management is legally under the Fisheries Division. It is unclear who will provide oversight.

Grenada: Annandale will be a Forest Reserve, coming under the management of the Forestry Department. It is unclear who will provide oversight.

St. Vincent & Grenadines: The Tobago Cays are a marine park designated under the Marine Parks Act and under the oversight of the Marine Parks Board. The intention is to designate some other entity to manage the park, and the Board will monitor their progress; should the park continue to be managed directly by the Board, there will be little objective arm's-length oversight.

Where protected areas are both terrestrial and marine, placing their management under either the Fisheries or Forestry Department is likely not to produce a holistic approach.

Additional conflicts of interest exist when the agency responsible for maximizing the fish catch or timber production is also in charge of protected area management. It is important to separate the function of resource extraction – even sustainable resource use – from protected area management and to establish at least an arm's length relationship.

A workable option would seem to be to adopt the approach of St. Vincent and the Grenadines, where each country would have a Protected Area Management Board to provide oversight, while day-to-day management would be performed by some contracted entity – either a government department separate from Fisheries and Forestry, or an NGO. Sustainable use of Fisheries and Forestry resources would remain under the governance of the relevant departments. It will be important to make sure that the Board possesses natural resource management skills.

Where the managing entity is not itself representative of the stakeholders, it should be required to take a participatory approach.

Whether a protected area is called a "park" or a "management area" is only a matter of style; both mean crafting clear boundaries, zoning for levels of use, drawing up appropriate regulations, biophysical and socioeconomic monitoring, and meaningful enforcement. If there is some intention of sub-regional integration, it would be good to have a consistent nomenclature within the OECS.

Hopefully the legal consultancy under OPAAL will elaborate along the same lines.

8.3 Biodiversity Conservation is the Cinderella

In none of the six protected areas were concerns about either marine or terrestrial biodiversity conservation predominant. In St. Kitts and Grenada the major concern was watershed protection; in the others the concern was maximizing revenue from tourism. Through the OPAAL project there is the opportunity to recover the main focus of sustainability: that the stocks of biodiversity do not fall or degrade over time. Indeed, this is the main issue with sustainable livelihoods: that in making a living, Caribbean people do not depreciate the very stuff on which our livelihoods depend.

Protected areas can generate revenue, but they are more than simply cash cows. Rather than being the Cinderella among many concerns, biodiversity conservation is the main event. As vulnerable small island states being pushed more and more into tourism as our area of "comparative advantage", we sacrifice our long-term well-being by going after short-term (and unsustainable) quick profits. Concerns about sustainability are mouthed in various policy documents, but are usually absent from development decision-making and actual practice. If the OPAAL project is successful it will help the OECS governments to renew and deepen their commitment to sustainable development.

8.4 The Importance of Water Quality

A consistent weakness across the OECS sub-region was the way water quality issues were treated. In no country was the marine water quality in proposed or existing protected areas tested – even sporadically. Indeed, without any empirical data, various consultants pooh-poohed even the thought that land-based or ship-based sources of marine pollution could be an issue.

It is the opinion of this author that nutrient pollution is a major issue in the four marine demonstration sites, and that sustainability there depends upon setting realistic discharge standards and adhering to them. The capital investment required to properly treat sewage to remove the reef-deadly nutrients is huge, and other technologies need to be explored. This might be a good subject for a future OECS-ESDU project. Under OPAAL it should be possible to

equip each country with the capacity (equipment and training) to test water quality and to determine both the point and non-point sources. It will also be important to monitor seasonal changes (rainy/dry), and progress with cleaning up the problem.

8.5 The Importance of Fisheries Management

The reef fisheries were in decline at all the four marine sites. This is not unusual for the Caribbean. Despite several efforts over the years – including the CIDA-funded Caribbean Fisheries Resource Assessment and Management Programme (CFRAMP) – this trend has not been arrested region-wide[85]. This is largely due to the reluctance of governments to manage fishing effort at the national level, which must include compulsory registration and licensing of fishers, gear and vessels, and may involve reducing the number of fishers and vessels[86]. This *laissez faire* approach to fishing as an occupation is unsustainable, and has led to the tragedy of the commons – and overfishing.

Because the OPAAL Project is committed to sustainable livelihoods, making fisheries (as a livelihood) sustainable falls squarely within its purview. Since it is relevant to at least three sites, there is the potential to develop a sub-regional approach. In this authors view, an OPAAL sustainable fisheries initiative has more chance of success than the CFRAMP initiative since it would not apply to the whole exclusive economic zone (EEZ) of the countries, but only to certain protected areas. Indeed should the OPAAL efforts show success in these pilot areas, this might create the political will to spread the approach nationally.

Managing fishing effort could be part and parcel of the protected area management effort in the marine demonstration sites. Fishing within the protected area (which, of course, would be zoned to include appropriate no-take zones) would be by permit only, and gear would be limited. Since with management the catch within the protected area will improve, it would be appropriate to charge a user-fee as a resource rent for fishing within the protected area, since incomes would have increased and would be sustainable.

This would immediately be applicable to Pointe Sable, Cabrits and the NEMMA. It could apply to the Tobago Cays if the marine park boundaries were made identical with the boundaries of the **Tobago Cays Marine Conservation Area** created in 1987; the area around the cays (including Mayreau Gardens) could be zoned for no-take.

Governments fear possible political fallout from reducing the number of fishers in the process of managing fishing effort, especially on small islands where fishing is a traditional occupation. Bearing in mind remarks made in the introduction (particularly that "fisheries management is not the management of fish") and the role of the social sciences in natural resource management, there is little basis for this fear in a fishery managed by savvy social scientists experienced in behaviour change techniques. The OPAAL Project – and possibly a successor project – has the opportunity to make a big difference in the sustainability of this major livelihood sector in the OECS sub-region and the Caribbean as a whole.

[85] These comments do not apply to deep-sea pelagic fisheries, which take place outside protected areas; protected areas are located on the island shelf and only have reef fisheries.

[86] As paradoxical as it may sound, in an overfished fishery, a reduction in fishing effort will lead to increased catches in terms of weight and number of fish – and even species composition towards more quality fish.

8.6 The Importance of Tourism

The vast majority of the proposed new sustainable livelihoods fall within the broad-based tourism sector. Indeed, many existing (and probably unsustainable) livelihoods in both terrestrial and marine protected areas are also tourism-related. This provides an opportunity for the OPAAL project to achieve economies of scale by addressing issues in this sector in a sub-regional way.

One of the common threats to all the areas (where tourism exists or is proposed) is that the quantity and quality of human presence will exceed the ability of the natural environment to neutralize its negative impacts. The point beyond which the natural environment cannot cope with a particular type of human impact is called the "carrying capacity" of the area, and were this boundary known, regulations could be enacted and enforced to prevent it being exceeded. However, the science of determining carrying capacity is in its infancy, and the best that can be done at this time is to estimate it.

A good and useful OECS-wide project would be to hire a specialist consultant to estimate the carrying capacity at all the OPAAL Demonstration sites. This should include references to beaches, hiking trails, restaurants, hotels, snorkeling, diving, kayaking, boat tours and the harvest of forest and marine products for craft and folk medicine. The methodology must be clear, and should be presented to each member state in a seminar, which will have the dual purpose of teaching the attendees the methodology of carrying capacity estimation, as well as increasing confidence in the consultant's estimations.

One of the most important factors which will transform unsustainable livelihoods into sustainable ones is training. The list of required training is long, and is listed below; but a module needs to be prepared and delivered to everyone on sustainability issues. The word "sustainable" as an adjective is glibly used, often inappropriately[87]. A sub-region-wide media campaign explaining sustainability would be a tremendous contribution to achieving the goals of OPAAL.

The training requirements for new and existing (sustainable) livelihoods are of two types: one we can call direct, and the other indirect. The direct training relates to the livelihood itself, for example:

- Production of high quality (sustainable) art and craft
- Sustainable fisheries
- Post-Harvest Fish Preservation
- Culture of ornamental plants
- Construction of high-yield charcoal kilns
- Tour Guiding skills
- Information relating to the specific tour (e.g. species identification)
- Converting a fishing boat into a tour boat
- Converting a spare bedroom into a Bed & Breakfast site
- Bed and Breakfast Operation (including housekeeping and breakfast preparation)
- Guest House operation
- Restaurant and Bar operation
- Ground Transportation operation (Taxi, bus, water taxi)
- Water Sports operation
- Hiking Tour operation
- Campsite and Eco-Lodge management

[87] For example, in Jamaica government agencies often speak of "sustainable mining", which is an oxymoron.

Indirect training relates to common skills and approaches needed to support many of the specific livelihoods, for example:

- Business training, including record keeping, accounting and cost control
- Liability issues and insurance
- Sales and Marketing
- Brochure and storyboard design
- Web site creation and maintenance
- First Aid
- Life-Saving (swimming)
- Cardio-Pulmonary Resuscitation (CPR)
- Presentation of Self (for anyone dealing with people, especially tourists)
- Conflict Resolution
- Food-Handlers' Permits
- Boat Handling Certification (required by some insurance companies) including seamanship, knots, etc;
- SCUBA certification
- Hiking Trail design, construction and maintenance
- Small-Scale sanitary disposal techniques
- Environmental issues (basic reef ecology, mangrove ecology, forest ecology, etc)

Should the OPAAL sites become areas where sustainable development is implemented and visible, this could become a hook for a marketing strategy. Indeed, there is no reason why they cannot be marketed as a group – as one integrated product – with packages of a few days in each[88]. This would also promote the further integration of the OECS.

[88] There could be a hiking package, and a SCUBA package, and a yachting package.

INVENTORY OF MATERIALS ON THE OPAAL DEMONSTRATION SITES IN OECS TERRITORIES

GENERAL

GEOGHAGEN, Tighe, Allan H. SMITH and Katy THACKER. **Characterization of Caribbean Marine Protected Areas: An Analysis of Ecological, Organizational and Socio-Economic Factors.** CANARI Technical Report No. 287. July 2001.

MASCIA, Michael B. *The Human Dimension of Coral Reef Marine Protected Areas: Recent Social Science Research and its Policy Implications.* **Conservation Biology** 17:2 April 2003. pp. 630-632.

McCONNEY, Patrick, R. POMEROY and R. MAHON. **Guidelines for Coastal Resource Co-Management in the Caribbean: Communicating the Concepts and Conditions that Favour Success.** CCA/CERMES/MRAG. 2003.

OECS. **OECS Human Development Report 2002: Building Competitiveness in the face of Vulnerability.** Morne Fortune: OECS. 2002.

POMEROY, R., Patrick McCONNEY and R. MAHON. **Comparative Analysis of Coastal Resource Co-Management in the Caribbean.** CCA/CERMES/MRAG. 2003.

ANTIGUA: NORTHEAST MARINE MANAGEMENT AREA

ALEVISON, William. *An Initial Plan to Manage Marine and Coastal Resources along the Northeast Coast of Antigua.* OAS: Parham Harbour Development Project. March 1993.

ANTHONYSON, Donald and Myld CLOVIS. *A Survey of the Seatons Community on Management of the North Sound Area.* St. John's: The Environmental Awareness Group. January 2004.

ANTHONYSON, Donald and Carole McCAULAY. *A Survey of Fishermen: North Sound, Antigua.* St. John's: The Environmental Awareness Group. February 2002.

ANTIGUA AND BARBUDA. *Development of Tourism Infrastructure at Parham Harbour, Antigua: Master Development Plan – Summary Briefing***.** nd.

ANTIGUA AND BARBUDA. FORESTRY UNIT, MINISTRY OF AGRICULTURE, LANDS AND MARINE RESOURCES AND AGRO-INDUSTRIES. *Project Description, Parham Harbour, Northshore Island Marine Park Economic Line Project.* 2005.

ANTIGUA AND BARBUDA: MINISTRY OF AGRICULTURE, LANDS AND MARINE RESOURCES AND AGRO-INDUSTRIES. *Notice of the Declaration of the North East Marine Management Area (NEMMA).* August 2005.

ANTIGUA AND BARBUDA. *Statutory Instruments 2005, No. 36***. Official gazette Vol. XXV No. 82, 29th December, 2005.** [Declaration of the North East Marine Management Area under Section 22 of the Fisheries Act, 1983]

ANTIGUA AND BARBUDA. *The Land Development (Interim Control) Regulations made under Section 22 of the Land Development (Interim Control) Act, 1974 (Repealed) and Preserved by Section 32 (3) (a) of the Interpretation Act*.

ANTIGUA AND BARBUDA. *The Fisheries Act 1983***.** No. 14 of 1983.

ANTIGUA AND BARBUDA. *The (DRAFT) Fisheries Act [2004]***.**

ANTIGUA AND BARBUDA. *The Fisheries Regulations 1990***.** Statutory Instruments 1990. No. 10 of 1990.

ANTIGUA AND BARBUDA. *The (DRAFT) Regulations [2004]***.**

BRANDT, Marilyn E., Wade T. COOPER, Aletta T. YÑIGUEZ and John McMANUS. **Results of a Coral Reef Survey of the North Sound of Antigua, W.I.** Miami: Rosensteil School of Marine and Atmospheric Science. 2005.

BUNCE, Leah. *Assessment of the Marine and Coastal Resources within Bird Island Marine Reserve and Wildlife Sanctuary and Recommendations for the Parham Harbour Facilitation Project, Antigua.* Duke University School of the Environment. October 1995.

BUNCE, Leah. *Coral Reef Management in Antigua: the Socioeconomic and Public Policy Conditions affecting Success & the Implications for Future Reef Management.* Duke University School of the Environment. September 1997.

BUNCE, Leah. *Coral Reef Management Options for Antigua.* Duke University School of the Environment. October 1995.

CAMBERS, Gillian. *Proposed Environmental Monitoring Plan for the Bird Island Marine Reserve*. St. Thomas: IRF. December 1996.

ENVIRONMENTAL AWARENESS GROUP. *North Sound Management Workshop for Tour Operators: Background information on the process of establishing the Soufriere Marine Management Area.* St. Johns: EAG. November 2003.

ENVIRONMENTAL AWARENESS GROUP. *Offshore Island Workshop for Tour Operators: April 25, 2000.*

ENVIRONMENTAL AWARENESS GROUP. *Report on the Consultation of Parham, Pares, Fitches Creek, Seatons, Glanvilles, and Willikies on Management of the Proposed North Sound Marine Park.* St. Johns: EAG. December 2004.

ENVIRONMENTAL AWARENESS GROUP. *Report on a Workshop with Great Bird Island Recreationalists to Discuss the Future of Great Bird Island.* St. Johns: EAG. August 2000.

ENVIRONMENTAL AWARENESS GROUP. *Seatons Community Survey.* St. Johns: EAG. January 2004.

GEORGE, Sarah. *OPAAL Country Visit and 2005-6 Workplan Implementation Meeting, Antigua and Barbuda*. August 8-10, 2005.

HORSFORD, Ian S. **Antigua – Barbuda Vessel Frame Survey 2001.** Perry Bay: Fisheries Division. April 2004.

HORSFORD, Ian S. *Sociological Features of Two Fishing Communities: Point-Villa and Grays-Green***.** Perry Bay: Fisheries Division. November 2004.

HORSFORD, Ian S. *Status of the Conch Fishery of Antigua-Barbuda***.** Perry Bay: Fisheries Division. November 2004.

HORSFORD, Ian S. *Status of the Spiny Lobster Fishery of Antigua-Barbuda***.** Perry Bay: Fisheries Division. October 2004.

ISLAND RESOURCES FOUNDATION. *Bird Island Marine Reserve: Management Plan.* Parham Harbour Facilitation Project. May 1997.

ISLAND RESOURCES FOUNDATION. *Northeast Coast Management Area and the Bird Island Marine Reserve and Wildlife Sanctuary: Characterization of Marine Resources.* Parham Harbour Facilitation Project. June 1996a.

ISLAND RESOURCES FOUNDATION. *Northeast Coast Management Area and the Bird Island Marine Reserve and Wildlife Sanctuary: Pollution Stresses and Impacts.* Parham Harbour Facilitation Project. June 1996b.

ISLAND RESOURCES FOUNDATION. *Northeast Coast Management Area and the Bird Island Marine Reserve and Wildlife Sanctuary: Usage Patterns and the Resource Management Perceptions of Users.* Parham Harbour Facilitation Project. 1996.

JAMES, Philmore. *Management plan for Cades Bay Marine Reserve, Antigua W.I.* OECS. March 2002.

McCALLA, Winston. *Legal Issues in regard to the development of Tourism related Infrastructure at Parham Town Harbour 1991-1992.* OAS: Department of Regional Development and Environment. December 1991.

McCAULAY, Carole. **Offshore Islands of the North Sound: A teacher resource pack to Antigua's unique coastal habitats.** St. John's: Environmental Awareness Group. August 2001.

McMANUS, John. Rosensteil School.

MINGS, Lucia. *Report on North Sound Management Workshop for Tour Operators.* St. Johns: Environmental Awareness Group. November 2003.

ORGANIZATION OF AMERICAN STATES. **Development of Tourism Infrastructure at Parham Harbour: Master Development Plan**. Washington DC: OAS Department of Regional Development and Environment. 1995.

ORGANIZATION OF AMERICAN STATES. **Development of Tourism Infrastructure at Parham Harbour: Master Development Plan Volume II: Phase 1**. Washington DC: OAS Department of Regional Development and Environment. 1995.

OECS-EDSU. *Baseline Scenario*. n.d.

OPAAL. *Profiles for Proposed Protected Areas in Antigua and Barbuda.* November 2002.

RICHARD BRAINARD PLANNING & URBAN DESIGN. *Development of Tourism Related Infrastructure at Parham Harbour, Antigua: Preliminary Master Plan: Technical Inputs*. December 1992.

SHADBOLT, Amy. An Analysis of Recreational Users on Great Bird Island. St. Johns: EAG. July 2000.

SMITH, A.H. *Farming edible seaweeds in the Caribbean*. **Applied Phycology Forum** 9(1): 1-2. 1992.

DOMINICA: CABRITS NATIONAL PARK (MARINE SECTION)

CHRISTIAN, Colmore S. *Lesser Antilles Coastal Protected Areas Workshop: Cabrits Project Summary*. Roseau: Forestry and Parks Service. July 1986.

DOBBIN MILUS INTERNATIONAL. **Cabrits National Park: Design Development Stage, Phase One.** Prepared for the Dominica National Park Service and the Organization of American States. Vienna (Virginia): Dobbin Milus. July 1995.

DOMINICA. **Dominica's Biodiversity Strategy and Action Plan 2001-2005.** Roseau: Ministry of Agriculture and the Environment.

DOMINICA. **Fisheries Regulations 2004.**

DOMINICA. **Population and Housing Census 2001: Census Report.** Roseau: Central Statistical Office.

DOMINICA. **A Selection of Legislation Related to Natural Resource Conservation and Tourism.** Roseau: National Parks Unit, Forestry, Wildlife and Parks Division, Ministry of Agriculture and the Environment. 2003.

OPAAL. *Protected Area Profile: Cabrits National Park.* n.d.

HALCROW GROUP LTD. **Dominica Country Poverty Assessment**. Final Report: Volume 1 of 2: Main Report. CDB. June 2003.

HONYCHURCH, Lennox. *The Cabrits and Prince Rupert's Bay: History & Nature Notes*. Roseau. 1982.

HONYCHURCH, Lennox. *The Cabrits National Park*. Brochure.

JAMES, Arlington. **Flora and Fauna of Cabrits National Park, Dominica.** Roseau: Forestry, Wildlife & Parks Division.

JAMES, Arlington. **Inventory of the Flora, Fauna and Morphology of the Indian River.** Roseau: ENCORE, USAID, WWF. April 1994.

POPO, David T. **Community Ecotourism Development in Cochrane Village, Dominica: A Case Study.** The Morne: OECS. nd.

PUTNEY, Allen D., Lennox HONYCHURCH, Arlington JAMES and Douglas WHITE. *Cabrits 2000: Development Concepts for the proposed Cabrits National Park, Dominica.* Roseau: Eastern Caribbean Natural Area Management Plan and the Government of Dominica. February 1984.

SHANKS, David L. and Allen PUTNEY. *Dominica Forest and Park System Plan.* Roseau: Eastern Caribbean Natural Area Management Plan. 1979.

VAN'T HOF, Tom and ALLPORT, Jiselle. *Management Plan for the Marine Section, Cabrits National Park, Dominica.* October 1998.

GRENADA: ANNANDALE FOREST RESERVE

BASS, Stephen. **Participation in the Caribbean: A Review of Grenada's Forest Policy Process**. Policy that Works for Forests and People Series No. 10. London: IIED. 2000.

CARICOM/FAO/ODA. ***National Forestry Action Plan: Grenada. Main Report.*** St. Georges. 1993.

DUNN, Justine, and Aden FORTEAU, et al. *Annandale Forest Reserve Management Plan (*Working Draft – June 2002*).*

CIRELLI, Maria Theresa and Rosalyn E. WILKINSON. **Grenada Forest Management Project – Phase II: Forestry and Wildlife Legislation Review.** Draft Protected Area, Forestry and Wildlife Legislation. Report to the Government of Grenada. October 2003.

GRENADA. *Map of the Island of Grenada Divided into Parishes including a Plan of the Harbour of St. George. Taken from an actual Surveymade by Gavin Smith in the Year 1801 under the Authority of the Legislature of the Island.* 1899.

GRENADA: FORESTRY AND NATIONAL PARKS. *Plan of Annandale Forest Reserve containing 236 Ha situate at Annandale in the Parish of St. George.* May 1999.

GRENADA: MINISTRY OF HEALTH, SOCIAL SECURITY, THE ENVIRONMENT AND ECCLESIASTIC RELATIONS. **National Environmental Policy and Management Strategy for Grenada.** St. George's. April 2005.

GRENADA: NATIONAL STATISTICAL OFFICE. **Grenada Core Welfare Indicators Questionnaire (CWIQ) Survey 2005: Basic Report: Key Indicators of Development Performance Including an Assessment of the Impact of Hurricane Ivan.** St. Georges: 2005.

JEFFERYS, Thomas. *Grenada divided into its Parishes, Surveyed by Order of His Excellency Governor Scott, and Engraved by Thomas Jefferys, Geographer to the King.* London: Robert Sayer. 1775.

KAIRI CONSULTANTS. *Poverty Assessment Report – Grenada: Main Report.* 2 Volumes. Tunapuna: October 1999.

LAURIE, C. Keith. **Grenada: Tropical Forestry Action Plan: Agro-Forestry/Livestock.** St. George's. October 1992.

OPAAL. *Site Assessment: Proposed Annandale Forest Reserve, Grenada.* n.d.

PATERSON, Lt. Daniel. *A Topographical Description of the Island of Grenada surveyed by Monsieur Pinel in 1763 by Order of Government with the Addition of English Names, Alterations of Property, and other Improvements to the Present Time.* London: W. Faden. 1780.

RARE. *Assessing the Potential for Small-Scale Tourism Development in Grenada and Carriacou.* n.d.

SMITH, Gavin. *Reference to the Plan of the Island of Grenada: The Names of the Different Estates; the Proprietors' Names (Corrected up to 1824); the Species of Produce Made; and the Quantity of Land belonging to Each.* London: J. Miles & Co. August 1824.

THOMAS, Augustus. *Overview of Biodiversity in Grenada.* Prepared for Workshop on Biosafety, 4-16 April 2005, Grenada.

UNDP. **ACP-EU Water Facility: Actions in ACP Countries: Detailed Grant Application Form for Non-state Actors (ACP and EU), Public Bodies (EU) and International Organisations. n.d.**

ST. KITTS: CENTRAL FOREST RANGE

BEARD, J.S. *The Natural Vegetation of the West Indian Islands.* **Oxford Forestry Memoirs.** No. 21. 1948. Printed at Oxford by The Clarendon Press. 1949.

CAMPBELL. *Mount Liamuiga.* (mimeo).

CATER, J.C. *Forestry in the Leeward Islands.* **Development and Welfare in the West Indies**. Bulletin No. 7. February 1944.

FAO. **Tropical Forest Action Plans for Nine CARICOM Countries: Report on the Preparatory Mission by W.S. Chalmers.** March 9, 1990.

KAIRI CONSULTANTS. *Poverty Assessment Report – St. Kitts and Nevis.* Tunapuna: March 2001.

LINDSAY, Kevel and Bruce HORWITH. **A Vegetation Classification of St. Kitts and Nevis.** Island Resources Foundation. November 1999.

OPAAL. *Declaration of the Central Forest Reserve as a Protected Area as the OPAAL Project Site for St. Kitts.* n.d.

OPAAL. *Protected Area Profile: Central Forest Area (St. Kitts).* n.d.

ROSENFELD, Paul. *The Mount Liamuiga Crater Trail: A Quantification and Qualification of the Biodiversity along the St. Kitts' Crater Trail.* (mimeo). 1993.

ST. CHRISTOPHER AND NEVIS. *The National Conservation and Environmental Protection Act, 1987.* Act No. 5 of 1987.

WORLD RESOURCES INSTITUTE. *Biological Diversity and Tropical Forest Assessment for the Eastern Caribbean.* Centre for International Development and the Environment. December 1988.

ST. LUCIA: POINTE SABLE NATIONAL PARK

--- *Ministry endorses Pointe Sable National Park.* Newspaper article of September 23, 1997.

CHARLES, Patricia. *Feature Address at the Official Opening of the Mankote Mangrove Viewing Tower*. Delivered at the Official Opening of the Mankoté Bird Viewing Tower in Vieux-Fort on December 6, 1997.

CLAUZEL, Sylvester. *The Point Sable National Park Project: A Very Noble and Idealistic Idea*. **Discourse.** March 6, 1997.

DE BEAUVILLE, Susanna. **Lessons Learnt during the Development and Implementation of the Coastal Zone Management Project (2001-2), St. Lucia.** Castries: Department of Fisheries. June 2004.

DE BEAUVILLE-SCOTT, Susanna. **Reference Book for Students and Teachers: Fisheries and Coastal Resources of St. Lucia.** Castries: Department of Fisheries. nd.

ESPEUT, Peter. *The Cultivation of Gracilaria (Irish/Sea Moss) in the Caribbean: Social and Economic Perspectives.* Vieux Fort: Caribbean Natural Resources Institute (CANARI), St. Lucia. October 1991

ESPEUT, Peter and Thomas HOURIGAN. *An Evaluation of the St. Lucia Systems Plan for Parks and Protected Areas.* September 1991.

GEOGHAGEN, T. and A.H. SMITH. *Conservation and Sustainable Livelihoods: Collaborative Management of the Mankòtè Mangrove, St. Lucia.* Vieux Fort: Caribbean Natural Resources Institute. Community Participation in Forest Management: Case Study Series 1. 1998.

HUDSON, B. *A Socio-Economic Study of Community-Based Management of Mangrove Resources in St. Lucia*. Unpublished MNRM Thesis. Winnipeg: University of Manitoba. 1997.

HUDSON, Leslie, Yves RENARD, and Giles ROMULUS. **A System of Protected Areas for St. Lucia.** Castries: St. Lucia National Trust. 1992.

JAMES, Julius. *The History of the Mankote Bird Viewing Tower*. An Address delivered at the Official Opening of the Mankoté Bird Viewing Tower in Vieux-Fort on December 6, 1997.

MORTLEY, Keith. *Sea Moss Cultivation in the Caribbean.* July 2005.

MORTLEY, Keith. *Sea Moss Farmers Meeting.* May 2004.

MORTLEY, Keith. *Sea Moss Report.* March 2005.

NORVILLE, Peter. *Review of Legal and Institutional Frameworks for the Management of Protected Areas in St. Lucia*. n.d.

NORVILLE, Peter. *Towards Declaration of Point Sable National Park.* n.d.

POINTE SABLE NATIONAL PARK PLANNING COMMITTEE. *Management Guidelines for the Pointe Sable National Park (Proposed).* May 1999.

POINTE SABLE NATIONAL PARK PLANNING COMMITTEE. *Status of Information on Natural Resources and their Management on the South-East Coast of St. Lucia.* January 1997.

SAMUEL, Nicholas and Allan SMITH. *Popular Knowledge and Science: using the Information that Counts in managing Use of a Mangrove in St. Lucia, West Indies.* Vieux

Fort: Caribbean Natural Resources Institute. August 2000. Paper presented at Quebec 2000 Millennium Wetland Event, August 6-12, 2000.

ST. LUCIA. **Biodiversity Country Report of St. Lucia**. Castries: Ministry of Agriculture, Forestry and Fisheries. 2000.

ST. LUCIA. **National Biodiversity Strategy and Action Plan of St. Lucia**. Castries: Ministry of Agriculture, Forestry and Fisheries. 2000.

ST. LUCIA. **National Land Policy: A White Paper (Final Draft)**. Castries: Ministry of Physical Development, Environment and Housing, November 2005.

ST. LUCIA. **National Tourism Policy (Final Draft)**. Castries: Ministry of Tourism, 2003.

ST. LUCIA. **St. Lucia Core Welfare Indicators Survey**. Castries: Central Statistical Office, November 2004.

ST. LUCIA NATIONAL TRUST. *Ideas for the Tourism and Education Components of a Management Plan for Mankote Mangrove*. A Discussion paper.

ST. LUCIA NATIONAL TRUST. *Pointe Sable and More*. A 23 Minute Video. 2000.

ST. LUCIA NATIONAL TRUST. *Report of April 18th 2002 Final Committee Meeting and Consultation*. A Discussion paper.

SERIEUX, Vaughn. *Aquaculture Project Proposal*. November 2004.

SMITH, A.H. *Farming edible seaweeds in the Caribbean*. **Applied Phycology Forum** 9(1): 1-2. 1992.

SMITH, A.H. and F. BERKES. *Community-Based use of Mangrove Resources in St. Lucia.* **Intern. J. Environmental Studies** 43:123-131. 1993.

SMITH, A.H. and S. KOESTER. *A Description of the Sea Urchin Fishery in Laborie, St. Lucia*. **People and the Sea: A Study of Coastal Livelihoods in Laborie, St. Lucia.** Vieux Fort: CANARI/DFID. November 2001.

SOUTHERN TOURISM DEVELOPMENT CORPORATION. *Terms of Reference for Consultancy Services to develop a Coastal Management Project.*

SOUTHERN TOURISM DEVELOPMENT CORPORATION. *Work Plan October to December 2005.*

SOUTHERN TOURISM DEVELOPMENT CORPORATION. *Work Programme & Cost Estimate (WP/CE) April 2006-March 2007.*

ST. VINCENT & THE GRENADINES: TOBAGO CAYS MARINE PARK

CCA. *A Participatory Strategic Plan for Sustainable Development in the Grenadine Islands.* Sustainable Integrated Development and Biodiversity Conservation in the Grenadine Islands – Phase 1. December 2002

CCA. *Stakeholders in Sustainable Development in the Grenadine Islands.* Sustainable Integrated Development and Biodiversity Conservation in the Grenadine Islands – Phase 1. October 2002

CCA/CERMES. *Annotated Bibliographic Information on the Grenadines.* Sustainable Integrated Development and Biodiversity Conservation in the Grenadine Islands – Phase 1. October 2003.

CCA/CERMES. *Final Report of Phase 1: Celebration, Mini-Projects and Phase 2 Proposal.* Sustainable Integrated Development and Biodiversity Conservation in the Grenadine Islands – Phase 1. November 2003.

CERMES. *Inception Training Workshop for Enhancing the Management Effectiveness of the Tobago Cays Marine Park, St. Vincent and the Grenadines: Union Island, 19-20 December 2005.* Cave Hill: 2005.

CERMES. *Report of the Fisherfolk Planning Workshop, Robert Divonne marine Centre, Mayreau, St. Vincent and the Grenadines: February 15-16, 2006.* Cave Hill: 2006.

CERMES. *Report of the Vision and Project Planning Workshop for Southern Grenadines Water Taxi Association and Carriacou Petit Martinique Water Taxi Association held on June 27-28, 2004, Carriacou, Grenada.* August 2004.

ECLAC/CDCC. *St. Vincent and the Grenadines: Evaluation of the Tobago Cays Marine Park.* Economic Commission for Latin America and the Caribbean/Caribbean Development and Co-operation Committee. May 2002.

FINLAY, James, Allan FRANKLIN and Robin MAHON. *Government Institutional Capacity and Arrangements for Sustainable Development in the Grenadine Islands.* Sustainable Integrated Development and Biodiversity Conservation in the Grenadine Islands – Phase 1. CCA. January 2003.

FRENCH MISSION FOR CO-OPERATION. *Action Plan for the Tobago Cays National Marine Park.* December 1993. Updated March 1995.

FRIENDS OF THE TOBAGO CAYS. *Education Forum.* Kingstown: 2004.

GUMBS, Nilio Atilio. *The Economic Impact of the Tobago Cays National Marine Park on Local Resource Users.* A Research Paper Submitted in Partial Fulfillment of the MSc Degree in Development Studies. Consortium Graduate School of Social Sciences, UWI. Mona: 1996.

KAIRI CONSULTANTS. *Poverty Assessment Report – St. Vincent and the Grenadines: Main Report.* Volume 1 of 2. Tunapuna: July 1996.

MAYREAU ENVIRONMENTAL DEVELOPMENT ORGANIZATION. *A Management Proposal for the Tobago Cays Marine Park, St. Vincent and the Grenadines.* Mayreau: 2003.

MAYREAU ENVIRONMENTAL DEVELOPMENT ORGANIZATION. *Marine Island Tour Guide Workshop (November 6-9 2003): A Manual/handbook for Tour Guiding on Mayreau.* Mayreau: 2003.

OAS. *Project Proposal: Development of the Tobago Cays National Park.* 1988.

SIMMONS, Bertha Ines. *Tobago Cays Marine Park: Are the Conditions for Successful Co-Management likely to be met?* A Research Paper Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Science in Natural Resource and Environmental Management of The University of the West Indies. Cave Hill: CERMES. 2005

ST. VINCENT & THE GRENADINES. *The Fisheries Act 1986.* Act No. 8 of 1986.

ST. VINCENT & THE GRENADINES. *Management Plan for the Tobago Cays: Project Proposal Development 1998.*

ST. VINCENT & THE GRENADINES. *The Marine Parks Act 1997.* Act No. 9 of 1997.

ST. VINCENT & THE GRENADINES. *The (Draft) Marine Parks Authority Act 2005.* Act No. 9 of 1997.

ST. VINCENT & THE GRENADINES. *National Parks Act 2002.* Act No. 33 of 2002.

ST. VINCENT & THE GRENADINES. *Management Plan for the Tobago Cays Marine Park:* n.d.

ST. VINCENT & THE GRENADINES. *Marine Parks (Tobago Cays) Declaration Order, 1997.* Statutory Rules and Orders 1997: No. 40. December 23, 1997.

ST. VINCENT & THE GRENADINES. *Marine Parks (Tobago Cays) Regulations, 1998.* Statutory Rules and Orders 1998: No. 26. July 8, 1998.

ST. VINCENT & THE GRENADINES. *Strategic Alliance Agreement for the Protection and Preservation of the Tobago Cays Marine Park: between Palm Island Resorts Ltd. and the Government of St. Vincent and the Grenadines.* Kingstown: 2004.

ST. VINCENT & THE GRENADINES. *Tobago Cays Marine Park: Management Plan.* June 1998.

ST. VINCENT & THE GRENADINES. *Tobago Cays Marine Park: Management Plan.* August 1998. (Written by Kurt Cordice, Manager)

ST. VINCENT & THE GRENADINES, MINISTRY OF FOREIGN AFFAIRS & TOURISM and FRENCH MISSION FOR COOPERATION. *Survey on the Yachting Activity in the Tobago Cays and the Grenadines*. Kingstown. March, 1995.

ST. VINCENT & THE GRENADINES, STATISTICAL OFFICE. **Population and Housing Census Report 2001**. Kingstown: nd.