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491

ISSN 0429-9345

Socio-economic indicators in integrated coastal zone and community-based fisheries management

Case studies from the Caribbean

Global Partnerships for Responsible Fisheries

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Cover photograph:
Typical Belizean fishing boat/Courtesy of the Caribbean Regional Fisheries Mechanism

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FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
Rome, 2006

Preparation of this document

This document consists of two parts. The first contains case studies on the consideration of socio-economic and demographic concerns in fisheries and coastal area management and planning in selected Caribbean countries – Belize, Dominica, Jamaica, Saint Lucia, Trinidad and Tobago and the Turks and Caicos Islands – as well as a comparative study on the use of demographic and socio-economic information in coastal and fisheries management, planning and conservation in Malaysia and the Philippines. The second part presents the report of a regional workshop, held 13–17 June 2005 in Trinidad and Tobago, and jointly organized by the Ministry of Agriculture, Land and Marine Resources of Trinidad and Tobago, the Secretariat of the Caribbean Regional Fisheries Mechanism (CRFM) and the Food and Agriculture Organization of the United Nations (FAO), where the findings of the above studies were discussed and policy recommendations formulated.

The country case studies were written by Ms Imani Fairweather-Morrison, Belize; Mr Harold Guiste, Dominica; Ms Sarah George, Saint Lucia; Ms Suzuette Soomai, Trinidad and Tobago; Mr G. Andre' Kong, Jamaica; and Mr Wesley Clerveaux and Ms Tatum Fisher, the Turks and Caicos Islands. The report of the comparative study was written by Dr Milton Haughton, CRFM Secretariat, Belize; Mr Joseph Simmonds, Saint Kitts and Nevis; Mr Leslie Straker, Fisheries Officer, Saint Vincent and the Grenadines; and Mr William Gregory Bethel, Bahamas. The report of the regional workshop was prepared by Mr Terrence Phillips, CFRM Secretariat, Belize. The full document has been edited by Ms Lynn Ball. At the time of the preparation of this publication Mr U. Tietze was working in the Fishing Technology Service of the FAO Fisheries Department. He retired from the Organization at the end of 2005.

Abstract

During 2004 and 2005, the Caribbean Regional Fisheries Mechanism (CRFM), assisted by the Food and Agriculture Organization of the United Nations (FAO), carried out case studies in Belize, Dominica, Jamaica, Saint Lucia, Trinidad and Tobago and the Turks and Caicos Islands on the consideration of socio-economic and demographic concerns in fisheries and coastal area management and planning. Among the needs identified in the case studies are: (i) assistance to the Caribbean Community (CARICOM) member states to identify and map boundaries of the coastal ecosystem; (ii) formulation of appropriate legal and regulatory frameworks within which management and conservation of fisheries and coastal resources can be effected; (iii) greater awareness of the need for collection and use of socio-economic and demographic indicators in fisheries and coastal resource management; (iv) building the capacity of stakeholder groups and training programmes to include social science in coastal resource management; (v) implementation of a subregional project for analysis of socio-economic and demographic data for use in planning, management and conservation of fisheries and coastal resources; (vi) country-specific estimates of the economic and social contribution of the fisheries sector and individual fisheries to GDP; (vii) integration of socio-economic and demographic considerations into coastal area management and national fisheries management plans; (viii) information sharing on case studies in which socio-economic and demographic indicators have been integrated into fisheries and coastal planning and management; (ix) improvement of fisheries data systems to include relevant socio-economic and demographic data; and (x) identification of socio-economic costs and benefits of the development of a common fisheries regime within CARICOM.

In addition to these case studies undertaken in the Caribbean, a study team from the Caribbean carried out a comparative study on the use of demographic and socio-economic information in coastal and fisheries management, planning and conservation in Malaysia and the Philippines.

The findings of these studies were reviewed by a regional workshop, held 13–17 June 2005 in Trinidad and Tobago. Most workshop recommendations focus on actions to be taken by national governments, such as promoting the development of fishing communities through fishers' and community-based organizations; review by each country of its legal framework and establishment of task forces comprised of government agencies, industry and other stakeholders; policy direction to promote economic and social development of fishing communities and community-based organizations and creation of fisheries development units under the fisheries departments.

Activities for follow-up by FAO include: (i) assistance in the development of materials on community-based fisheries management and the collection and use of socio-economic, demographic and cultural information for use by fisheries extension personnel and fishers' organizations; and (ii) provision of technical advice on fisheries port development and management for and with the participation of coastal communities and major stakeholders.

Tietze, U.; Haughton, M.; Siar, S.V. (eds.)
Socio-economic indicators in integrated coastal zone and community-based fisheries management – Case studies from the Caribbean.
FAO Fisheries Technical Paper. No. 491. Rome. FAO. 2006. 208p.

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Acknowledgements

The Secretariat of the Caribbean Regional Fisheries Mechanism performed the important role of coordinating the country case studies and organizing a regional workshop (13–17 June 2005) on the collection of demographic information on coastal fishing communities and its use in community-based fisheries and integrated coastal zone management in the Caribbean. The Fisheries Division of the Ministry of Agriculture, Land and Marine Resources of Trinidad and Tobago extended welcome cooperation and hospitality, hosting and co-organizing the workshop and related field trips.

Appreciation is further expressed for the assistance provided in for the implementation of the case studies by member States of the Caribbean Regional Fisheries Mechanism and their concerned government agencies: the Fisheries Divisions of Dominica, Grenada, Saint Kitts and Nevis, Saint Lucia and Trinidad and Tobago, and the Fisheries Department of Belize. The comparative study on the use of demographic and socio-economic information in coastal and fisheries management, planning and conservation in Malaysia and the Philippines was supported by the FishCode Programme of Global Partnerships for Responsible Fisheries of the FAO Fisheries Department, through contributions provided by the Government of Norway to the FishCode Trust (MTF/GLO/125/MUL). The Fisheries Development Authority of Malaysia, the Intergovernmental Organization for Marketing Information and Technical Advisory Services for Fishery Products in the Asia Pacific Region and the Bureau of Fisheries and Aquatic Resources of the Philippines kindly hosted and assisted members of the study team from the Caribbean during their work in Malaysia and the Philippines, and made senior experts available to serve as resource persons at the regional workshop.

Acronyms and abbreviations

ACP/EU	African, Caribbean and Pacific States/European Union
ADB	Agricultural Development Bank
BELPO	Belize Environmental Law and Policy
BFAR	Bureau of Fisheries and Aquatic Resources
CAC	Coastal Advisory Committee
CANARI	Caribbean Natural Resources Institute
CARICOM	Caribbean Community (Member states – Antigua and Barbuda, The Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Haiti, Jamaica, Montserrat, Saint Lucia, St. Kitts and Nevis, St. Vincent and the Grenadines, Suriname, Trinidad and Tobago; Associate members – Anguilla, Bermuda, British Virgin Islands, Cayman Islands, Turks and Caicos Islands)
CARIFIS	Caribbean Fisheries Information System
CATIE	Centro Agronómico Tropical de Investigación y Enseñanza
CBO	Community-based Organization
CCA	Caribbean Conservation Association
CCAD	Central American Commission on Environment and Development
C-CAM	Caribbean Coastal Area Management Foundation
CDB	Caribbean Development Bank
CERMES	Centre for Resource Management and Environmental Studies
CFRAMP	Caribbean Fisheries Resource Assessment and Management Programme
CFTDI	Caribbean Fisheries Training and Development Institute
CITES	Convention on the International Trade in Endangered Species of Wild Flora and Fauna
CRFM	Caribbean Regional Fisheries Mechanism
CRM	Coastal Resource Management
CSO	Central Statistical Office
CZM	Coastal Zone Management
CZMAI	Coastal Zone Management Authority and Institute
DECR	Department of Environmental and Coastal Resources
DEP	Department of Economic Planning and Statistics
DFID	Department for International Development (United Kingdom)
DFMP	Draft Fisheries Management Plan
ECCB	Eastern Caribbean Central Bank
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EMA	Environmental Management Authority

EU	European Union
FAB	Fisheries Advisory Board
FAC	Fisheries Advisory Committee
FAD	Fish Aggregating Device
FARMC	Fisheries and Aquatic Resources Management Council
FDA	Fisheries Development Authority
FDAM/LKIM	Fisheries Development Authority of Malaysia/Lembaga Kemajuan Ikan Malaysia
FISMIS	Fisheries Management Information System
FON	Friends of Nature
FRMP	Fisheries Resource Management Project
GCFI	Gulf and Caribbean Fisheries Institute
GDP	Gross Domestic Product
GEF	Global Environment Facility
GNP	Gross National Product
GRT	Gross Tonnes
ICCAT	International Commission for the Conservation of Atlantic Tunas
ICRAFD	Integrated Caribbean Regional Agricultural and Fisheries Development Programme
ICZM	Integrated Coastal Zone Management
IDRC	International Development Research Centre (Canada)
IFAD	International Fund for Agricultural Development
IFARMC	Integrated Fisheries and Aquatic Resources Management Council
IMA	Institute of Marine Affairs
INFOFISH	Intergovernmental Organization for Marketing Information and Technical Advisory Services for Fishery Products in the Asia Pacific Region
IPED	Integrated Planning and Environment Division
JICA	Japan International Cooperation Agency
LGU	Local Government Unit
LSED	Legal, Standards and Enforcement Division
MAC	Monitoring and Advisory Committee
MAFC	Ministry of Agriculture, Fisheries and Cooperatives
MAFE	Ministry of Agriculture, Fisheries and the Environment
MALMR	Ministry of Agriculture, Lands and Marine Resources
MBRS	Mesoamerican Barrier Reef System
MCW	Ministry of Communications and Works
MFAU	Marine Fisheries Analysis Unit
MPA	Marine Protected Area
MPAAC	Marine Protected Area Advisory Committee
MSD	Maritime Services Division
NAMDEVCO	National Agricultural Marketing Development Company
NEPA	National Environment and Planning Agency

NFARMC	National Fisheries and Aquatic Resources Management Council
NGO	Non-governmental organization
NOAA	National Oceanic and Atmospheric Administration (United States of America)
NRCA	Natural Resources Conservation Authority
OECS	Organization of Eastern Caribbean States
PBFMC	Portland Bight Fisheries Management Council
PBPA	Portland Bight Protected Area
PBSDA	Portland Bight Sustainable Development Area
PfB	Programme for Belize
PhilFIS	Philippine Fisheries Information System
PHMR	Port Honduras Marine Reserve
PIOJ	Planning Institute of Jamaica
SFC	Sugar Cane Feed Centre
SICAP	Central American System of Protected Areas
SIDS	Small Island Developing State
SMMA	Soufriere Marine Management Association
SPS	Sanitary and Phytosanitary
SSMR	Soufriere/Scotts Head Marine Reserve
STATIN	Statistical Institute of Jamaica
TBT	Technical Barriers to Trade
TCI	Turks and Caicos Islands
TED	Turtle Excluder Device
THA	Tobago House of Assembly
TIDE	Toledo Institute for Development and Environment
TPDco	Tourism Product Development Company
UNCED	United Nations Conference on Environment and Development
UNCLOS	United Nations Convention on the Law of the Sea
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations Children's Fund
USA	United States of America
WCS	Wildlife Conservation Society
WECAFC	Western Central Atlantic Fishery Commission
WWF	World Wildlife Fund

Introduction

Article 10 of the Code of Conduct for Responsible Fisheries (CCRF) sets out principles and standards for the Integration of Fisheries in Coastal Management. Article 10.2.4 of the CCRF suggests that states establish systems to monitor the coastal environment as part of the coastal management process, using among other things economic and social parameters.

In early 2004, the Caribbean Regional Fisheries Mechanism (CRFM) Secretariat requested FAO's assistance in undertaking a study on the use of socio-economic and demographic indicators in integrated coastal area management and fisheries management in the Caribbean Community (CARICOM) region. The study involved three main components. First, country-specific case studies were undertaken in selected Caribbean countries: Belize, Dominica, Jamaica, Saint Lucia, Barbados, Trinidad and Tobago and the Turks and Caicos Islands. These were aimed at documenting past and current initiatives in the CARICOM region in which socio-economic and demographic indicators were used in integrated coastal and fisheries management. They would also serve to identify ways and means of incorporating such information into ongoing coastal zone and fisheries management programmes.

The second component was a comparative study on the use of socio-economic and demographic indicators in coastal management and fisheries management in the Southeast Asian countries of Malaysia and the Philippines, which are more advanced in this respect, in order to learn from their experiences.

The third component was a regional workshop to present, discuss and refine the country-specific and comparative studies by obtaining input from all CARICOM countries. The aim was to produce recommendations for follow-up action to improve integrated management of coastal resources through, *inter alia*, the use of socio-economic and demographic indicators in the planning and decision-making process, improving the standard of living of fishing communities and promoting sustainable development.

Country-specific case studies were eventually prepared for Belize, Dominica, Jamaica, Saint Lucia, Trinidad and Tobago and the Turks and Caiços Islands, between June 2004 and May 2005, by short-term consultants engaged by the CRFM Secretariat.

The comparative study tour to Malaysia and the Philippines, involving representatives of the Bahamas, Saint Kitts and Nevis, Saint Vincent and the Grenadines and the CRFM Secretariat, took place during August 2004. Its objectives were to: (i) examine and determine how socio-economic and demographic information is used by fisheries and other government administrations and fishers' associations in the preparation of management and development plans and in monitoring the impact of those plans and programmes on fishers and their families; and (ii) study and determine how the socio-economic well-being of fishers and their families has been improved through special programmes and projects implemented in the context of fisheries and coastal management, development and conservation programmes.

The third component took place on 13-17 June 2005, when the CRFM Secretariat, in collaboration with FAO and the Fisheries Division of the Ministry of Agriculture, Land and Marine Resources (MALMR), Trinidad and Tobago, organized and convened a regional workshop on the Collection of Demographic Information on Coastal Fishing Communities and Its Use in Community-Based Fisheries and Integrated Coastal Zone Management in the Caribbean.

As mentioned, the mandate of the workshop was to review the findings of: (i) the country case studies on the status of coastal zone and fisheries/aquatic resources management and on the incorporation of demographic/socio-economic indicators in selected Caribbean countries; and (ii) the comparative study on the use of demographic indicators in coastal area and fisheries management between the Caribbean and selected countries in Southeast Asia. The ultimate objective was to formulate recommendations for improving the standard of living of fishing communities and strengthening integrated coastal zone and fisheries management in the Caribbean through, *inter alia*, the collection and use of demographic information on coastal fishing communities.

PART I

Case studies and comparative study

CASE STUDY

Belize

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2004

1 Consideration of socio-economic and demographic concerns in fisheries and coastal area management and planning in Belize

BACKGROUND

General

Belize is located in Central America and is bounded by Mexico in the north, and by Honduras and Guatemala on the western and Caribbean coasts. The country is relatively large in comparison with other Caribbean nations (22 963 square kilometres (km^2) of land area, including 689 km^2 on 450 offshore cays (Hartshorn *et al.*, 1984) and an exclusive economic zone (EEZ) of approximately 170 000 km^2 – over seven times its land area (Gillet, 2003). It has a wide array of fairly well-preserved natural environments, which have not yet been overly exploited. It is perhaps best known for its barrier reef, which is the largest coral reef in the Caribbean and the second longest in the world, extending for some 220 km along the coast.

Demography

The 2000 census reports the population of Belize at just under 250 000, almost equally split between men (50.5 percent) and women (49.5 percent). This represents a 26.8 percent change in growth from 1991, when the total population stood at just over 189 000, which brings the growth rate to 2.7 percent in 2000.

The predominant ethnic groups in Belize are the Mestizo and Creole, which represent some 48.7 and 24.9 percent respectively. However, a diversity of other ethnic groupings is reflected in smaller segments of the population. This current ethnic composition represents a shift in compostion of over five percentage points from the 1980 census, which reported Mestizo and Creole populations at 33.4 and 40.0 percent respectively. Such changes have had some influence on the rural-urban population figures, in that with the growth in the Mestizo population has come growth in the rural inland population. In 2002, approximately 48.6 percent of the population lived in urban centres, which is a notable shift from the 1980s, when more than half the population (52.4 percent) resided in urban centres throughout the country.

Today, approximately 82 137 people, or 33 percent of the population of Belize, reside in eight villages, four towns and one city along the coast (Table 1 gives the population distribution along the coast). The indigenous Garinagu comprise approximately 14 percent of the coastal population and, for Palacio (2002b), "the sea is a primary source of food – and it has a sacred place in Garifuna

TABLE 1
Population of coastal communities in Belize

Settlement name	Population	Percentage
Corozal	7 589	9.24
Sarteneja	1 640	1.99
San Pedro	4 499	5.48
Belize City	49 040	59.71
Caye Caulker	630	0.77
Dangriga	8 814	10.73
Hopkins	1 027	1.25
Seine Bight	871	1.06
Placencia	501	0.61
Punta Negra	27	0.03
Punta Gorda	4 329	5.27
Barranco	241	0.29
Mango Creek/ Independence	2 929	3.57
Total	**82 137**	**100**

Source: compiled from CSO data for 2000.

spirituality. They pay homage to the sea (*barana*) and earth (*mua*) as primary givers of life".

The structure of the population is typical of many developing countries in that it is young. Approximately 41 percent of the population is below the age of 14 and approximately 20 percent between 15 and 24. Dependency ratios are therefore very high. The child mortality rate is approximately 19.7 percent.

The Belize Country Poverty Assessment of 1996, using a per capita measure of poverty, reports that 33 percent of the population and 25.3 percent of the households were below the poverty line. This estimate would place Belize's level of poverty second only to Guyana's in the Caribbean Community (CARICOM) region (Pantin, 2004). Poverty is greatest in the southernmost part of the country, and women constitute 49.5 percent of the poor. The youthfulness of the poor is a reflection of the population structure itself, as 53.5 percent of the poor are below the age of 14. The correlation between unemployment and poverty is evident. In 1996 27.7 percent of the poor were unemployed, as opposed to 15.5 percent of the non-poor.

Economy

Gross domestic product (GDP) stands at US$1.28 billion (2002 estimates), and agriculture, of which fisheries is a subsector, contributes some 18 percent. The real economic growth rate has slowed drastically, from 10.8 percent in 2000 to 4.6 in 2001 and 3.7 in 2002, due in part to declining revenues from international markets and the impact of several hurricanes.

Until recently, the Belizean economy has been dominated by its exports sector, which hinges on three agricultural products: sugar, bananas and citrus. More recently, fisheries have begun to contribute significantly to overall GDP – aquaculture particularly. However, with the twin threats of erosion of preferential arrangements and growth in globally competitive export industries, there is a risk for those employed in the traditional agriculture sector. Due to these macroeconomic transformations, the country has been turning to tourism – particularly cruise tourism – to facilitate economic growth. In 2003 tourism contributed 14.6 percent to GDP and the sector grew at a rate of 36.7 percent from 2002 to 2003.

Belize primarily exports to the United States of America (47.6 percent) and the United Kingdom (24.1 percent). Primary imports, derived mainly from the United States of America (29.5 percent), are machinery (28.3 percent), manufactured goods (17.8 percent), minerals and fuel (17.3 percent) and food (12.6 percent).

Fisheries

The fisheries subsector is of growing importance to the Belizean economy. Although the capture fisheries industry is primarily small scale and is undertaken within the shallow protected waters of the barrier reef and the atolls, the industry has grown from approximately 790 registered fishers and 566 vessels in 1973 to approximately 3 527 (Coastal Zone Management Authority and Institute – CZMAI, 2003a) registered fishers and 800 vessels in 2002 (Marin, 2001). Over 500 people are employed in processing and marketing, while more than 900 permanent and 700 part-time workers are employed in the aquaculture industry. The subsector's contribution to GDP is approximately 5 percent, ranking it third in terms of importance to the agriculture sector (Ministry of Agriculture, Fisheries and Cooperatives – MAFC, 2002b).

Artisanal fishing vessels are generally fibreglass skiffs, sailing dories or motorized dories of approximately 3.5 to 9 metres in length. Artisanal fishers fish a range of species according to the seasonality and geography of the stocks, an approach that is reflected in the wide variety of gears used. Gill nets, beach seine and cast nets, hook and line, rod and reel, lobster and fish traps and shrimp trawlers are all used. However, the industry has traditionally focused on lobster and conch fisheries, and it is only within the last

TABLE 2
Estimated landings in 2003

Commodity		Estimates (lbs)	% change over 2002		Dollar value (BZ$)
Lobster	Head	50 463.0	8.4	↑	104 229.00
	Tail	547 180.0	6.9	↓	13 488 982.00
	Subtotal	564 792.0			13 593 211.00
Conch	Meat	416 542.0	28.6		
	Fillet	33 719.5	?	↑	4 100 000.00
	Subtotal	450 261.5			
Marine shrimp (export)		147 866.0	37.0	↓	998 154.25
Shrimp aquaculture (export)		22 300 000.0			91 800 000.00
Fin-fish farmed	Whole fish	21 124.0	?		Uncertain sold domestically
	Fillet	54 769.0			
Aquarium	Invertebrates	350.0	159.6		2 450.00
	Fish	8 270.0		↑	39 148.71
Others	Stone crab	868.0	64.6	↓	?
	Squid	591.0	26.0	↑	?
Total		34 284 371.0			

Source: derived from the Draft Fisheries Statistical Report 2003.

ten years that shrimp, finfish and pelagics have gained recognition for their economic potential (Belize Fisheries Department, 2002). Estimated earnings from capture fisheries for 2003 are reported at BZ$18.5 million (see Table 2 for details of estimated landings).

Aquaculture in Belize has grown by approximately 160 percent over the last ten years (Myvett and Quintana, 2002). Export earnings have grown from BZ$1.8 million in 1990 to BZ$51.7 million in 2002, and 2 749 hectares of land were devoted to shrimp farms alone in 2002, reflecting a 12 percent increase from 2001 for the predominant farm type. Preliminary 2003 estimates suggest that earnings from aquaculture have now grown to BZ$91.9 million.

Political, legal and administrative structure

Belize is divided into six districts and has only recently gained independence from the United Kingdom (September 1981). Settlement of a longstanding territorial claim by Guatemala to terrestrial and marine areas of the country is being negotiated.

As in most Caribbean countries, decision-making tends to be concentrated in the executive branch (Governor General, Prime Minister, Deputy Prime Minister and Cabinet); the legislative branch, which consists of an upper house or Senate, and a lower House of Representatives; and the judicial branch, which includes the Supreme Court. Through recently enacted legislation, village councils have been empowered to become involved in decision-making regarding resource use at local levels, albeit in an advisory capacity.

Belize has had a relatively long history of conservation efforts. These have been readily supported as a result of its association with the broader ecoregion, the Mesoamerican Barrier Reef System (MBRS). It has also been involved in several bilateral and regional conservation agreements.

INSTITUTIONAL AND LEGAL ENVIRONMENT

Management and regulation of fisheries and aquaculture

Responsibility for marine resource conservation in Belize is alarmingly splintered. McField *et al.* (1996) identify over 94 acts, administered by 18 permit-issuing agencies through 10 ministries. Furthermore, Belize is signatory to over 24 international conventions and treaties relating to marine life and coastal protection, including the

Convention for the Regulation of International Trade of Endangered Species (CITES), the World Heritage Convention, the Convention on Biological Diversity and the International Convention for the Prevention of Pollution from Ships (McCalla, 1995; Jacobs, 1998).

Notwithstanding this legislative and institutional fragmentation, it is well recognized that MAFC is the government agency with primary responsibility for formulating, executing, monitoring and coordinating policies related to fisheries management, among other things. It executes these responsibilities through its primary legislative tool, the Fisheries Act (1980), Chapter 210 of the laws of Belize, which was revised in 1993. Through this act, the Belize Fisheries Department is given responsibility for establishment of an advisory board, preparation of a management plan, fisheries access agreements, local and foreign fishing licensing, fish processing establishments, fisheries research, including aquaculture development, and marine reserve establishment and management.

The department is also tasked with oversight and regulatory responsibilities for the aquaculture sector as it relates to the formulation of policy and legislation, the issuance and administration of farming permits or licences, technical advice to farmers and potential farmers, environmental compliance monitoring and enforcement (Myvett and Quintana, 2002). The legislative amendments have in fact served to strengthen the process for issuing fishing licences and improving regulation of the aquaculture sector.

Through this act and subsequent regulations, the department has instituted gear restrictions, size limits and closed seasons applicable to most fisheries. The act specifies conservation measures as well, such as prohibiting the use of explosives, poison or other noxious substances "for the killing, stunning, disabling or catching of fish". The department also regulates the issuance of fishing vessel and other licences.

Marine protected areas (MPAs) are also used as a fisheries management tool, and in this regard the department has established 8 marine reserves and 11 spawning sites to assist in the protection of essential habitats in order to facilitate the replenishment of heavily exploited stocks such as the Nassau grouper.[1] These initiatives have been supported by those of the Forest Department: through the National Parks Act and other relevant legislation, the Minister of Natural Resources has declared a number of other marine and coastal mainland regions as protected areas so as to protect wetlands and other critical habitats. The Wildlife Protection Act (1981), for instance, is administered by the Forest Department and includes protection against the killing, taking, molesting, exportation, importation, trade and transportation of critical and endangered species such as turtles and the manatee.

Notwithstanding the abundance of legislation and provisions under the act, there are recognized deficiencies in fisheries management. First, the fisheries are largely open access, because the measures to regulate vessel licensing, etc. do not effectively limit entry or control fishing effort (Gillett, 2003 and McConney, Mahon and Pomeroy, 2003). At the time of the assessment conducted by the McConney team, the Fisheries Department had a staff of 19 permanent employees, as well as several who had not been permanently appointed, bringing the staff total to 45. The departmental allocation for 2002–2003 was US$250 000, of which 90 percent was used to pay salaries alone, leaving very small allocations for operational activities. These budgetary constraints have impaired the department's ability to strengthen its technical expertise and base, its ability to sustain research and monitoring regarding species into which it advocates diversification and, perhaps most importantly, they have crippled its enforcement capabilities. Similar problems plague the Forest Department.

[1] The MPA system of Belize is currently comprised of 13 marine protected areas: eight marine reserves, of which five are World Heritage sites; two natural monuments, both World Heritage sites; one national park; and two wildlife sanctuaries.

These resource limitations have obviously impacted the department's ability to assess the status of critical export species, such as the Queen Conch, and to implement management measures. As a result, Belize was notified by CITES that, if it failed to address this monitoring and management weakness by September 2004, it would be faced with the possible imposition of an export embargo on the commodity.

Of further concern is the approval of legislation by the Cabinet that calls for the formulation of a new Fisheries Development Authority, but removes all responsibility for the management of shrimp farming (the largest contributor to aquaculture in Belize) from the legislation. This move may be a follow-up to remarks by the chairperson of the Shrimp Growers Association in October 2003, "We do not see the relevance of the Fisheries Department in the development process of shrimp farming; we see the relevance of the Belize Agricultural Health Authority and Department of the Environment, but we do not see a role for the Fisheries Department." (Belize Fisheries Department, 2003a).

Regional planning and development in coastal areas

Like fisheries management, regional planning and development legislation in Belize is equally splintered across a range of institutions. Trench-Sandiford (2003) identifies five primary pieces of legislation relating to planning and development in Belize and several efforts without legislative authority. The legislation comprises the Housing and Town Planning Act, Land Utilization Act, Coastal Zone Management Act, Reconstruction and Development Corporation Act and Belize Building Act. Under the Housing and Town Planning Act, several orders for coastal communities have been promulgated (the Corozal Town Planning Scheme, 1964; Dangriga Town Planning Scheme, 1964; and Ambergris Cay Planning Scheme, 1990) through which land-use and zoning plans have been developed and are being implemented. Socio-economic data sourced primarily from the Central Statistical Office (CSO) have been used in the preparation of these plans. However, these earlier initiatives failed to give direct and detailed consideration to the socio-economic conditions of fishers, perhaps as a result of the top-down approach to development planning that characterized the process. As Palacio puts it, "The government of Belize does not know how to respond to the development needs of coastal community groups. By continuing to deny communities their right to form their own governance systems and to pay for them, the highly centralized governance systems are obstructing the formation of functional community-based structures."

The origins of the move towards a more holistic and integrated approach to coastal zone management in Belize are often traced back to a meeting in San Pedro in 1989. At that meeting, it was recognized that horizontal and vertical integration of decision-making regarding Belize's coastal resources was necessary. The meeting resolved that a coastal zone management (CZM) unit be established within the Fisheries Department to initiate the programme, and by 1990 a small unit and technical committee had been established. With the financial assistance of the Global Environment Facility (GEF) and the United Nations Development Programme (UNDP) in 1993, a US$5 million coastal zone management project was launched, providing the basis for a permanent national programme.

Recognizing the need to overcome jurisdictional fragmentation formally, in 1998 the Government of Belize passed the Coastal Zone Management Act, Chapter 329 of the Laws of Belize, which was revised in 2000. This legislation called for the establishment of the CZMAI as a separate entity, primarily to advise and assist the minister in his decisions on coastal resource use (Box 1). To support the strengthening of this agency, UNDP, GEF and the European Union provided an additional US$6.9 million.

The act called for establishment of an advisory council and executive board to provide interagency coordination and advise on coastal issues. The board benefits from high-level representation of key government agencies, such as the Ministries of Economic

BOX 1
Functions of the Coastal Zone Management Authority

- advise the Minister on all matters relating to the development and utilization of the resources of the coastal zone in an orderly and sustainable fashion;
- advise the Minister on the formation of policies in regard to the coastal zone;
- assist in the development and implementation of programmes and projects that translate the marine and related policies of the Government into activities that contribute to sustainable development of coastal resources;
- assist in the development and execution of programmes and project that foster and encourage regional and international collaboration in the use of marine and other related areas of the environment;
- review the Coastal Zone Management Plan prepared in accordance with the provisions of Part V of the Act and furnish recommendations to the Minister;
- commission research and monitoring in any coastal area or in relation to any activity which may impact on such areas;
- promote public awareness of the unique nature of the Belize coastal zone and of the importance of its effective conservation and the sustainable management and utilization of its resources for the benefit of present and future generations of Belizeans;
- in consultation with governmental agencies, non-governmental agencies and the private sector, assist in the preparation of guidelines for developers for coastal zone development;
- co-operate with government departments, statutory boards, non-governmental organizations and the private sector on matters that are likely to have an impact on the ecology of the coastal zone;
- in collaboration with government and private sector agencies, maintain a national coral reef monitoring programme and coastal water quality monitoring programme and any other technical monitoring programmes;
- advise the Minister on any other matters relating to the coastal resources that may be referred to the Authority by the Minister.

Source: Coastal Zone Management Act, Chapter 329 of the Laws of Belize.

Development, Natural Resources, Tourism and Fisheries, while the advisory council has an even broader representation, comprising various government department heads and representatives of the private sector, cooperatives, non-governmental organizations (NGOs) and academia.

Of importance here is the fact that the act calls for the preparation of a coastal zone management plan for all of Belize, to be developed through a broadbased, consultative process allowing for input by all sectors, including the fisheries sector. With a view towards development of this plan, CZMAI has facilitated formulation of a National Integrated Coastal Zone Management Strategy for Belize through quite an extensive process. It provides linkages between national and local authorities, as well as with NGOs and private-sector partners. This strategy, which was officially adopted by the Cabinet of Belize in February 2003, refers to the role of CZMAI in poverty alleviation and acknowledges the important roles and functions of the various actors/ partners in fisheries management and the need for a process of integration through stakeholder participation.

The strategy lays out a detailed methodology for development of the management plan, utilizing a series of regional coastal plans for eight planning regions nationwide, each having a coastal advisory committee (CAC) with detailed terms of reference.

These committees facilitate a more bottom-up approach to decision-making, thereby increasing local ownership and inclusion in the resource management process, as may be seen in the following section. CAC members are trained in leadership skills, conflict resolution, consensus-building and mechanisms for conducting effective meetings.

Co-management of fisheries and coastal aquatic resources

> *The definition of co-management focuses on "sharing of responsibility and authority [for the management of resources] between government and stakeholders."* – McConney (2003a)

Perhaps the most comprehensive, current and accurate work on co-management is to be found in McConney, Mahon and Pomeroy (2003a), which provides a detailed case study report on fisheries management in the context of integrated coastal zone management (ICZM). The chronicle starts with the establishment of the Fisheries Advisory Board (FAB) in 1965, which, as the report puts it, facilitated an interesting consultative form of co-management in Belize, despite the fact that co-management has not been legally institutionalized.

The McConney review points out that FAB has met frequently over the last 35 years to consider various fisheries management issues (both development and conservation), and that the fisheries cooperatives[2] exercise considerable power in and through FAB. FAB's primary role is to plan for the management and development of fisheries and the development of proposals for access agreements, joint venture investments in fisheries or development projects in the fisheries sector, for example. However, in the absence of legal operational guidelines, changes occur in the operations of the board that reflect the preferences of a particular chairperson or influential member.

Recognizing the need for greater partnership in management, the department has also signed approximately five co-management agreements for marine protected areas, even though there is a recognized lack of an explicit legal basis and guidelines for doing so. To support management at these sites, marine protected areas advisory committees (MPAACs) have been established at five of the World Heritage sites, with membership consisting of government agencies, elected community representatives, local non-governmental and community-based organizations, local institutions and fisheries cooperative members. The primary functions of these committees are to facilitate a more bottom-up and integrated approach to resource management and, more importantly, to enable a better balance in the management of the sites (i.e. an ideal mix of ecological and social considerations).

Integration of fisheries and coastal aquaculture management into coastal area management, planning and conservation

The intervention favouring the integration of fisheries and coastal aquaculture management into coastal area management planning and conservation has yielded quite a number of successes. First, the Chief Executive Officer of the Ministry of Agriculture, who represents the governments' fisheries interests, sits on the CZMAI board and has held the position of chairperson since the inception of the agency. As FAB reports to the same chief executive officer, there is the potential for exchange of information and the synchronization of policies and programmes. Moreover, the CZMAI Board also acted as the steering committee of the recently completed Sustainable Use of the Belize Barrier Reef Complex Project, funded by UNDP, GEF and the European Union. As

[2] The Northern, Caribena, National and Placencia fishing cooperatives are active, with a total membership of 1 285 and assets of over US$20.1 million. In 2000 seafood exports from fishing cooperatives exceeded US$19 million, representing over 28 percent of total fish exports.

the project had major components related to improvements in Belize MPA system management, an administrator of the Fisheries Department would sit as an observer at board meetings. Fishing cooperatives and the Fisheries Department have also had representation through the advisory council of the CZMAI board, again providing an opportunity for information exchange and policy harmonization.

Second, the coastal planning programme that facilitated the development of a cay development policy and detailed land-use planning and zoning guidelines stands to have a positive impact upon fishing interests in terms of reducing habitat destruction, the pollution from land-based activities and even land-tenure conflicts that may arise.

Third, the framework establishing the coastal advisory council has been a useful forum for building knowledge of development initiatives, if not for reconciling differences regarding resource use. It provides an avenue for creating a balance in terms of decision-making, power and equity among stakeholders in coastal resource management.

Fourth, through FAB, the advisory council, CACs and MPAACs, fishers have used their organizations as vehicles for representation and have been very effective in doing so. As McConney, Mahon and Pomeroy (2003) put it, they "do not … project themselves as being powerless in relation to other stakeholders in the coastal zone …" such as the tourism-related groups.[3]

Notwithstanding the above-mentioned achievements, there are numerous constraints on the integration of fisheries into coastal management as promoted by the FAO Code of Conduct for Responsible Fisheries. First, national legislation is notably lacking in various areas, including its legal definition of the coastal zone, which does not include the EEZ and mainland/watershed areas, thereby inadvertently but legally restricting the scope of all planning and resource management exercises.

Second, the CZMAI mandate was legally restricted to initiating cross-sectoral planning, with very limited additional responsibilities or powers. Sectoral agencies with recognized, widely varied mandates retained all their responsibilities and, on a discretionary basis, chose what aspects of planning and actions they wished to coordinate with others through CZMAI. Thus, while the responsibilities and mandates of sectoral agencies were analysed and defined, they were never legislatively revised within the context of integration in order to reduce overlapping or conflicting jurisdictions. In addition, appropriate coordinating and integrating arrangements were never established formally through instruments such as memoranda of understanding, which could also establish the timelines and formal methodologies for keeping all agencies informed of coastal area policies to ensure coherence in policy implementation.

Third, integration by nature calls for some transparency and accountability. The process has called into greater question the open-access nature of the industry and the resultant inefficiencies generated, which affect other industries as well. The fishing industry has a hard time convincing other resource users of the need to restrict their activities when regulatory measures used to control resource use within the industry itself suffer from less than desirable enforcement, partly due to economic constraints. Further, within the coastal planning process, it has become apparent that conflicts within the industry – among fishers from differing geographic regions using the same fishing areas, between trawlers and small-scale fishers, and among poachers from neighbouring countries – impact the ability to address intrasectoral resource management issues.

Fourth, in its role of facilitating integration, CZMAI is seen as being conservationist rather than production-oriented, contributing to a certain level of tension between the

[3] CZMAI (2002) contradicts this view in that only 16 percent of the fishers interviewed in a nationwide survey "believed that fishers are 'very involved'" in decision-making. Some 44 percent of fishers believed that they or their representatives (cooperatives) are not involved in the decision-making process regarding MPAs specifically.

Fisheries Department and CZMAI (McConney, Mahon and Pomeroy, 2003). Some suggest that it is for this reason that CZMAI has been excluded from FAB and that the representative of CZMAI will have no voting rights in the soon-to-be established Fisheries Development Authority (FDA). On the other hand, CZMAI has argued that FAB cannot be expected to give objective management advice if its most powerful members, including the host agency, are oriented towards increased exploitation. The lack of voting rights on the FDA clearly reduces opportunities for the CZMAI representative to influence the board and perhaps seek synchronization of policies and practices (McConney, Mahon and Pomeroy, 2003).

Lastly, the participatory processes and framework, as much as they were desirable in terms of building alliances, proved to be demanding from a time and financial perspective (Johnson, 2002). Fishers and other stakeholders found the process demanding and, as CACs and MPAACs had no legal basis, committee members were fearful that the efforts stopped short of fully empowering them. Moreover, although members of CACs benefited from conflict resolution training, the process did not clearly outline recommendations for dealing with and overcoming potential conflicts.

Future outlook and next steps

With the completion of the UNDP/GEF/European Union project – which has been the main stimulus for and investment in the process of integrating fisheries management into coastal area management, planning and conservation – there is growing international and national concern about the sustainability of the programmes and strategies. The failure to embed the programme more firmly in the legal frameworks could easily result in the dissipation of years of investment. It is therefore pertinent that the CZMAI board review the planning guidelines and, more importantly, the implementation framework with intent to adopt. Similarly, legislative amendments would be required to formally incorporate MPAAC and co-management partners into the marine protected areas framework.

The protected areas issues could perhaps be addressed within the broader context of strengthening the overall framework for national policy and planning for both marine and terrestrial protected areas in Belize. This would ensure that, among other things, there is the introduction of a strong legal basis for co-management, one which recognizes the need to consider the socio-economic conditions of the coastal communities that rely on these resources. The Government of Belize hopes to overcome some of the weaknesses identified in protected areas management through implementation of the ongoing National Protected Areas Systems Planning initiative.

However, even if there is the legal framework and a more participatory approach to resource management, there is still a need for sustainable financing for site-level efforts and coastal area planning initiatives. This will require not only international inputs, but also private-sector and government financial commitment.

SOCIO-ECONOMIC AND DEMOGRAPHIC CONSIDERATIONS

Socio-economic and demographic information availability

Through the national census, which the CSO undertakes every ten years, one is able to obtain extensive data on coastal fishing communities. The census generates data on population, age, sex distribution, access to basic amenities, housing conditions, employment by industry and unemployment, income and poverty levels and educational attainment, among other variables. The data are therefore readily available. In fact, Belize is the only Caribbean country that has posted its entire census data for 2000 on the Web (www.cso.gob.bz), an initiative facilitated by its link to a Central American database. Through the Central American Commission on Environment and Development (CCAD) and its Central American System of Protected Areas (SICAP) initiative, data on the labour force and other variables are also available. However, the

TABLE 3
Key published reports

Year	Title of study	Geographic scope	Author	Data source	Issues addressed
2000	Population census	Nationwide	Central Statistical Office	Household surveys nationwide	Age, sex distribution, access to basic amenities, housing conditions, employment by industry and unemployment, income and poverty levels, educational attainment.
2002	Community management of protected areas conservation project (COMPACT)	Nationwide	Joseph Palacio	Questionnaire and focus-group meetings	Use of coastal resources, knowledge of threats and sources, MPA contribution to welfare of coastal community, social values related to various forms of resource exploitation, willingness to alter behaviour, extent of economic reliance, benefits to women and youth.
2002	Fishers perception of marine protected areas in Belize	Nationwide	CZMAI (Tanya Williams)	Questionnaire	Purpose of MPAs, impact on fisheries, knowledge of regulations, involvement in decision-making, primary fishing grounds, source of income, interest in MPA education programmes.
2000	Voice of the fishermen of Southern Belize	Southern Belize	Will Heyman and Rachel Graham	Questionnaire and secondary data	Distribution of fishers, time fishing, vessel and gear type, geography and seasonality of fishing, cost and marketing of fisheries, economic alternatives of interest to fishers, knowledge of laws and regulations, estimated landings and value of fisheries, species-specific perceptions of resource, suggestions for improvements.
2000	Evaluation of management effectiveness	Nationwide	Melanie McField	Evaluation workshops	Administration at sites, policy, legal issues, planning, management programmes, knowledge, illegal uses, legal uses, threats and biogeographic characteristics.
2000 & 2001–2002	State of the coast reports	Nationwide	CZMAI (various contributors)	Each article within report usually describes its methodology and source of information	Manatee programme reports, status of MPA reports, MPAAC initiatives, status report on fishing and aquaculture industries, coastal area panning initiatives, policy development, water quality reports.
2003	Fisheries statistical report	Nationwide	Belize Fisheries Department (Villanueva and Carcamo)	Cooperative and department records	Description of capture fisheries and aquaculture sector, number of fishers, vessels, status of production for major species.
2003	Fisheries Department annual report	Nationwide	Belize Fisheries Department	Combination of sources	Capture fisheries production levels, efforts to improve management of specific species, e.g. Queen Conch, management of high seas fisheries, ecosystems management (enforcement), monitoring of commercial species, spawning aggregations, turtles, aquaculture (production levels, policy, employment).
2004	Socio-economic impacts of the Port Honduras Marine Reserve (PHMR)[1] on the coastal communities of Southern Belize, Central America (1999–2004)	Southern Belize	Emily Collins	Questionnaires and secondary data	Ethnicity, age, education, no. people per household, type of fisher, years in fishing, occupation, involvement in tourism, involvement in management of PHMR, fishing effort (trips/week, hours/day), ownership of vessel, type and size of vessel, power, perception of marine environment, major impact and threats, status of resource and species, effect on income and livelihoods, perception of Toledo Institute for Development and Environment (TIDE) as manager, foreseen challenges for TIDE.

[1] A 1 295 km^2 reserve in southern Belize.

CSO has confirmed that to date there have been no requests for *disaggregated data* on fishers specifically, although numerous requests have been made for information on coastal communities broadly speaking, nor have they separately published disaggregated data on fishers or coastal communities.

Belize has also established a Social Indicators Committee,[4] chaired by the CSO, which has strengthened national capabilities to generate social data. Through this committee, some 77–80 indicators have been developed and information maintained. The first and last publication was issued in 1998 (Glenn Avilez, chairperson, telephone interview, 2004). The United Nations Children's Fund (UNICEF) has provided training to member agencies and equipment for the storage and generation of data; however, the efforts of this committee seem largely unknown to those in the fisheries management fraternity.

At the sector level, fishing cooperatives generate some catch effort data, which are submitted to the Fisheries Department on a monthly basis, and it is these data that are used by the department in their annual and other publications. However, both the cooperatives and the department confirmed that they generate very limited social data on fishers due to the perceived costliness of doing so. The cooperatives generate data on catch and the region fished, while the department generates general information on the number of registered fishers, the number of aquaculture farms, employment in the sector and, at the macro level, for example, income generation and contribution to GDP. More importantly, a permit from the department is legally required in order to undertake coastal research. All research findings must be lodged with the department and, as such, are available to the public. However, Belize Barrier Reef Committee members have for some time now expressed concern regarding the need for greater accessibility of data and reports, perhaps via postings on the agency's Web site.

The generation of microlevel disaggregated data is more commonly undertaken through the initiatives of NGOs, for example in the preparation of management plans for MPAs (which often have a component dedicated to understanding the coastal communities with which they work), or through newly emerging initiatives such as the Global Socioeconomic Monitoring Initiative (SocMon) research, being undertaken by a number of co-management partners, which is highlighted in the case study reports in the subsequent section.

Use of socio-economic and demographic indicators

Outside of the earlier land-use planning initiatives undertaken in coastal areas, which naturally utilized socio-economic and demographic indicators in profiling communities, the most recent and more comprehensive initiative involved the planning guidelines developed for all the coastal regions of Belize. Reports issued in connection with this initiative are listed in Table 3. The planning exercise was, however, restricted to cays, most of which are uninhabited. It reflected on the need to safeguard the interests of fishers through the protection of traditional use areas such as beaches and fishing grounds. While it was notably weak in its use of detailed information on fishers, its usefulness to policy and permit-issuing agencies was high from a land-use planning perspective. It used primarily population data derived from CSO and interviews with fishers who were at the fishing camps when the land-use assessments were being conducted. Interviews focused on occupancy and density, rather than on other quality of life variables. The exception in the coastal planning programme was Caye Caulker (a pilot area under the planning programme), which is described in detail as a case study.

One research project was dedicated to understanding the socio-economic conditions of coastal communities: an assessment of socio-economic conditions in Placencia,

[4] The Social Indicators Committee was established in 1997. It comprises various social government ministries and NGOs and its aim is to improve the timeliness, quality and accuracy of social data.

TABLE 4
Data captured by Palacio questionnaires

Data type		Description
Demographic		Age, source of income, household size, ethnicity, time in community
Environmental	Geography	Methods of livelihood from sea, areas exploited relative to reef, distance from community
	Awareness of reef	Level of knowledge of basic reef features
	Threats to reef	Awareness of threats and ranking of these
	MPAs	Awareness of purpose and contributions of MPAs
Social value		Level of acceptance of various kinds of livelihoods
Cultural attitude		Community-specific uses, cultural memories, etc.
Economic		Income generation possibilities, alternatives

Hopkins and Monkey River was undertaken in partial fulfilment of an academic requirement and at the request of the Friends of Nature (FON). Other work, undertaken by Pantin *et al.* in the early part of 2004, addresses the barriers to introducing alternative sustainable livelihoods strategies such as access to credit.

Palacio undertook another extremely useful assessment in 2002 for the COMPACT project. He extensively observed coastal communities cultural, economic and social use of marine resources and their role in economic development, as well as possible community-based interventions to mitigate threats. The assessment, which was intended to inform the UNDP/GEF small grants programme for the World Heritage sites, derived its data primarily from questionnaires and focus-group meetings involving a range of coastal users (fishers, tourism industry stakeholders, elders, media, civil society and local government). His questionnaire captured the socio-economic data detailed in Table 4.

McField's (2000) evaluation of the management effectiveness of the Belize Marine Protected Areas System (a consultancy for CZMAI) is perhaps the most comprehensive attempt at determining the extent to which protected areas in Belize have been useful tools in conserving ecosystems and fisheries stocks, among other functions. Using the evaluation protocol of the World Wildlife Fund (WWF) and Centro Agronómico Tropical de Investigación y Enseñanza (CATIE), the assessment concluded that the management of the MPA network was "moderately satisfactory (71 percent)". McField's assessments were instrumental in highlighting the deficiencies in MPAs, which were primarily "weak policies, laws, knowledge, biogeography characteristics and the management of legal and illegal uses". Government-managed MPAs were "minimally satisfactory (46 percent)" and those administered by NGOs "satisfactory (77 percent)" depending on the management model.

Despite this moderately satisfactory rating – and due to continued expression of concerns from fishers and the strong lobbying for de-reservation of some sites – CZMAI conducted a survey of fishers in 2002, with the support of an MPA working group, to determine fishers' perceptions of MPAs in Belize. The findings of this survey, along with several related studies, are available at www.coastalzonebelize.org. The questionnaires, which targeted 247 fishers nationwide,[5] revealed that some 42 percent of fishers did not understand the concept of MPAs and often equated it with the closing of an area to facilitate tourism. Some 45 percent felt that MPAs impacted negatively on fisheries, and 23 percent said MPAs did not change the state of fisheries in any way. Some 68 percent of fishers indicated that they knew the regulations of MPAs, while 58 percent of the fishers who believed fishers did not comply with the regulations suggested that they deliberately chose to ignore them due to economic needs.

[5] Margin of error is reported as +/- 5 percent at a confidence level of 90 percent.

The research was illuminating, underscoring the fact that despite the many planning initiatives and attempts to bring fishers closer to the heart of decision-making regarding resource use, there was still much to be done to improve appreciation and understanding of the benefits to be derived from management and conservation measures.

Perhaps as a consequence of this recent research, many of the site-level initiatives in the last two years have been directly oriented towards improving the integration of socio-economic and demographic data into the management of resources. Influenced by the methodologies of the National Oceanic and Atmospheric Administration (NOAA) and of R. Pomeroy, several co-management partners have begun implementing social monitoring programmes to generate their own data through questionnaires. Primary data are often supported by the work of Heyman and Graham (2000) on fisheries resources, Palacio (2002a and b) on community perspectives, Brown and Pomeroy (1999b) on coastal resource management issues, McField (2000) on co-management and management effectiveness in MPAs, and CZMAI (2000) on policy and planning. Several of these recent initiatives are featured in the case study reports: they provide useful insights into the complexity and challenges to be encountered in considering the socio-economic dimensions of resource management.

Case studies

CASE STUDY 1: Community-based planning at Caye Caulker

In fulfilling its mandate for the preparation of a coastal zone plan for all of Belize, CZMAI piloted development of a plan for a 399-hectare island called Caye Caulker, which lies northeast of Belize City. Over the last 15 years, this small island has been transforming itself from a fishing community to one based on tourism. Today there are approximately 150 active fishers on the island. The planning exercise began in 1999 with three major components: land-use planning, socio-economic studies and tenure analysis. The approach used in developing this plan was to guide the formulation of all plans for other planning regions, especially the more developed islands.

The land-use-planning component was intensive in that it served to document and categorize all parcels and lots on the island (north and south). Categories were established for all existing and proposed land uses, including residential, hotel, commercial, community, recreation, mixed use, unoccupied, and public infrastructure such as piers. Recommendations were made for densities – an exercise considered highly valuable for municipal managers.

The second component of the planning exercise was a socio-economic survey of occupied, developed parcels and lots on the more developed, southern portion of the island, which includes a village. The survey instrument was a questionnaire developed by the senior planner at the Central Housing and Planning Department and the coastal planner at CZMAI. University of Belize interns assisted in administering the questionnaire.

Some 53 percent of the population responded to the survey, and data were generated on various socio-economic indicators such as those captured in Table 5.

The tenure analysis identified lands being used as fishermen's camps and the extent to which community members owned land, as an asset. The data derived were then used in the cartographic modelling developed to determine areas suitable for development on the island. While the socio-economic data were not plugged into the cartographic model, the Caye Caulker Advisory Council used the data derived from the surveys to support the drafting of planning guidelines. The magnitude of the exercise was such that the CZMAI decided that the planning programme should be a 'rolling' one, because of the dearth of physical planners in the agency and country as a whole.

CASE STUDY 2: Programme for Belize

The Capacity-Building for the Sarteneja Fishing Community Project was supported through the Caribbean Regional Fisheries Mechanism (CRFM) Programme for Belize

TABLE 5
Socio-economic indicators captured in Caye Caulker assessment

Household/tenure	No. of people occupying dwelling, ownership of lot and house, length of time living at location, born on island or not
Housing	No. of rooms, materials of outer wall, condition of structure, preferred housing, vision for upgrading island
Basic infrastructure	Availability of and access to drinking water, reliability of service, availability of and access to electricity, location of kitchen, sharing of kitchen, fuel for cooking
Waste-disposal system	Type of toilet provision, disposal of liquid waste, adequacy of surface drainage
Socio-economic	Members of household with regular incomes, main source of income, type of employment, other skills of household members, location of employment, transportation type, household income level, rental costs, mortgage bills, fish or grow part of food supply, ability to save and with whom
Education	Children attending school, type of school, travel to school
Improvement desired	Improvements desired for dwelling, urgent needs of neighbourhood and community, interest in residing permanently on island

TABLE 6
Indicators captured in PfB survey

Data type	Description
Personal	Age, gender
Geographic	Distance travelled for livelihood, region/area work
Threat and mitigation	Perceived problems and threats to livelihoods, priority ratings and suggested solutions
Social value	Acceptability of methods of earning living, interest of youth, reliance on sea today vs. years ago and reason for reliance
Economic	Sources of livelihood, best alternative income-generating options, options most suitable for women, interest in employment options other than fishing, family members working for salary or paid employment, employment type of family members and changes in employment for family
Socio-demographic	Length of time in community, people in household, ethnicity, educational attainment, post-school training

(PfB). Under this project, a national, non-profit NGO worked with the residents of Sarteneja, a northern coastal community that is home to approximately one-third of Belize's licensed commercial fishers. They worked to develop a strategy for alternative livelihoods for fishers in order to reduce the overall fishing pressure on commercial and non-traditional species. The aim of the initiative was to build the capacity of Sarteneja fishers to articulate their development priorities better and to become meaningful participants in the planning of local development activities.

Some 30 men and 8 women participated in the visualization and planning exercise, which produced a vision, a mission and four development-oriented strategic objectives for the community. The workshop session was partly informed by a survey that was administered in the latter part of 2002. This survey captured the socio-economic data listed in Table 6.

As a result of its intervention, the PfB is undoubtedly expected to play a key role in assisting the community in implementing the strategy, which in itself is a formidable task. Historically, the community has been polarized politically, its geographic remoteness and socio-economic characteristics are such that economic alternatives are limited, and fishers from this village are often cited as the major overexploiters of marine resources, but they claim to be accused unjustly (Palacio, 2001). In the case of the PfB (which is still being documented by researchers), the broadening of understanding through the use of socio-economic data amplifies the multidimensional nature of the management challenge and the need for a coordinated approach to solving it.

CASE STUDY 3: Friends of Nature

The NGO Friends of Nature has co-management responsibilities with the Forest and Fisheries Departments for management of Gladden Split, Silk Caye Marine Reserve and Laughing Bird Caye National Park. Through the Caribbean Coastal

Co-Management Guidelines Project, undertaken with the support of the Caribbean Conservation Association (CCA), and the University of the West Indies' Centre for Resource Management and Environmental Studies (CERMES), a case study report for MPAs was produced in 2003, co-managed by FON.

Unlike many of the other case studies, the work of Pomeroy and Goetze (2003) leaned considerably on less costly secondary data, gleaned from existing reports and census data, to highlight various resource and socio-economic attributes as well as community-level institutional and organizational arrangements for the management of coastal resources. Data on the characterization of ecosystems seem to be largely derived from the management plans of the parks and a host of other related reports developed primarily within the last seven years.

Several socio-economic indicators were addressed in the study, for example land tenure and traditional land use by fishers and their families during the various seasons, an economic mainstay of coastal communities that use or impact the parks. Other indicators included characterization of the fisheries in terms of vessel type, distance operated, range of species exploited and gear type – information largely derived from the works of Perez (2000), Heyman and Graham (2000), Jacobs (1999) and Palacio (2001a; b).

The report established the linkage to the need for effective management impressively, and it is in this component that it generated much primary data through the documentation of information gathered in interviews with key informants. Several recommendations were made for improvements in management to facilitate greater inclusion of the socio-economic dimension as well as for overall improvements.

With the technical and financial support of The Nature Conservancy, the management team at FON is developing measures to incorporate socio-economic indicators systematically into overall management and strategic plans. Activities are underway to further analyse threats to conservation targets and to link the threats directly to socio-economic indicators. Under this initiative, the team at FON is also partnering with the World Resources Institute through a related initiative called "Reef at Risk", which intends to develop more complex databases for modelling human-derived threats to coral reefs. However, the remaining challenge is to incorporate the findings into strategies to effect change in management methodologies so that biodiversity is conserved and the well-being of fishers and their families is improved.

CASE STUDY 4: Wildlife Conservation Society

The Wildlife Conservation Society (WCS) has been working with the management team at Glovers Reef Atoll (one of the most remotely located marine reserves) for over 15 years – conserving the atoll's biodiversity through the proper management of resources. To this end, and using NOAA's SocMon guidelines for the Caribbean, WCS has begun implementing a project to develop and conduct a socio-economic monitoring programme for Glovers Reef. The programme seeks to enhance existing conservation activities, inform future management efforts and provide a mechanism to balance conservation objectives with community needs and concerns over the long term, thus building support for MPAs through improved management and demonstrating the benefits of the Glovers Reef Marine Reserve.

The initiative strikes an interesting balance in the use of primary and secondary data. Much of the secondary data include alternative livelihood research financed by the United Kingdom's Department for International Development (DFID), the works of Palacio and Perez and other national statistical publications, such as the *Belize abstract of statistics* (CSO, 2001)and Belize travel and tourism statistics. Socio-economic data are captured in a survey recently administered to fishers, tour guides and households that includes queries on: community perception of involvement and effectiveness of management, level of awareness, perceived threats and problems, demographics and material style of life, as highlighted in Table 7.

TABLE 7
Data captured in WCS survey instrument

Data type	Description
Demographics	Age, educational attainment, household occupancy levels, employment ranked by contribution to household income, involvement of women in fisheries
Coastal and marine/ fishing activities	Years fished at Glovers, percentage catch from Glovers, no. of days on fishing trip, trip to Glovers, species targeted, gear type used, crew size, where commodity sold, personal description of condition of fisheries 5 years ago vs. today, perception of cooperative spirit, interest in supporting management team at Glovers
Attitudes and perceptions	Awareness of MPA and its zones, rules and regulations, feelings of cooperatives' representative on advisory committee, membership in other organizations, willingness to change occupation, selection of alternative option, etc.
Threats and problems	Problems identified and recommended solutions
Material style of life	Ownership of various assets including land, house, fishing equipment and vessel, household items, land-based transportation. Material used for roof, walls, windows and floors of dwelling unit

Although the initiative has started recently, the main constraint encountered has been the reluctance of some fishermen and households to provide answers to the questionnaires. Initially, some fishermen and tour guides did not want their wives to participate in the survey, but eventually many agreed when the purpose was explained in a detailed, simple manner. Another reason for this reluctance was the feeling that many surveys are being conducted, but fishermen never seem to benefit and no one learns the results.[6] Some respondents were suspicious that the survey was being carried out by the Government and felt that if they were open with their comments, they would be reported. Others were very sceptical and felt it was pointless to participate, as in their opinion the enforcement of the reserve is so weak. The fishermen in Sarteneja were, impressively, the most willing to participate and were very supportive of the survey.

It may be too early to chronicle achievements under the initiative, however a final report and some leaflets of summary findings were to be produced for dissemination to the three coastal communities at the end of 2004 or early 2005. WCS intended to present the findings of their work at community meetings, and the WCS team planned to present preliminary findings of the work at the Gulf and Caribbean Fisheries Institute (GCFI) meeting in November 2004.

CASE STUDY 5: Toledo Institute for Development and Environment

Perhaps the most advanced and comprehensive attempt at using socio-economic data in the management of coastal resources can be found in the management efforts of the Toledo Institute for Development and Environment (TIDE). Through the financial support of a Coral Reef Conservation Grant, TIDE has implemented the Enhance Management Effectiveness of Marine Protected Areas Project. Among other aims, the project intends to develop a complete adaptive-management framework for the Port Honduras Marine Reserve.

Major objectives of the initiative include monitoring and evaluation of the status of and changes in resource populations, the health of the ecosystems, and the governance and socio-economic effects of the reserve. Various socio-economic and governance indicators guided the assessment, including those listed in Table 8. The data were generated largely through primary data collection methods, specifically three questionnaires: a commercial/sport-fisherman survey (22 pages), a household survey (13 pages) and a stakeholder interview (17 pages). TIDE involved community members in data gathering and analysis, and, where available, secondary data and information

[6] The WCS survey was conducted only recently and after the other case studies. As a result of the lack of a coordinated approach between co-management partners throughout the network, respondents seem to be feeling bombarded by many researchers, all asking the same or similar questions at different times.

TABLE 8
Indicators captured in TIDE assessment

Socio-economic indicators	Governance indicators
Household perception of availability of local seafood	Existence of management plan and adoption of plan
Local attitudes and beliefs regarding resources within PHMR	Community understanding of PHMR rules and regulations
Local fishermen and tour guide (fly-fishermen) perceptions of catch	Degree of stakeholder participation in management of PHMR
Perceptions of non-market and non-use value of PHMR	Level of stakeholder satisfaction from participation
Level of understanding of human impact on marine and coastal resources	Amount and quality of training provided to community to enable it to take part in management of PHMR
Distribution of management information to buffer communities	Availability of resources (human and capital) for monitoring of reserve
Material state of life of households	Clearly defined, realistic enforcement procedures
Distribution of income by household	No. of patrols carried out per time period and distribution of patrols over reserve area
	Effective education programme in place on PHMR and marine resources
	No. of stakeholders involved in sustainable income generation activities
	No. of stakeholders involved in monitoring and surveillance

supported the work. TIDE has just completed the first draft of its work (through the efforts of a graduate student), but it is clear that the methodology used and the indicators covered are comprehensive and perhaps even costly.

More important is the fact that the next stage of the TIDE initiative involves communicating the results to stakeholders and developing the adaptive-management framework for the Port Honduras Marine Reserve (PHMR). This process involves evaluating the success of the organization in meeting the goals stated in the management plans, based on the evaluation results. TIDE intends to reprioritize its goals based on the evaluation and the needs of management and stakeholders, and will make whatever changes are required to the management system and daily activities. This process is expected to continue on an annual basis, but may very well prove too costly for management if undertaken at the same scope. Only those indicators most susceptible to change may be chosen for the annual evaluations.

Lessons learned

Without a doubt, there are existing datasets that allow assessment of a broad range of societal issues: characterization, governance, educational attainment, access to services and infrastructure, economic well-being in terms of income generation, and standard of living and basic household assets of fishers, among others. Much of the primary data generation being undertaken seeks to fill existing gaps in data on resource-use patterns. While not much regional and national trend analysis has been undertaken outside of the work of Pantin *et al.*, data are available to facilitate such comparative assessments – particularly on standards of living and the likelihood of displacement due to rapid growth in coastal development, e.g. tourism. However, there seems to be little *awareness* of the fact that comprehensive datasets exist – generated fairly recently. There is also an issue of *accessibility* to that data, as not all datasets are posted on the Web or in annual publications.

To a lesser extent, the literature and the primary data collected have provided a context for understanding issues such as the role of the women and youth in the fisheries, which remains largely undocumented.[7] While the review indicates that

[7] Women and youth in the coastal community of Monkey River, for example, are usually the ones preserving the fish through "corning".

there is an understanding of household income levels, it underscores the lack of a comprehensive understanding of the expenditure patterns of these households, which may help determine the extent to which they are able to save and invest as opposed to living on the edge of poverty.

It is also evident that the socio-economic data available are used by many for resource management purposes – a utility generally found by those "outside of the fishing community", who try to ensure that fishers and their families are not marginalized and that their realities are factored into management strategies. However, it is remarkable that the fishing community has not been able to assist its membership in telling its story in a way that goes beyond the annual publications. In addition, these publications speak to production levels, but they should also address the extent to which lives are improved and/or marginalized as the national economy transforms from agriculturally based to tourism oriented.

For many managers, utilization of socio-economic variables brings into sharper focus the multidimensional nature of the challenge. It highlights the need for coordinated approaches to understanding and solving it, especially where such an approach might prove to be more cost effective and pragmatic, for example in the context of data collection.

CONCLUSIONS AND RECOMMENDATIONS

Extent to which socio-economic and demographic concerns have been addressed

The efforts of Belize to incorporate socio-economic concerns in management focus on transforming governance frameworks from a top-down approach to one that is built on the principles of improving horizontal and vertical integration. (Horizontal integration would be in terms of the various sectors, and vertical in terms of bridging from the top/government to the bottom/community level.) This approach has enabled recognized improvements in the exchange of information and synchronization of policies and programmes. It has also provided local benefits by laying the foundations and prerequisites for increased equity and shared decision-making.

This framework has also supported the consideration of resource use at regional levels. The plans produced for the planning zones established nationwide will undoubtedly impact fishing interests positively in terms of reducing habitat destruction, pollution and land-tenure conflicts. At more localized levels, through MPAs and co-management interventions, the framework has resulted in growing attempts to integrate socio-economic and demographic concerns into the routine management of protected areas, so that park management is not divorced from the human dimension.

These efforts have been extremely challenging in terms of framework maintenance and continued cooperation and interest. Without a strong legal basis, weaknesses have become evident. Moreover, integration has proved to be more costly than anticipated from the time, human and financial resource perspectives. Efforts have highlighted the need for sustainable livelihoods programmes, but they have also documented various barriers for communities and underscore that the challenge is of great magnitude and complexity.

Recommendations for strengthening the use of socio-economic and demographic indicators

Legal issues. Notwithstanding these advances, there is significant scope for deepening the efforts, specifically as they relate to the legal bases for co-management and for the establishment and functioning of the MPAACs. This influences decision-making on resource use and management by providing an avenue through which stakeholders can raise pertinent issues. A process of legislative review and the drafting of specific recommendations for amending relevant legislation could contribute greatly. Such a process would require the assistance of the CRFM and the international community,

as well as from local organizations such as Belize Environmental Law and Policy (BELPO).

Awareness of data and accessibility. There is also a need to build awareness of the availability of key datasets, which can be enabled through further support to the CSO and the Social Indicators Committee in the areas of advocacy and building awareness of the data it generates. Moreover, improvement is needed in the frequency of publication of its data, if only for indicators that are deemed more sensitive and therefore subject to frequent change.

The same is true for data collected and research authorized by the Fisheries Department. There is a need for increased access to its data by the public (whether it be reports or raw data) through regular uploading to a Web site. MPAs and their co-management partners should follow suit, so as to allow a reduction in duplication of effort (particularly in data collection) and improved sharing of information. Technical and financial assistance to these organizations may be required in this area.

Improved understanding. Despite the commendable efforts and accomplishments in the use of indicators in management, indicators should be used to understand specific issues. For example, what impact do international and regional commitments and national economic development trends have at the local level. In an era of globalization and declines in stock for certain species, how do the poorest of the poor fare? Are they able to adapt the alternative livelihood strategies promoted by many? In addition, the mainstreaming of gender and youth issues in resource management, particularly the fisheries sector, has a long way to go, as does the need for improved understanding of household expenditure patterns. International and regional assessments would best be undertaken through the CRFM, perhaps in collaboration with other relevant arms of CARICOM.

In conclusion, Belize as a country has achieved quite a lot in terms of integrating socio-economic information into fisheries and coastal area management, but there is still room for improvement in the way plans are developed for fisheries management, coastal zones and marine protected areas.

ACKNOWLEDGEMENTS

The author acknowledges the following individuals and agencies for willingly sharing the details of their experience, which facilitated the preparation of this report:

Michael Salton of the Caribbean Regional Fisheries Mechanism
Will Jones and Shalini Cawich of Friends of Nature
Robin Coleman and Will Mehia of the Toledo Institute for Development and Environment
Herbert Haylock of the Programme for Belize
Janet Gibson of the Wildlife Conservation Society
James Azueta, George Myvett and Rigoberto Quintana of the Fisheries Department
Leandra Cho-Ricketts and Gina Young of the Coastal Zone Management Institute
Leticia Vega and Glenn Avilez of the Central Statistical Office
Joseph Palacio, Ph.D.

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CASE STUDY

Dominica

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2004

2 Consideration of socio-economic and demographic concerns in fisheries and coastal area management and planning in Dominica

GENERAL COUNTRY INFORMATION

The Commonwealth of Dominica is an island located 15° 30' north and 61° 25' west in the Eastern Caribbean. It is the most northerly and largest island comprising the subregional Windward Islands group. Dominica is situated between the two French-speaking islands of Martinique and Guadeloupe. Located in the middle of the Lesser Antilles, the island has a landmass of 750.6 square kilometres (km²) (290 square miles).

The climate is classified as humid tropical marine, having temperatures of about 27 °C (80 °F) almost year round, with a slight drop from December to February. The island is mountainous and experiences very high rainfall, with an average of 4 445 mm of rain annually. About 65 percent of the land area is covered by vegetation ranging from scrub woodland on the west coast to rain forest in the interior. Dominica has demarcated its maritime boundaries and has established a 200 nautical mile (nm) EEZ, a 24 nm contiguous zone and a 12 nm territorial sea.

Dominica lies in the path of tropical storms and hurricanes, which are a regular climatic feature of the wider Caribbean region.

Population

The 2001 national census estimates the population of the island at 71 727, recording a decrease of 69 over 1991 (Government of Dominica, 2002a), with an annual growth rate of 0.01 percent over 1991 (Population and Housing Census, 2001) and a population density of about 95 people per km², making it the least densely populated of the Windward Islands. The people of Dominica are mainly of African origin, with some mixed ethnic groups resulting from its colonial past (Britain and France). Dominica is also home to the indigenous Carib Indians, the only island in the Caribbean on which they were able to survive the ravages of the colonial powers that shaped the history of this region.

The largest age grouping, 15–64 years, comprises 64 percent of the population, with men and women almost equal in number. The 0–14 and 65 and over age categories comprise 27.8 and 7.9 percent respectively, with women exceeding men by about 1 000 individuals.

The people of Dominica are bilingual, speaking English, which is the official language, and a French Creole. The literacy level is estimated at 94 percent, the birth rate was 16.8 percent in 2000, the infant mortality rate stands at 13 percent, unemployment exceeds 26 percent (Eastern Caribbean Central Bank (ECCB) estimate, 2003) and about 65 percent of the population lives in coastal communities. The urban and rural populations are 30.2 and 69.8 percent respectively.

Economy

There has been a severe decline in the performance of the economy over the last five years. From 1997 to 2000, average economic growth was 0.37 percent. (Government of Dominica, 2002b). In 2002 Dominica recorded a GDP of 685.18 million East Caribbean dollars (EC$), which represented a decline of 4.67 percent (ECCB estimate, 2003). Agriculture, which was the main generator of economic growth through the export of bananas and employed in excess of 8 000 farmers, has experienced a decline in performance due to the impact of trade liberalization. Its contribution to GDP decreased from 38 percent in 1997 to 1.79 percent in 2001. Total domestic exports registered a drop of 19.4 percent.

The fisheries sector contributed 1.87 percent to GDP in 2002. There were 1 592 registered fishers and 796 fishing boats as of 27 July 2004. Of all registered fishers, 40 percent (636) were full-time and 60 percent (956) part-time operators.

Types of exports included bananas, citrus, coconut, cocoa, soap, beverages, herbal oils and extracts. Exports were estimated at EC$115.4 million in 2002 (ECCB estimate, 2003).

Major markets were the European Union, the Caribbean Community (CARICOM) and the United States of America (16 percent). Imports into Dominica were estimated at EC$333.55 million (ECCB estimates, 2003) and included machinery and equipment, foodstuffs, canned and salted fish, manufactured articles and cement. Major suppliers were the Organization of Eastern Caribbean States (OECS), CARICOM, the United States, Canada, the European Union and Japan.

Political, legal and administrative structure

Dominica has a Westminster-style parliamentary democratic government. The island gained independence from England in 1978 and adopted a constitution. There are three political parties: the Dominica Labour Party (the majority party), the Dominica United Workers Party and the Dominica Freedom Party. The President is nominated by the Prime Minister and elected for a five-year term. The President appoints the leader of the majority party as Prime Minister and also appoints members of Parliament from the ruling party as Cabinet ministers on the Prime Minister's recommendation. The Speaker of the House of Assembly is appointed by the Prime Minister. The House of Assembly is composed of 21 regional representatives and nine senators. Elections for representatives and senators must be held at least every five years.

Dominica's legal system is based on English Common Law. There are three Magistrates Courts, with appeals made to the eastern Caribbean Court of Appeal and, ultimately, to the Privy Council in London (retained as the highest court of appeal as an arrangement between Dominica and the United Kingdom after independence).

The island is divided into ten parishes, governed by local government or village councils. Urban and city councils govern towns and urban communities. Supported largely by property taxation and matching funds from central government, the councils are responsible for the administration and regulation of local village activities, sanitation and the maintenance of secondary roads and other public amenities.

INSTITUTIONAL AND LEGAL ARRANGEMENTS FOR THE MANAGEMENT, DEVELOPMENT AND CONSERVATION OF FISHERIES, AQUATIC AND OTHER COASTAL RESOURCES

The institutional arrangements that exist for the management, development and conservation of fisheries and other coastal resources in Dominica include mainly government institutions – and fishers' organizations, community groups and non-governmental organizations to a lesser extent. Table 1 indicates areas of jurisdiction and the roles played by various government institutions in the management of fisheries and coastal resources.

TABLE 1
Government institutions responsible for management, development and conservation of fisheries and coastal resources

Agency	Responsibility in relation to marine resources
Environmental Health Department	Pollution control and water-quality monitoring
Office of Prime Minister	Dominica Coast Guard – enforcement of maritime and marine environmental law, search and rescue
Ministry of Legal Affairs and Immigration	Formulation of legislation for protection of coastal and marine resources and provision of legal advice
Ministry of Finance, Planning, National Security and Overseas Nationals	Planning for coastal development and execution of environmental impact assessment (EIA)
Maritime Administration	Administration of maritime affairs and ship registry, including foreign fishing vessels
Ministry of Communications and Works	Sand mining and removal of stones from shoreline and permit letting, road construction and sea defence works, etc.
MAFE (Fisheries Division)	Sustainable use of marine and coastal resources, including turtles and marine mammals
Forestry and Wildlife Division	Wild life, including turtles and marine birds, and river systems
Environmental Coordinating Unit	Coordination of environmental activities and international environmental conventions and treaties

Source: Fisheries Division, Dominica (2001)

Based on the information given, it was observed that areas of overlapping jurisdiction and conflict existed among government institutions and between those institutions and the fisheries sector. For example, the Bureau of Standards indicated that there was confusion, with three different government agencies setting standards for fish and the same fish products: the Fisheries Division, the Environmental Health Department and the Bureau of Standards.

Information from the Forestry and Wildlife Division indicated that areas of confusion, coupled with a lack of collaboration and cooperation, made its work more difficult and had a negative impact on the fisheries sector. For example, the Fisheries Division, within the Ministry of Agriculture, Fisheries and the Environment (MAFE), has jurisdiction over the conservation and management of the biological resources of beaches in Dominica, including turtles, but not over the substratum or the sand. Fisheries legislation enacted by the Government of Dominica in 1987 gives the Fisheries Division enforcement powers for the protection of undersized and nesting turtles and their eggs, as well as protection of these animals at sea.

The Forestry and Wildlife Division, which is also a department within MAFE, has control over terrestrial matters up to the beach and they, too, are responsible for enforcing protection of turtles on the beach, but not in the sea. There has been some collaboration between these two institutions recently regarding the protection of nesting turtles.

The Ministry of Communications and Works (MCW) is responsible for permits for sand mining on the beaches of Dominica, granting permits to the public for the removal of sand and stones. MCW has no interest in nesting turtles or beach erosion and these mining activities have detrimental consequences for fisheries and the coastal environment.

There is a lack of coordination between the Fisheries Division and MCW. This lends itself to disorganized development in the coastal zone, with dire consequences for coastal and fisheries management.

The Physical Planning Division is the permit agency for erection and establishment of physical structures within the coastal zone. Definite linkages have been identified between this institution and other government institutions in Table 1. However, they are not used to foster organized development and management of fisheries and coastal resources.

Water-quality monitoring is carried out in the laboratories of the Environmental Health Department. Fish inspection and reef monitoring are done by the Fisheries Division.

The Maritime Administration is another institution responsible for the registration of foreign fishing vessels, and it is totally independent of the Fisheries Division. The marine police are responsible for general marine law enforcement, including the rescue of fishers at sea.

Failure to establish linkages at the governmental institutional level results in a disorganized management system, which lends itself to poor management, habitat degradation and user conflicts in the coastal zone.

Fishers' organizations

Fishers' organizations play a small role in the management, development and conservation of fisheries and coastal resources. There are eight registered fishers' cooperatives within the industry, of which five are functional. The cooperatives are mainly service oriented. These organizations are the medium through which the Fisheries Division disseminates information on fisheries development and conservation to fishers within the industry. Management measures have mainly been imposed on these institutions in the past, in the hope of fostering compliance.

However, there is a need for greater participation and involvement of these organizations in actual planning, development and management of fisheries and coastal resources.

Legal arrangements

An incomplete legal framework exists for the management of fisheries and coastal resources. The Fisheries Act of 1987 and territorial sea, contiguous zone and EEZ legislation have been enacted. Regulations were also enacted for the establishment of the Soufriere/Scotts Head Marine Reserve (SSMR) in the south. However, fisheries regulations to give effect to the act have not yet been passed, and this poses a major impediment to fisheries and coastal management in Dominica.

The Forestry and Wildlife Division has different legislation from that of the Fisheries Division. There are also differences in the length of the closed seasons for turtles under the Forestry and Wildlife Act and the Fisheries Act. The closed or nesting season for turtles under the Forestry and Wildlife Act ends in the middle of the breeding season, while that for fisheries regulations (not yet enacted) terminates at the end of the breeding season. In order to avoid changing the legislation, which involves a lengthy process, cooperation on this matter could help provide better management of turtle resources. Poachers have learned of this loop hole and are taking advantage of it.

A beach mining act is in place, but it is not enforced; nor is it tied to the biodiversity of the coastal area in terms of management and conservation. There is no legislation governing the function and role of the environmental coordinating unit in Dominica. This scenario indicates that there is an inadequate legal framework for effective management of marine and coastal resources, and institutional strengthening is needed to achieve this objective.

Administrative arrangements for management, development and regulation of fisheries and aquaculture

Management, development and regulation of fisheries and aquaculture are administered by the Fisheries Division. The chief fisheries officer is the head of the division and, in collaboration with the rest of the staff and subdepartments, presents development plans, gives management advice and enforces fisheries regulations. The administrative structure involves the Minister of Agriculture at the top, followed by the Permanent Secretary, to whom the chief fisheries officer is responsible. The final authority regarding fisheries management decisions is a political one taken at the Cabinet level.

Aquaculture is done on a very small scale, and the Fisheries Division is also responsible for research and development in this area. This includes identification of aquaculture sites, pond construction, development of water systems, pond management and hatchery operations, etc. The Forestry and Wildlife Division has responsibility for the administration of freshwater aquatic resources, but does not engage in aquaculture development on the island.

Administrative arrangements for conservation and rehabilitation of the coastal environment and aquatic resources

Administrative arrangements currently in place involve the Fisheries Division, Environmental Coordinating Unit, Forestry and Wildlife Division and Lands and Surveys Department, all of which are under MAFE.

Other administrative bodies with major influence on the coastal environment are the Physical Planning Division and MCW. MCW is particularly involved with rehabilitation works in the coastal environment, including coastal infrastructure development, sea defence walls and protection from coastal erosion.

Administrative arrangements for regional planning and development in coastal regions

The Ministry of Foreign Affairs, Trade, Labour and the Public Service administers regional planning and development for matters external to Dominica. All matters of regional concern have to be approved by this ministry for purposes of diplomacy and political correctness. However, once approval is granted, the actual coastal development works are done by this ministry through its Committee on Trade and Economic Development and by MAFE through its relevant divisions, the National Development Corporation and the Tourism Division.

Past and present efforts in the field of co-management of fisheries and coastal aquatic resources: constraints encountered, results achieved, future outlook and next steps

For several years, the Fisheries Division has made moderate strides in the field of co-management of fisheries. These include fostering the development of strong fishers' groups and institutions, which would be able to undertake fisheries management roles and work alongside the Fisheries Division to achieve this objective. Most of the existing groups and fishers' cooperatives are not yet sufficiently developed to be actively involved in the management of fisheries resources.

The establishment of the SSMR was legalized in 1998, and it has since experienced varying degrees of success in developing co-management of fisheries and marine resources. The organizational structure of the SSMR involves the village council, scout troop, village improvement committee, hoteliers, the Dominica Water Sports Association and area fishers' groups. This arrangement represents a first step towards co-management in the fisheries sector.

The beach-seine fisheries in Dominica are another example of co-management initiatives. Fishers themselves have developed rules by which the fisheries were managed with little input from the Fisheries Division.

Constraints on fishers' organizations include: lack of cooperation among fishers, limited administrative and financial management skills, difficulty in attracting younger fishers into the industry, reluctance of fishers to integrate into the wider society and lack of adequate representation of fishers at decision-making levels.

In the case of the SSMR, fishers are intimidated to some degree by people perceived as being more educated or who enjoy higher social status. There is a tendency to favour tourism activities over fisheries, and the command and control system of management is still very prevalent in the area.

In terms of achievement, some degree of institutional capacity for co-management has been achieved. Education and awareness-building are ongoing, and there is a need for greater participation and involvement of the wider community to achieve effective co-management.

Past and present efforts in the field of integration of fisheries and coastal aquaculture into coastal area management, planning and conservation: constraints encountered, results achieved, future outlook and next steps

There have been no planned programmes in Dominica to integrate fisheries into coastal area management. However, some initiatives, such as the Cabrits and Pottersville sea defence projects, have incorporated fisheries to an extent into management of the coastal area. The Dominica Biodiversity Strategy and Action Plan and the Caribbean Planning for Adaptation to Climate Change projects, attempted some integration of fisheries into coastal area management, planning and conservation. The Integrated Development Plan identified various components of the national economy and their relevant linkages in an effort towards integration. However, this plan did not integrate fisheries to any extent, mainly due to the low priority given this sector by other government agencies.

Constraints encountered included: little understanding of the dynamics of fisheries, failure to make the necessary linkages with fisheries and other coastal economic activities such as road construction, hotel development, building excavation, garbage disposal, etc. Fisheries were not prepared to play an active role in management of coastal resources, and this was mainly due to the disorganization of the fishers. Cooperation and collaboration were lacking between the fisheries sector and other sectors, agencies and entities within the coastal area, as well as awareness of the impact of land-based activities on fisheries and coastal areas. Fishers had poor or no representation at decision-making levels. One of the greatest constraints was the social and economic forces at play in terms of the balance of power in the coastal area (Guiste, 2003).

Results have not been very encouraging. However, some moderate progress has been made in community awareness and involvement in the planning of coastal development and activities. The future requires a greater concentration of effort on identifying relevant stake holders in the coastal area in order to minimize user conflicts and move away from the sectoral planning approach to a more integrated development planning approach.

CONSIDERATION OF SOCIO-ECONOMIC AND DEMOGRAPHIC CONCERNS

The consideration of demographic and socio-economic concerns in fisheries and coastal area management and planning is critical in addressing the issue of sustainable livelihoods of fishing communities. Based on a comparative analysis of socio-economic conditions in the Caribbean region, Baker (1997) indicates that Dominica had the highest incidence of poverty in the OECS grouping.

Some fishing communities have been identified as being among the rural poor (Caribbean Development Bank (CDB), 2003). Fishers tend to have many children, unsatisfactory housing and living conditions, low income, inadequate sanitation facilities and extended family structures, among other issues. The economic aspects of return on investment versus resource availability, cost-benefit analyses, and fisher- and community-dependent indicators – as was done for the flyingfish fishery (Guiste, 2001) – are all very important considerations in improving the socio-economic condition of fishers and their communities in Dominica.

Availability of socio-economic and demographic information on coastal fishing communities: study reports and agencies that have conducted studies, including fisheries censuses

There are no known dedicated fisheries censuses for Dominica per se. However, some

socio-economic and demographic studies or reports done on the island have included fishing communities to an extent. Some of the studies include the following:

Country poverty assessment
The Caribbean Development Bank, in collaboration with the Government of Dominica, conducted a comprehensive poverty assessment in 2001/2002. The assessment was done using seven sample communities, including the fishing communities of Dublanc, Scotts Head and the Carib Territory. The methodology involved a questionnaire on living conditions, community surveys, statistical sampling techniques, transects, poverty indicators, head-count ratios, data collection, validation and analysis. It also involved the use of the participatory poverty-assessment approach.

The study report (CDB/Dominica, 2003) showed that the incidence of poverty was not homogeneous, but spatial and geographic in nature. The vulnerable groups indicated in the study were youth, displaced farmers, women heading households and the elderly. All the groups identified in the study exist in most fishing communities.

Dominica Rural Enterprise Project: appraisal report
The Dominica Rural Enterprise Project was funded by CDB through a loan to the Government of Dominica and was executed by the International Fund for Agricultural Development (IFAD, 1995). The main objective was to identify a means to increase the income-earning capacity of people in rural communities in Dominica, including fishing communities. The project was implemented by MAFE.

Areas of focus included feeder-road construction for agricultural development purposes, marketing, small business and fisheries development.

Social and economic study on the flyingfish fishery sector of Dominica
This study was in the form of a paper prepared for FAO (Guiste, 2001). The objective was to determine the social and economic importance of the flyingfish fishery to the island and to compare it with other islands to further determine its importance to the Caribbean region.

The report highlighted the socio-economic aspects of that fishery and utilized demographic information such as housing, education, health facilities and access to credit for flyingfish fishers. The issues of income and expenditure from the fishery, cost-benefit analysis and the social interactions that influenced the nature of the fishery were also addressed. The Fisheries Division conducted the study using primary and secondary data from within the fishing industry. Catch and effort data were obtained from the division, and information on revenue and expenditure for the fishery was obtained directly from fishers through a questionnaire.

Dominica/European Community: country strategy paper and national indicative programme for the period 2002–2007
This ongoing project has a broad social and economic scope. It seeks to provide 3.7 million euro over the life of the project to cover macroeconomic support, sectoral policies, and programmes and projects in support of focal and non-focal areas of community assistance. These include restructuring of the banana industry, agricultural diversification and support for social sectors. It is also intended to cover unforeseen needs such as emergency assistance, debt-relief initiatives and support to mitigate adverse effects of instability in export earnings.

National opinion poll on socio-economic conditions in Dominica – 2001/2
This poll was conducted by the Dominica Academy of Arts and Sciences in 2002. Its objective was to provide a base value for the measurement of economic growth, for the purposes of comparison, and to measure changes in the socio-economic conditions

of Dominica as the people themselves perceived them. It was, therefore, an opinion survey and not a quantitative measure of the economy of Dominica. The method used was based on random sampling of residents from 21 constituencies around the country using a questionnaire. The results indicated that there were generally low ratings for government services in comparison with private-sector services, with media and banking services receiving the highest ratings.

Use of socio-economic and demographic indicators in the preparation of coastal area profiles and management/development plans

Socio-economic and demographic indicators have been used to some extent in the preparation of coastal fisheries development and management projects in Dominica. Some examples are given:

Roseau Fisheries Complex

The Coastal Fisheries Development Project used data from government estimates of economic performance on the fisheries sector and its contribution to GDP. In addition, primary data were collected by the Fisheries Division on: the number of fishers the project would serve; estimates and projections of the increase in numbers of fishers, vendors and middle men that would be attracted to the industry as a result of the project; fishing fleet; estimated income from fishing; and the projected increase in income after completion of the project. An estimate of the number of beneficiaries, including both fishers and non-fishers, was considered in the planning stages.

The existing fish production capacity in terms of the size of the fishing fleet was compared with the presumed capacity after project implementation. Information for estimating the income-generating capacity for fishers, fish vendors and exporters was also utilized in project planning.

Demographic information on training needs, available skills, people's capacity to manage the facility and the involvement of women was also considered in order to ensure maximum use of the facilities upon completion.

Marigot Landing Site Improvement Project

Consideration was given to the use of social, economic and demographic information in the planning stages of the Marigot Landing Site Improvement Project. Information on the major income-generating and economic activities in the Marigot area was obtained from primary sources, since it was not available prior to the project. A design team from Japan conducted a study to verify and justify the magnitude of the project and to plan effectively.

The area population was taken from the national census. Skills available in the area were also considered, since the project would require certain skilled personnel for marine mechanics, maintenance and repair of outboard engines, inboard diesel engines and refrigeration equipment. This information was obtained from primary sources.

Fishing-fleet and catch-and-effort data were considered in planning the project. They were used to determine the capacity of the facility and to project future development, as well as to integrate the fisheries into development of the coastal space. For example, the port authority was involved in the project, as well as the customs and excise department. Their involvement made it possible to consider the social dynamics of the area and the influence that the fisheries project would be anticipated to have on the various sectors of the Marigot community and the general population of the area. Demographic studies were used to determine the extent to which certain amenities should be incorporated into the project to serve the community as a whole, rather than only the fisheries sector. The relative age distribution of the fishers was taken into account, as it was observed that up to 65 percent of fishers from the Marigot area were

over 55 years old. This prompted the Fisheries Division to create incentives to attract younger people into the industry.

In addition, demographic information on traffic flow near the project site was considered in the planning stages. Flight information on movement of aircraft to and from the Melville Hall airport was also taken into consideration, because it was anticipated that the project would present an opportunity for the export of high-quality fish from the Marigot landing facility.

Preparation and implementation of special projects – in the context of fisheries and coastal area management and conservation programmes – that aim to improve the socio-economic well-being of coastal fishers and their families

Dominica Rural Enterprise Project

This is a special project prepared by IFAD and CDB and implemented by MAFE. It aims to improve the socio-economic well-being of specific disadvantaged coastal and inland communities. The project created a credit for fishers, administered by local credit unions existing in or very close to targeted fishing communities. An assessment of the needs of the most disadvantaged fishers was made and, based on a recommendation of the Fisheries Division, individuals were given boats and engines on credit with no collateral.

During implementation of the project, severe constraints have been experienced. First, the project is managed by non-fisheries staff. Although the Fisheries Division had some input into choosing candidates for the project, the advice of the fisheries officers was not heeded. The division advised the project that fibreglass boats should be constructed instead of wooden boats. However, wooden boats were built and stockpiled in a shed for a few months before they could be handed over to the fishers in one official ceremony. This waiting period caused the boats to crack and leak, and some were attacked by wood termites and damaged before they could be used. Some of the boats had to be repaired before they were delivered and launched.

Second, the project management unit did not study the habits, likes and preferred styles of boats of the fishers, who had had specific boat builders in the past. The Fisheries Division advised the project to allow fishers to choose their boat builders, but the managers paid no attention. They decided to sign a contract with one boat builder for the building of all the boats required under the project. As a result, fishers refused some of the boats.

Owing to the problems encountered with the boats, some fishers fell into arrears on their loan repayments. The credit institutions had to write off three boats as bad debts.

The project also involved the construction of fishers' locker rooms and mooring facilities in the coastal area, but initially there was very little involvement of fishers. In Scotts Head, the construction included facilities for street vendors as well as facilities for fish handling. The street vendors had to be accommodated because they were displaced by the project site at which the lockers were to be constructed. The area is also a prime tourist site, and the new development was integrated into the rest of the community.

Upon completion, however, the facility did not have a management plan and, as a result, remained unoccupied for a very long time. No handing over ceremony took place, the fishers got impatient and locals started vandalizing the facility out of frustration.

The project was also providing for the establishment of two gas stations for fishers. By this time the project management unit had learned from its previous experiences and fully involved the fishers in the negotiation and planning processes. This subproject is ongoing, and the installation of the gas stations has also involved the local community, because it is intended to serve vehicle drivers as well as fishers.

The future looks very promising for this particular subproject. The fishing vessel component experienced only partial success and the fishers' facilities could be salvaged if proper management systems were put in place. The fishers could have been responsible for the facilities and put their own management system in place, but responsibility was left to the Fisheries Division, which did not devote enough attention to managing the infrastructure.

Small project in Layou

The fishers of Layou village embarked on a small, five-mile longline project, which was sponsored by the OECS Natural Resources Management Unit in 2001. The project included the purchase of a fibreglass boat, a 75 horsepower outboard engine, a line hauler, longline material, a hand-held radio and global positioning system units, as well as life jackets, flares and other safety equipment.

The implementation met with limited success. Problems arose with the management of the boat and equipment and with a lack of unity and cooperation among the fishers. The community was not well integrated into the delivery of this project. This could have been another reason for the very limited success experienced. Lack of an appropriate management mechanism meant that no one was specifically responsible for the maintenance, repair and upkeep of the fishing equipment. In addition, fishers in the area were mainly seine fishers, and the equipment given was for deep-sea fishing for migratory pelagics. Fishers complained that better use could have been made of the equipment if a fish-aggregating device had been provided.

In the future, fishers should be more involved in the planning of projects intended for them, and management must become a key focus in the planning stages.

World Food Programme Project

This project aimed to develop land-based infrastructure in order to enhance the livelihoods of fishers and their families. It consisted of jetties, slipways to facilitate landing of boats on the beach, locker rooms for storage of gear and equipment, and net and boat repair sheds that allowed fishers to work in a sheltered area.

Sponsored by the World Food Programme, the project was implemented in 1993 by the MCW in collaboration with the Fisheries Division. It benefited five fishing communities on the west coast of Dominica. The coastal area was enhanced as a result and also realized synergies in non-fisheries benefits, which accrued as a result of the new facilities. For example, the jetties were used extensively by hawkers, who traded in agricultural produce in the neighbouring French islands. These traders used fishing boats to transport their produce, but the fishers themselves hardly ever used the jetties for landing fish.

It was observed that in most cases the jetties were too high for the small boats for which they were built and could not be used. The decking of the jetties, which was made from wooden planks instead of solid concrete, was washed away during heavy seas, and there was no system in place to repair it. The jetties remained practically non-functional for extended periods.

The lockers in some villages, such as Capuchin and Viellecase, fell into disrepair owing to the absence of an organized management system for upkeep of the facilities. There was also limited capacity among the fishers for managing their own affairs, due to a lack of training and of unity. Lack of community involvement and ability to integrate into the larger society also contributed to this undesirable outcome.

In the community of Bioche, however, the local village council got involved in management of the facility, because it was the only place in which the community could conduct activities. A fisheries group was organized and a payment system for the locker rooms implemented. This has led to the facility being properly maintained. This injection of management skills from the council and other members of the community

assisted the fishers immensely. The facilities became community owned rather than belonging to fishers only, and the community properly integrated the facilities into the wider society. This project was very successful. The other areas met with varying degrees of success, although, for all the projects, management was a prime factor.

Marigot Landing Site Improvement Project

The project is funded by the Government of Japan and implemented in collaboration with the Government of Dominica. The landing site improvements are presently under construction. The site aims to provide fish landing, handling and processing facilities to improve the socio-economic life of the fishers, the entire community of Marigot and the surrounding villages of Woodford Hill, Wesley and the Carib Territory.

One of the major achievements of the project is the cooperation of the Marigot community during its implementation. Some land owners who are not fishers willingly allowed access roads through their property to the project site, and other individuals allowed piping for water to the facility to be laid on their property. In addition, there has been tremendous interest in and integration of the rest of the community into the coastal area occupied by the project site.

The project offers a great occasion to integrate fisheries into the management of the coastal area. There is also a strong sense of ownership of the project in the community. Many view the facility as an opportunity for economic growth and social development and are therefore very supportive of it.

The project still faces the challenge of the management system to be employed for smooth operation of the facilities after completion. This is particularly because of the very large number of stakeholders who have come forward with many ideas for operation and management.

Use of socio-economic and demographic indicators in monitoring the impact of management regulations on the socio-economic well-being of coastal fisheries, their families and others

There are no known, documented studies indicating the use of these indicators in monitoring – mainly because there are no legal fisheries regulations. However, there have been communities that have reacted to certain management decisions of the Fisheries Division and other sectors. In such cases, unplanned or disorganized monitoring has been done to alleviate and pacify the situation.

For example, the turtle resources of the Rosalie and Laplaine areas of Dominica have been receiving some attention regarding their management and conservation. A turtle-watching programme has been implemented in these nesting areas, with mixed reactions from the public. Some who used to poach nesting turtles have suffered an imposed change of behaviour, while others see the programme as an invasion of local culture and of a people's way of life. Enforcement of conservation laws (under the Forestry and Wildlife Act) has also met with stiff resistance by people that, in some instances, have threatened wardens with violence.

In such cases, management regulations have had some negative impact on the socio-economic life of the people. This situation has become particularly serious in the light of the present poor economic situation of the country. People have been laid off work and salary reductions effected, with the purchasing power of the public being reduced as a result.

Another example involves closed seasons for lobster and conch. No studies have been done using socio-economic or demographic indicators to determine the impact of this, and other such management measures, on the social and economic lives of fishers and their communities – neither in the long nor the short term. However, it is generally understood that fishers would strongly resist management measures that curtail their activities.

Such information or observations have not been captured and used as demographic indicators to monitor the impact of management regulations in any formal way.

CONCLUSION AND RECOMMENDATIONS

Conclusion

Socio-economic and demographic concerns have been addressed to a limited extent in fisheries resources management, planning and conservation in Dominica. In recent times, such information has been used in planning fisheries infrastructure development to determine the size and capacity of fisheries land-based facilities. Demographic information on the size and average age of the fishing population in some zones has been used for planning purposes and for projection of the size of the fishing fleet and potential fishing effort. In the 2004/2005 work plan of the Fisheries Division, information on full- and part-time fishers has been applied in determining levels of fishing effort and in informing strategies that could be undertaken to increase fish production. Such strategies include providing the necessary incentives to convert part-time into full-time fishers.

Some socio-economic studies have included fishing communities. However, except for foreign funding agencies that demand such data when funding projects, such as the Japan International Cooperation Agency and the European Union, socio-economic and demographic data have not been considered extensively in fisheries management in Dominica.

Management of the beach-seine fisheries also involves tremendous social interaction and rules that have been recognized by the fisheries management authorities. The rules have been utilized in the actual management of the fisheries resources, and this has brought about an almost self-policing mechanism in terms of management of the coastal pelagic fishery. The process has reached the point where management measures suggested by the fishers and fishing communities have been incorporated into the draft fisheries conservation laws of Dominica.

There have been some isolated areas in which the need for socio-economic and demographic data has been addressed in the planning, management and conservation of fisheries, and to a much lesser extent in the management of coastal resources. Nevertheless, this has not been a common practice or a generally established principle. This has led to underutilization of scarce resources, limited planning capacity and ineffective fisheries management strategies and programmes.

Recommendations

This case study report recommends:

- That the concept of integration of fisheries into coastal area management be considered as the basis or overall framework within which relevant social, economic and demographic indicators are used for the most effective results in planning, conservation and management.
- That fisheries and coastal resources be viewed as a dynamic system with various components, which include fisheries, tourism, recreational activities, coastal development, commercial activities and private and public ownership of coastal properties, and that socio-economic and demographic indicators be applied in the wider context to include all the components of the system and their relevant interactions and interdependencies.
- That assistance be given to CARICOM member states to help identify and map the appropriate boundaries of the coastal system to include the relevant areas and the corresponding socio-economic and demographic indicators that impact them.
- That an appropriate legal framework be formulated within which management and conservation of fisheries and coastal resources could be effected from information

derived from socio-economic and demographic data, and that protection be provided for minority groups and entities within the coastal system that are at risk of being marginalized by more powerful forces with stronger political affiliations or economic status.

- That greater awareness of the need for collection and use of socio-economic and demographic data in fisheries and coastal resources management be promoted through the establishment of appropriate programmes and activities.
- That organized training programmes including social sciences in fisheries and coastal area management be implemented to impart new skills to the personnel of the various fisheries departments in the region, in order to strengthen or enhance capacity in that area.
- That a regional subproject be developed within these programmes for the purpose of analysing socio-economic and demographic data for use in planning, management and conservation of fisheries and coastal resources, considering that most fisheries personnel in the region are biologists or fisheries scientists.
- That regional institutions with the relevant capabilities and expertise be used as far as possible in building and strengthening the regions' capacity for collection, analysis, dissemination and use of such information in fisheries and coastal resources management.
- That the external institutions that could be involved include, *inter alia*, the University of the West Indies, FAO, the International Development Research Center, OECS and CARICOM, the Canadian International Development Agency and Japan International Cooperation Agency.
- That local institutions include the Fisheries Division, Central Statistical Office, community groups and organizations, fishers' cooperatives, village councils, the Dominica Hotel and Tourism Association, Dominica Port Authority, Ministry of Communications and Works and the Physical Planning Division.
- That all foreign assistance geared towards capacity-building and institutional enhancement of socio-economic and demographic indicators, as it relates to fisheries in the CARICOM region, be channelled through the Caribbean Regional Fisheries Mechanism. It has a well-established process for networking, provision of training, identification of appropriate human and other resources, relevant expertise and a well-organized system for dissemination of information in the entire region.

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CASE STUDY

Jamaica

G. André Kong
Fisheries Division
Ministry of Agriculture
2004

3 Consideration of socio-economic and demographic concerns in fisheries and coastal area management and planning in Jamaica

GENERAL COUNTRY INFORMATION

The Maritime Areas Act 1996 confirmed Jamaica's status as an archipelagic state by establishing straight archipelagic baselines joining the outermost points of the outermost islands and drying reefs of the archipelago. The main island of Jamaica is located at 18° north and 77° west, about 145 km south of Cuba and 161 km west of Haiti. The tropical maritime climate is modified by the northeast trade winds and land-sea breezes. The average temperature is 27 °C, ranging from 23 °C in winter to 28 ° C in summer.

The main island's terrain presents east-to-west interior mountain ranges along almost its full length. The highest elevation, the Blue Mountains, rises to 2 256 metres (m). The island is 236 km long and between 35 and 82 km wide, with a total area of 10 991 km^2. The coastline is 1 022 km long and is punctuated by numerous coastal features such as bays, beaches, estuaries, harbours, lagoons, mangrove swamps and rocky shores. The relatively wider south island shelf attains its maximum width of 24 km due south of the parishes of St. Catherine and Clarendon. The eastern section of the south shelf is dominated by large reef systems. The narrower north shelf (maximum width 1.6 km, less than one nautical mile) is characterized by fringing coral reefs. The island shelf and nine proximal banks have a total area of 4 170 km^2.

The archipelagic waters, approximately 12 000 km^2, include the Morant Bank and most of the Pedro Bank. The territorial sea is 12 nautical miles from the archipelagic baseline. Jamaica has not yet completed maritime boundary delimitation negotiations with all the states concerned. However, the total area of Jamaica's EEZ is estimated at 274 000 km^2. Located within the EEZ, to the northeast of the mainland, are several small banks (i.e. the Henry Holmes, Albatross, Grappler and Formigas).

Jamaica's oceanic banks rise abruptly from depths of well over 500 m to a submarine plateau with mean depths of 20–40 m. On some banks, depths of less than 20 m are encountered in areas where reefs, cays and shoals are present. Proximal banks to the south are the New, Blossom, Waltham and Dingle banks and to the northeast the Grappler, Henry Holmes, Formigas, Albatross, Morant, Bowditch and Salmon banks. Offshore are the Pedro and Morant banks and Alice Shoal, which is located in the Joint Regime Area, a maritime space shared with Colombia, between the Seranilla and Bajo Nuevo banks.

The Morant Bank is located east of the main island (about 100 km^2). The Morant Cays serve as a base largely for fishers from the eastern section of the island. The Pedro Bank is located to the south of the main island. This bank has a total area of 8 040 km^2, a submerged plateau with depths ranging from 0 to 50 m and an average depth of 24.5 m. The circumference of the bank is about 590 km. There are westerly currents of about 1.5–2.5 knots. The bottom consists of sand flats, sparse coral cover and seagrass

beds. On the southeastern section of the bank are three small cays, the North East and Middle Cays, both inhabited by fishers (some up to 11 months of the year), and the South Cay, a designated bird sanctuary.

Population

The 2002 census estimated Jamaica's population at 2 624 700, with a population growth rate of 0.5 percent. The ethnic composition of Jamaica is as follows: blacks 90.9 percent, East Indians 1.3 percent, whites 0.2 percent, Chinese 0.2 percent, mixed 7.3 percent and others 0.1 percent. The labour force was estimated at 1 115 600 in 1999 with the agriculture sector employing 5.8 percent. In the same year, unemployment stood at 16 percent. The average household size in 2001 was 3.4 people, with rural households continuing to be slightly larger (average size of 3.7).

The population distribution remained the same as in 2000. The majority (57.8 percent) were of working age, 32.9 percent were children 0–4 years, and people 65 years and older made up 9.3 percent.

The incidence of poverty decreased in 2001, moving to 16.8 percent from 18.7 percent in 2000. Rural areas experienced a decline to 24.1 percent from 25.1 percent in 2000. For the Kingston Metropolitan Area compared with other towns, the incidence of poverty was 7.6 percent and 13.3 percent respectively, moving from 9.9 percent and 16.6 percent respectively for 2000.

Economy

At the end of 2001 the real gross domestic product (GDP) amounted to J$19 940.2 million. The contribution to GDP (in producer values) in 2001 by the agriculture sector was J$1 451.0 million, with fisheries contributing J$86.4 million (at constant 1986 prices). Overall percentage contribution to GDP by the agriculture sector was 7.3 percent, with fisheries contributing about 0.4 percent (Report of the *Economic and Social Survey Jamaica*, 2001).

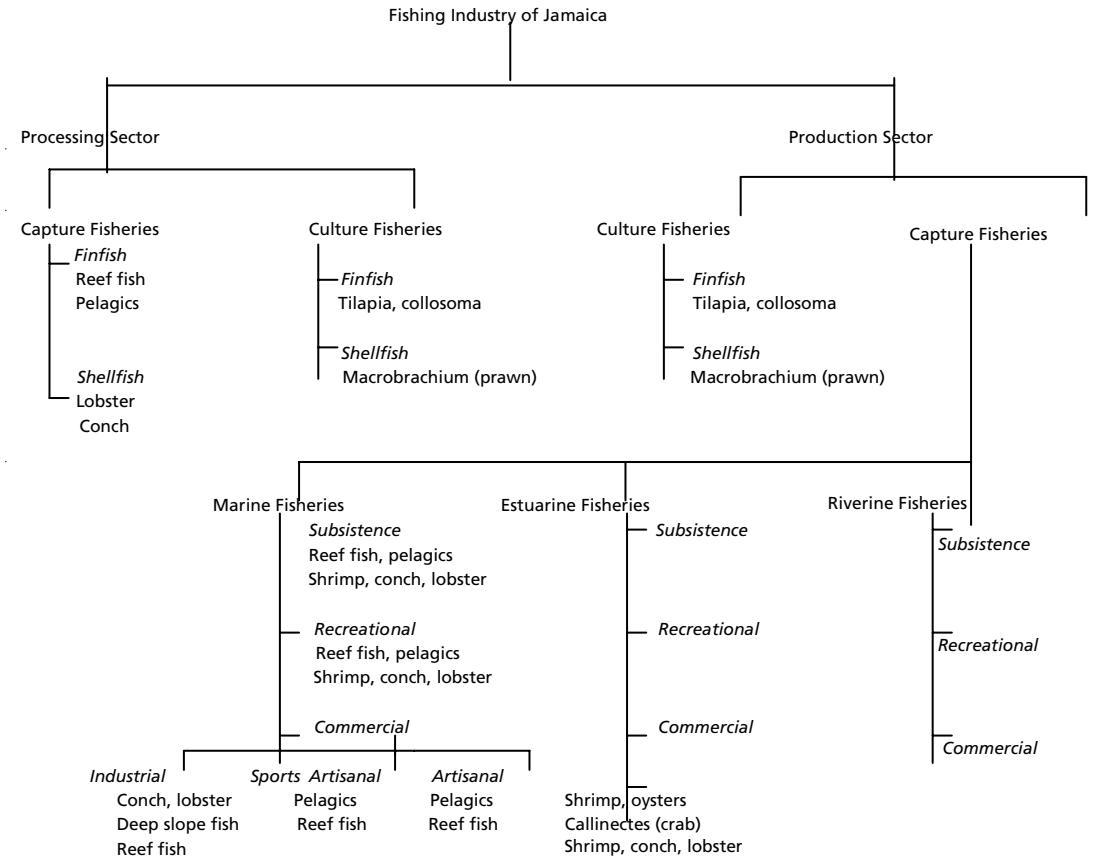
Fisheries sector

Fishers involved in marine capture fisheries. Figure 1 provides a general overview of the current structure of the Jamaican fisheries sector, which can be broadly divided into processing and production subsectors, with both having capture and culture fisheries elements. The primary captured fishery species processed for exportation are conch and lobster, while the red hybrid Tilapia are the dominant cultured species processed. Most capture fishers are artisanal and operate small boats. Only a small number engage in industrial fishing, mainly on Pedro Bank, for conch, lobster and finfish. An even smaller number are engaged in the tourism sector on charter and sport-fishing boats. There are also relatively small recreational and inland waters capture fisheries. However, very little information on these is currently available.

In 2004 there were 15 392 registered fishers in Jamaica, but estimates indicate that there may actually be over 20 000 Jamaicans engaged full and part time in fishing. According to the licensing and registration data of the Fisheries Division, Ministry of Agriculture, some 5 percent of registered fishers are women, and they actively engage in fishing at sea. Surprisingly, just under 43 percent of registered fishers reported having a primary school education, while about 50 percent indicated that they have at least a high-school level education. These figures are considered significantly high and are in striking contrast to the experience of the Fisheries Division, which found that a relatively high proportion of fishers are illiterate. The data also reveal a pressing need for self-empowerment of fishers through fishers' organizations, as only 6 percent of all fishers registered are or have ever been associated with one (Tables 1a through e).

In addition to those going to sea, a large number of people, mainly women, engage in fish processing, onshore as fish cleaners or in processing plants, and in marketing

FIGURE 1
Schematic diagram of the organization of the Fisheries Sector



as higglers (pedlars). Many women engaged in marketing are also boat owners. A large number of artisanal fishers, in particular on the north coast, have incomes well below the poverty level, and many have been known to leave the fisheries, although finding alternative employment is very difficult.

Fisheries production. Over the past several years, production in the fisheries subsector has remained relatively constant, with production in aquaculture ranging from approximately 3 000 tonnes in 1997 to 5 995.44 tonnes in 2002. Total production in the marine capture fisheries recorded a decline in 2003, partly as a result of decreased landing of finfish and partly as a result of prudent management, which dictated a decreased total allowable catch for conch (Table 2a). The continued decline in exports is also partly due to the sustainable management of the Queen Conch fishery, in which a progressively lower catch quota has been set in consecutive years since 1995 (Table 2b). Jamaica continues to be a net importer of fish and fish products, importing some 60 percent of total demand annually (Table 2c).

TABLE 1A
Family status

Status	No. of fishers
Common-law	3 896
Married	3 354
Divorced	75
Single	6 613
Widow/widower	69
Other	83

TABLE 1B
Time in the fisheries

Status	No. of fishers
Full time	11 188
Part time	2 808 (20%)
No time	82
Unknown	3

TABLE 1C
Gender

Status	No. of fishers
Men	13 379
Women	691 (5%)

TABLE 1D
Educational status

Status	No. of fishers
Primary	5 316
Secondary	5 138
Traditional high	1 172
College/university	602
Elementary	305

TABLE 1E
Cooperative affiliation

Status	No. of fishers
Cooperative member	852 (6%)
Non-coop. member	13 238

Source: Fisheries Division Database, Licensing and Registration System

In 2004 total capture fisheries production was estimated at 9 532.53 tonnes (Table 2d).

Marine capture fisheries: present status of fleet**.** The main vessel category (95 percent) consists of open canoes made of reinforced fibreglass plastic, powered by one or two outboard motors (25–75 horsepower, but mainly 40 HP). These boats range in size from 3.6 to 9 m (Table 3). There are still some non-mechanized boats generally propelled by oars, made of wood or a mixture of wood and fibreglass. There are also decked vessels (5 percent), generally made of steel, with lengths from 15 to 30 m. At the end of 2002 there were 4 154 registered fishing boats.

TABLE 2A
Fisheries production (tonnes) in Jamaica (1997–2003)

	1997	1998	1999	2000	2001	2002	2003
Finfish	5 578.75	4 160.98	6 283.74	4 585.55	4 348.57	7 000.00	4 594.92
Conch	1 821.20	1 700.00	1 366.00	0.00	946.00	946.00	504.25
Lobster	269.63	169.66	329.90	517.30	943.39	358.67	300.00
Shrimp	67.04	14.54	4.49	36.67	38.50	37.54	37.00
Others[1]	10.25	-	-	-	51.38	144.00	456.00
Tilapia[2]	4 200.00	4 300.00	4 500.00	~4 500.00	~5 000.00	5 851.44	2 512.50
Total marine fish production	7 746.87	6 045.18	7 984.13	5 139.52	6 327.84	8 342.21	5 436.17
Total Tilapia production	4 200.00	4 300.00	4 500.00	4 500.00	5 000.00	5 995.44	2 968.50
TOTAL fish production	**11 946.87**	**10 345.18**	**12 484.13**	**9 639.52**	**11 327.84**	**14 337.65**	**8 404.67**

[1] Includes shrimp produced by mariculture.
[2] Produced by aquaculture.

TABLE 2B
Export of marine fish products (1997–2001)

	1997	1998	1999	2000	2001
Quantity (kg)	3 180 477.00	2 536 716.00	1 936 580.00	840 459.00	956 013.00
Value (J$)	547.309 847.00	538 817 649.00	572 603 213.00	427 254 801.00	437 912 645.00

TABLE 2C
Import of fish products

	1999
Quantity (kg)	30 350 457.00
Value (J$)	2 191 342 690.00

TABLE 2D
Marine production

Type	Quantity (tonnes)
Finfish	8338.40
Shrimp	37.00
Lobster	567.13
Conch	590.00
Total	9 532.53

The fleet of 'semi-industrial' vessels is used for fishing on the Pedro and Morant Banks and also for transporting fish and supplies from and to the banks. For the seasonal conch fishery, extra boats with crew are leased from other countries, mainly Honduras.

Fishing areas and access. Under the present policy and legal regime, all fisheries are operated on an open-access basis except the industrial conch and lobster fishery and the artisanal fisheries on Pedro Bank. The capture fisheries areas can be broadly divided into five main areas:

- In-shore fisheries in the coastal waters of the main island, including nine proximal banks, usually subdivided into north coast and south coast. This area is severely overexploited.
- Fisheries on the Pedro and Morant banks. These banks are exploited, perhaps at or near their estimated maximum sustainable yield as far as conch and lobster are concerned. The reef finfish resources are overexploited. Access is limited, but heavy poaching occurs.
- Deep-sea fishing in all deep waters around the island and banks. The deep waters are only lightly exploited and mainly with very primitive gear.

TABLE 3
Boat material and size

Material	Number	%	Length (m)	Number	%
Fibreglass	2 697	70	1–3.9	111	28
Wood	860	22	4–8.9	3 106	79
Fibre/wood	209	5	9–25	689	17
Steel hull	56	1	>=26	7	0.2
Aluminium	11		Other	37	1
Other	41	1			
Total	3 874	100	Total	3 950	100

- Jamaica/Colombia Joint Regime Area near Alice Shoal. The extent of Jamaica's fishing effort in this area is unknown at present.
- Inland (riverine) areas, especially large river systems (e.g. the Black River).

INSTITUTIONAL AND LEGAL ARRANGEMENTS FOR THE DEVELOPMENT AND MANAGEMENT OF FISHERIES AND AQUATIC AND OTHER COASTAL RESOURCES

Maritime zones of Jamaica

The 1982 United Nations Convention on the Law of the Sea (UNCLOS) was ratified by Jamaica on 21 March 1983. Subsequently, Jamaica has pursued a consistent policy of updating its laws to ensure full compliance with the provisions of UNCLOS.

The pieces of legislation relevant to the maritime zones and areas of Jamaica are the Maritime Areas Act 1996 and the Exclusive Economic Zone Act 1991.

Maritime Areas Act 1996

This act replaced the Territorial Seas Act 1971. As mentioned, it confirms Jamaica's status as an archipelagic state by establishing straight archipelagic baselines joining the outermost points of the outermost islands and drying reefs of the archipelago. The act also establishes a contiguous zone (in accordance with article 33 of UNCLOS) within which Jamaica has jurisdiction to take any necessary measures to prevent contravention of legislation relating to customs, excise, immigration or sanitation in Jamaica, the archipelagic waters or the territorial sea.

Under the Maritime Areas Act 1996, and in accordance with article 76 of UNCLOS, Jamaica's continental shelf comprises those areas of the seabed and subsoil of marine areas that are beyond and adjacent to the territorial sea. These extend throughout the natural prolongation of the land territory of Jamaica to the outer edge of the continental margin, or to a distance of 200 nautical miles from the archipelagic baselines, where the outer edge of the continental margin does not extend to that distance. However, no part of Jamaica's continental shelf extends beyond 200 nautical miles from the baselines.

The act is an important piece of legislation that has significantly increased Jamaica's jurisdiction over maritime space. It has effectively reduced the potential area of the EEZ[1] and considerably increased the area covered by the archipelagic waters and territorial sea. The total area of the archipelagic waters is 12 000 km^2.

Exclusive Economic Zone Act 1991

This act (EEZ Act) established Jamaica's 200-nautical-mile EEZ. The enactment of this piece of legislation establishes a maritime regime (about 274 000 km^2) that is approximately 25 times the size of the landmass of mainland Jamaica. The act confers very broad powers on the Minister of Foreign Affairs and Foreign Trade to make regulations giving effect to the act and to regulate activities within the EEZ.

Under section 6(1) of the EEZ Act, the exploration or exploitation of living resources within the EEZ is an offence, except in accordance with a valid licence issued under the

[1] The potential area of the EEZ does not extend to 200 nautical miles in any direction.

relevant scheduled enactment. Licences authorizing exploration or exploitation within the EEZ must be issued in accordance with the provisions of the relevant scheduled enactments. For this purpose, such scheduled enactments are extended to the EEZ as if it constituted part of the territorial sea of Jamaica. In addition, the penalties provided in the EEZ Act for exploration and exploitation of living and non-living resources without a licence shall have effect in lieu of any corresponding penalties in the relevant scheduled enactment (s. 8(2)).

A total of fourteen acts currently constitute scheduled enactments under the EEZ Act. Those relevant to fisheries are the Fishing Industry Act, the Wildlife Protection Act and the Beach Control Act. The application of their relevant provisions is modified as described in the preceding paragraph.

Maritime boundaries and the Joint Regime Area with Colombia

In respect of the continental shelf, under the Maritime Areas Act 1996 and the Exclusive Economic Zone Act 1991, maritime boundary delimitation between Jamaica and any opposite or adjacent state must be effected by agreement on the basis of international law to achieve an equitable solution[2] (s. 3(3)).

Jamaica has concluded delimitation agreements with Cuba in the north and Colombia in the south. Under the terms of the delimitation treaty with Colombia, a Joint Regime Area (i.e. a joint management area) has been established. It is located to the southwest, around the offshore banks of Bajo Nuevo, Seranilla and Alice Shoal (about 250 nautical miles from Kingston).

Jamaica has also been conducting maritime boundary delimitation talks with four other states: Haiti, Honduras, Nicaragua and the United Kingdom in respect of the Cayman Islands.

Legal regime for fisheries

The main pieces of legislation presently governing fisheries activities in Jamaica are the Fishing Industry Act 1975, the Fishing Industry Regulations 1976 and the Morant and Pedro Cays Act 1907 (administered by the Fisheries Division) and the Aquaculture, Inland, Marine Products and By-Products (Inspection, Licensing and Export) Act 1999 (administered by the Veterinary Division).

As mentioned, several other statutes contain provisions relevant to fisheries. These are the Exclusive Economic Zone Act 1991, Maritime Areas Act 1996, Natural Resources Conservation Authority Act 1991, Beach Control Act 1956, and the Wildlife Protection Act 1945.

Fishing Industry Act 1975

This is still the main piece of legislation regulating the fishing industry in Jamaica. Under s. 3 of the act, no person shall engage in fishing in Jamaica or, if a citizen of Jamaica, in such areas outside Jamaica as may be prescribed, using any of the fishing methods described in the schedule, unless that person is the holder of a valid licence to fish. A licensing authority, in practice the Director of Fisheries, is empowered by the act to issue licences and is required to keep a register of all licences issued.

Under s. 23A of the act, any licence granted under its s. 5 or s. 11 in relation to the EEZ is subject to the provisions of the EEZ Act or any order made under s. 11 of this latter act.

In addition to the system of registration and licensing, the act provides for the conservation and management of fisheries resources.

The Fishing Industry Regulations 1976 contain further measures aimed at conservation. Regulation 14 prohibits the taking of berried female lobsters and any

[2] This is regarded as more advantageous to Jamaica than the principle of equidistance.

lobster of less than 76 mm carapace length. It also prohibits the use of any fry shove net of a length exceeding 12 feet (4 m) and prescribes minimum mesh sizes for beach-seine nets.

Aquaculture, Inland, Marine Products and By-Products (Inspection, Licensing and Export) Act 1999

This law governs the production, storage and transport of fisheries products and marine gastropods. With its signing, the old Animal Disease and Importation Law and Regulation 1948 was reinforced.

The Minister of Agriculture has formulated regulations under the act, and together the act and regulations have become very important instruments in the regulation of conch and lobster fisheries for export. They are administered by the Veterinary Division of the Ministry of Agriculture. The fees for inspections are considerably higher at the moment than the fines and fees charged under the Fisheries Act 1975.

Beach Control Act 1956

This act is administered by the National Environment and Planning Agency (NEPA) and regulates the use of the foreshore for specified purposes. Under this act, all rights to and over the foreshore are vested in the Crown. However, under s. 11 of the act, NEPA is empowered to grant licences for the use of the foreshore for any public purpose (such as recreational bathing) or in connection with business or trade, including fishing.

Under s. 12 of the act, NEPA is required to determine the needs and requirements of the public in relation to the use of the foreshore and land adjoining the foreshore for the purpose, *inter alia*, of fishing as a trade. Where necessary, it may acquire land or use rights over such land.

Wildlife Protection Act 1945

There are other statutes containing provisions relevant to fisheries conservation and management. The Wildlife Protection Act 1945 and the Natural Resources Conservation Authority Act 1991 are the most important examples.

Under s. 9 of the Wildlife Protection Act, it is an offence to take, kill or attempt to kill or knowingly buy, sell, expose for sale or have in one's possession any immature fish. Immature fish are defined as fish smaller than the size prescribed by any regulations made pursuant to the act. This provision effectively functions to define legal minimum size limits for the fish exploited.

The act also prohibits the use of poisons and other noxious materials or dynamite and explosives in the harvesting of fish. Such provisions, more commonly found (and perhaps more appropriately) in basic fisheries law, rather than in a statute aimed at conservation, do not exist in the Fisheries Industry Act 1975.

Natural Resources Conservation Authority Act 1991

This act (NRCA Act) is another important piece of legislation on fisheries conservation and management. Under this act, broad powers are conferred upon the minister having responsibility for NEPA (currently the Minister of Environment and Lands) to make regulations enhancing implementation of its provisions.

The NRCA Act empowers NEPA, with the approval of the minister, to regulate the taking of fish or any specified species of fish, control the methods or traps that may be employed in taking any fish, and make provision for the stocking of any water with fish and for the establishment and control of fish sanctuaries and hatcheries.

Management, development and regulation of fisheries

The primary agency with responsibility for the management, development and regulation of fisheries and aquaculture is the Fisheries Division. The main policy instruments

guiding the development and management of capture fisheries are the Fishing Industry Act 1975, the Fishing Industry Regulations 1976 and the Morant and Pedro Cays Act 1907. There is no existing legal framework for the management and development of aquaculture. However, the new comprehensive Fisheries Act is in a very advanced stage and should be enacted by early 2006. This new act provides for the employment of appropriate management and development strategies in capture and culture fisheries.

The enforcement of Jamaican fisheries and related laws and regulations is effected by four principal agencies:

- Jamaican Coast Guard, part of the Jamaica Defence Force;
- Marine Police, part of the Jamaica Constabulary Force;
- Fisheries Division; and
- game wardens attached to NEPA.

The Coast Guard has primary responsibility for monitoring, control and surveillance activities in offshore areas and the EEZ. In 1996, it established a station on the Pedro Bank (Middle Cay), which has facilitated more frequent and sustained patrolling.

The Marine Police is a separate branch of the Jamaica Constabulary Force, with special responsibility for enforcing laws related to fisheries, harbours, shipping and drugs. With respect to the enforcement of fisheries laws, it operates largely within the in-shore areas (immediate environs of the ports and harbours).

The Fisheries Division's inspectors and NEPA's game wardens are appointed under the relevant acts administered by the specific agencies. As a matter of policy, these enforcement officers do not operate without the assistance of either Marine Police or Coast Guard personnel. Such cooperative enforcement activities are arranged on an ad hoc basis for specific purposes (e.g. during the closed season for lobsters or conch).

Administrative arrangements for planning, development and conservation of the coastal environment and for the protection of aquatic resources

NEPA has overall responsibility for conservation of the coastal environment and aquatic resources and for planning and development in coastal regions. The agency was formed through a merger of the Natural Resources Conservation Authority (NRCA), the Town Planning Department and the Land Development and Utilization Commission, which took effect on 1 April 2001. There is currently no comprehensive legislation incorporating the mandates of the above-mentioned agencies. Consequently, though the 'physical' merger is in effect, legally the NRCA and its board are still operational and administering the Natural Resources Conservation Authority Act. Similarly, the Town and Country Planning Authority still exists and administers the Town and Country Planning Act. The NRCA has overall responsibility for environmental management, while the Town and Country Planning Authority is responsible for physical planning and development.

Regional planning and development

All development must conform to the relevant development order, which dictates the type and scale of development that can occur within a given geographical space. Both the NRCA and Town and Country Planning Authority under NEPA consider all development plans and collectively approve them, where appropriate, ensuring a synthesis of proper physical planning and development and sound environmental management. At the local level, the process also involves the relevant parish council and affiliate organizations (e.g. the Fisheries Division, Ministry of Health and National Water Commission) having the responsibility for implementing and monitoring the process in conjunction with NEPA.

The local parish council may authorize small-scale development (such as a dwelling) on the condition that it conform to the specific development order for the parish and the regulatory requirements and standards set by the various affiliate government agencies.

Conservation and rehabilitation of the coastal environment and aquatic resources

Three branches of the Integrated Planning and Environment Division (IPED) and two of the Legal, Standards and Enforcement Division (LSED) of NEPA have general oversight of the natural environment and resources of Jamaica:

- Integrated Water and Coastal Zone Management Branch under IPED is responsible for maintaining an understanding of the spatial distribution and status of the natural resources (living and non-living) in the watersheds and coastal zone areas of Jamaica.
- Protected Areas Branch under IPED is responsible for preservation of the natural environment through a system of protected areas.
- Biodiversity Branch under IPED is responsible for the maintenance of biodiversity and protection of all species listed under the Wildlife Protection Act, the Endangered Species Act and those on the various appendices of the Convention on the International Trade in Endangered Species of Wild Flora and Fauna (CITES).
- Enforcement Branch under LSED is responsible for enforcement of all legislation relevant to the coastal environment and aquatic resources.
- Legal Services Branch under LSED is responsible for prosecution of people contravening the relevant regulations and for provision of legal advice on environmental and natural resource issues.

NEPA works in very close cooperation with various affiliate agencies with specific jurisdiction and legal mandates, such as the Fisheries Division and the Forestry Department in matters related to fisheries and forestry respectively.

Co-management of fisheries

Co-management is regarded as an approach in which all stakeholders participate in the planning, execution and enforcement of regulations and strategy for the proper management and development of a given natural resource. A critical element of co-management is the development of a formalized, legally binding partnership arrangement between government and resource user groups.

Some examples of fisheries co-management efforts

Jamaica's efforts to achieve co-management of fisheries have been at best sluggish and limited. Particularly regarding the integration of fisheries and coastal aquaculture into ocean and coastal area management and development, they have been restricted, in most if not all cases, to the so-called "consultation with stakeholders". In reality, this has meant simply providing information to stakeholders, leaving them powerless to effect any significant changes to the given management or development plan.

There have been several attempts to achieve some level of co-management of fisheries, with the more important examples being:

- management and development of Jamaica's conch industry;
- establishment of the Portland Bight Fisheries Management Council (PBFMC);
- Fisheries Division/CARICOM Fisheries Resource Assessment and Management Programme (CFRAMP) Community Involvement and Education Subproject; and
- FAO/Government of Jamaica project for Development of a Policy Framework and Strategic Plan for Sustainable Fisheries Development in Jamaica.

Management and development of Jamaica's conch industry

One of the earliest attempts at co-management of fisheries started in the early 1990s owing to concern for the economic viability of the commercially important Queen Conch fishery. This took the form of progressively extensive consultation with all primary stakeholders, until the process culminated in a system that required unanimous agreement before any decision could be made. However, the process stopped short of facilitating the integral incorporation of primary stakeholders into the decision-

making process. It did not further empower stakeholders to implement and administer management strategies in partnership with the relevant government agencies.

The process, however, was very interesting – it followed a natural progression of development without any written policy directions or legal framework. The critical ingredient was political will, with the then Minister of State with responsibility for fisheries showing a very keen interest and being willing to accept and act upon the recommendations of the Fisheries Division.

The current level of co-management was developed from a series of discussions with all the primary stakeholders in order to:

- determine the status, structure and organization of the conch fishery;
- share other countries' experiences in marine resource management;
- introduce relevant management options; and
- gain consensus on the management actions required to safeguard the conch resource and, by extension, the livelihood of all who depend on it.

This earlier consultative process was used to define the overarching framework of the first management plan for the Jamaica conch fishery in 1993. The process was further strengthened so that every decision that related to the management and development of this industry was meticulously discussed with all stakeholders and any and all final decisions had to be unanimous. This approach achieved significant results: in the absence of a legal framework and based only on a 'gentleman's agreement', conch industry members agreed to implement the necessary strategies to ensure sustainable exploitation of the conch resource. Some of these strategies included: establishment of a quota management system for conch; voluntary reduction of fishing effort; implementation of minimum size limits and an annual closed season; provision of catch and effort data; and funding of conch abundance surveys to determine the status of the Jamaican conch population.

The Jamaican conch fishery management plan and strategy has been widely recognized by the CITES Secretariat and all conch-producing countries as one of the most successful and comprehensive conch management and development initiatives. This endorsement was further enhanced when, after a thorough analysis of the status of the global Queen Conch resource, CITES adopted the management approach of Jamaica and mandated all other conch-producing countries to implement similar management programmes.

Two very critical weaknesses can be identified in the conch fishery co-management process. First, the time period for translating the major elements of the management plan into law is protracted, particularly those elements related to equitable distribution of the resource (i.e. how the conch quota was divided), in order to protect the process from political interference. Second, the seeming lack of interest and inability of the Government to control the poaching of conch by foreign nationals has caused further problems. This widespread poaching has greatly undermined management efforts and the sacrifices of conch industry players.

The negative perception of the Government's failure to stamp out poaching by foreigners – although recognized by industry members as being difficult and very expensive – and to enact legislation with penalties and fines that would act as deterrents greatly affected the original gentleman's agreement and has resulted in a loss of confidence in the process.

The conch fishery co-management initiative clearly shows that:

- It is essential to ensure adequate, acceptable compliance with the agreed-upon strategies.
- One non-negotiable principle held sacred by stakeholders, which must be an integral, unequivocal part of any resource management initiative, is the guarantee of a 'level playing field.' All rules and regulations must be applied equally to all stakeholders without exception.

Portland Bight Fisheries Management Council

NRCA, under NEPA, delegated management responsibility for the Portland Bight Protected Area (PBPA) to the Caribbean Coastal Area Management Foundation (C-CAM), an environmental NGO, in July 2003. C-CAM's major thrust has been co-management of the natural resources of the PBPA through resource management councils. One such council is the PBFMC. Established on 29 June 1995 (International Fisherman's Day), the council currently has 32 members representing the following 20 organizations:

- Half-Moon Bay Fishermen's Co-op Society, Hellshire
- Old Harbour Bay Fishermen's Co-op Society
- Old Harbour Bay Fishers' Association
- Rocky Point Fishermen's Co-op Society
- Rocky Point Fishers' Association
- Barmouth Fishers' Association
- Welcome Fishers' Association
- Mitchell Town Fishers' Association
- Jamaica Fishermen's Co-op Ltd
- Monymusk Gun, Rod and Tiller Club
- Public Works Department Gun Club
- NEPA
- Fisheries Division, Ministry of Agriculture
- Port Authority of Jamaica
- Urban Development Corporation
- Jamaica Constabulary Force, St. Catherine (Old Harbour Bay)
- Jamaica Constabulary Force, St. Catherine (Greater Portmore)
- Jamaica Constabulary Force, Clarendon
- Jamaica Defence Force, Coast Guard
- Caribbean Coastal Area Management Foundation (C-CAM)

The PBFMC has the distinction of meeting every month since its establishment. Through its regular meetings and participation in other fora, the council has informed itself directly and indirectly about issues related to fisheries management and development. It has considered and agreed upon options and strategies for the management and development of PBPA fisheries resources. One important output of this process was the draft fisheries regulations for the PBPA.

Although the C-CAM co-management initiative is over ten years old, and despite the delegation of management to it by NEPA, the co-management process has not been able to mature and move beyond the stakeholder consultation process. This has largely been due to the inability of C-CAM to officially assume its legal mandate to manage the PBPA natural resources. None of the PBPA regulations have been enacted so far, a fact that has also greatly affected the organization in its drive to secure funding for its activities.

Fisheries Division/CFRAMP Community Involvement and Education Subproject

The project began in April 1996 as part of a regional effort by CFRAMP to further enhance the participation of fishers and other stakeholders in fisheries co-management. The objective of the project was to organize and empower fishers' groups to actively participate. Specific activities included a public education component that informed fishers of relevant fisheries legislation and good fisheries management practices. Other activities included training of select fishers and staff of the Fisheries Division in group formation and extension principles. It was anticipated that those trained would train others and facilitate the formation of fishers' groups in their respective communities. The further empowerment of fishers would rely on the passing of new enabling legislation and the ability of fishers' groups to seek and obtain funding.

The major constraint on the project was the inadequate capacity of the Fisheries Division to provide the necessary human and financial resources to support it. All the field officers that participated had other duties that detracted significantly from time available to conduct activities under the co-management project. And without the support of the Fisheries Division, most of the fishers' groups did not seem to have the momentum to continue.

However, notwithstanding these problems, fishers within the Kingston Harbour rim (an area in which the Fisheries Division focused its attention) have shown increased awareness of the need to organize and have realized some self-empowerment through addressing the numerous issues that affect them – for example, the impact of the dredging of Kingston Harbour on their ability to fish.

Although project support from CFRAMP has ended, the Fisheries Division continues to support the activities as a long-term programme. Progress will continue to be impeded, however, if the division does not develop the capacity to provide the necessary support to fishers and fishers' groups. Enabling policies and legislation are also needed that will empower fishers to truly participate in co-management.

FAO/Government of Jamaica project: Development of Policy Framework and Strategic Plan for Sustainable Fisheries Development in Jamaica

Under this project, FAO provided technical assistance to the Fisheries Division to develop the first national fisheries policy framework and strategic plan. The project was formally agreed on in October 2002 and was projected to end in December 2004. However, components of the project remained outstanding and were not to be completed until July 2005. It was expected that the policy and plan would provide guidelines and activities to mitigate the decline in capture fisheries and improve the economic, social and environmental state of both the capture and culture subsectors.

The outputs anticipated originally included the provision of new and revised drafting instructions to enhance the current draft fisheries bill. The new Fisheries Act would provide enabling instruments to facilitate the formation of a National Fisheries Advisory Council and the formalizing of community-based fisheries management groups. The new legislation would also provide the legal framework to encourage fisheries co-management.

The model used by the Fisheries Division in developing the policy and strategic plan was one of stakeholder consultation and participation in the development process. To this end, the Fisheries Division embarked on a series of consultative meetings with stakeholders throughout Jamaica, which began on 18 August 2003 and continued into November of that year. Stakeholders included capture fishers, the aquaculture industry and government agencies with complementary or convergent mandates in Jamaica. These consultations were the most comprehensive and extensive ever completed for the fisheries sector. In all, over 2 000 stakeholders participated in the meetings.

The results of the consultations formed the basis for the drafting of the national fisheries policy document. This draft was then presented, discussed and further refined by the stakeholders at two regional meetings, the first in Montego Bay in March 2004 and the second in Kingston in April 2004. The meetings were very well attended, with over 400 stakeholders attending both meetings. The draft policy consultation and other specific ones were used to guide the direction of the new fisheries legislation. Final reports on both the policy and strategic plan and on the legislation were to be available by July 2005.

The reports from this project will provide a sound basis for the repositioning or restructuring of fisheries co-management in Jamaica. Necessary next steps include the development, funding and implementation of projects and action-oriented activities based on the policy and strategic plan.

Other NGO activities in fisheries co-management

A few other NGOs continue to work in fishing communities with fisheries co-management as an objective. These include the Montego Bay Marine Park, Negril Coral Reef Preservation Society, Negril Environment Protection Trust and Discovery Bay Marine Lab of the University of the West Indies. The success of the efforts of each of these organizations, although ongoing, varies from poor to moderate and is not well documented.

CONSIDERATION OF SOCIO-ECONOMIC AND DEMOGRAPHIC CONCERNS

Socio-economic and demographic information on coastal fishing communities

The availability of social, economic and demographic information on fishing communities is patchy and disjointed simply because no focus is actually placed on 'fishing community' *per se*. Some social, economic and broad demographic information is captured during the Fisheries Division's fisher registration process. However, for the most part, detailed information has to be disaggregated from more general population data. The main agencies responsible for the collection, analysis, interpretation and publication of social, economic and demographic data are the Planning Institute of Jamaica (PIOJ) and the Statistical Institute of Jamaica (STATIN). A summary list follows of the some studies and reports, published or unpublished, and the organizations that produce them.

- Census on the fishing industry 1998. Fisheries Division (1998b), Ministry of Agriculture and STATIN. 42 pp.
- National income and product 2003. STATIN.
- Demographic statistics 2003. STATIN.
- Employment, earnings and hours worked in large establishments 2000–2002. STATIN.
- Census of agriculture 1996. STATIN.
- Environment statistics 2003 and mineral accounts. STATIN.
- Households and the environment 2002. STATIN.
- Statistical review – quarterly. STATIN.
- Economic and social survey Jamaica 2004. PIOJ.
- Jamaica survey of living conditions 2002. PIOJ.
- South coast sustainable development study. Halcrow Group Ltd.
- Licensing and registration data. Fisheries Division, Ministry of Agriculture.

Use of socio-economic and demographic indicators in the preparation of coastal area profiles and management/development plans

The Caribbean Coastal Area Management Foundation was formally incorporated in 1998 and is dedicated to the management and sustainable use of the natural resources of the Portland Bight Protected Area. C-CAM is by far the most developed NGO and has been active in organizing local communities and resource users into stakeholder groups (for instance, the Portland Bight Fisheries Management Council). Its aim is to incorporate these groups into the co-management of forests and fisheries resources and the development of sustainable economic activities throughout Portland Bight, including tourism and sustainable industrial development.

Portland Bight was selected as one of three demonstration sites for a joint project of the Global Environment Facility (GEF), the United Nations Environment Programme (UNEP) and the Organization of American States (OAS). The project was entitled Inter-American Strategy for Public Participation in Decision-Making for Sustainable Development. With GEF funds, C-CAM established a stakeholder process involving central and local government agencies, other NGOs and 30 local communities. On 18 July 2003, NRCA and C-CAM signed an instrument of delegation under which C-CAM would be responsible for overall management of specified areas of the PBPA,

including such activities as: inventory and monitoring, development of trails and attractions, infrastructure development, entrance fees, wildlife and wildland protection (coastal, marine and terrestrial), and patrol and enforcement.

In order to be awarded the instrument of delegation, C-CAM was required to submit detailed, comprehensive management and development plans for the PBPA. This process was greatly enhanced in early 1998 through grant funds from UNESCO that C-CAM used to conduct a census to map some 15 communities in the PBPA. The work involved a house-to-house census of coastal communities in which detailed social and demographic data were collected. The data were utilized to fine-tune existing data on the communities, refine the profile of the protected area and contribute to development of the comprehensive *Portland Bight Sustainable Development Area Management Plan: 1998–2003*.

The specific management plans covered fisheries, wetlands, forestry, marine turtles, coral reefs, the near-shore cays in the bay, seagrass beds, the Jamaican iguana, Goat Island, crocodiles, avifauna, manatees, caves and even cultural aspects. Most significantly, there was a plan for the incorporation of area stakeholders into PBPA co-management, which set out the manner in which the Portland Bight Sustainable Development Area (PBSDA) would be organized and operated and provided many useful maps. It also documented a need for the formation of a fisheries management council, which would have representatives from the user community and the public sector.

Coastal area management and conservation project for improving the socio-economic well-being of coastal fishers and their families

Since 2002 the Government of Jamaica has been preparing the Jamaica South Coast Sustainable Development Project. The effort was spearheaded by the Tourism Product Development Company (TPDco) in conjunction with various stakeholders, including other government agencies (e.g. the Fisheries Division) and NGOs (e.g. C-CAM). This very broad project has a sustainable fisheries management component involving activities geared towards fisheries and coastal area management and conservation programmes. It aims to improve the socio-economic well-being of coastal fishers and their families.

The project will help address the problem of the declining socio-economic viability of fisheries on the Jamaican south shelf by facilitating sustainable fishing practices and production along this coast. To achieve improved management of the fisheries resources for sustainable social and economic benefits, the project will strengthen the institutional capacity of the Fisheries Division while empowering fishers' organizations on the south coast to actively participate in fisheries resource management. This will be achieved by pursuing three component objectives: development and implementation of fisheries co-management strategies; effective monitoring compliance and regulatory control; and fisheries resource monitoring.

Activities under the project will include training of fishers in organizational development and principles of fisheries management, while working with communities to develop resource management maps/plans. The project will also work with other stakeholder groups and agencies in the project area.

Additionally, the project will conduct intensive compliance monitoring for a period of six months in several key fishing communities in the project spectrum. Compliance and monitoring operations will continue after the initial approach, but less intensively, and will be extended to the entire south coast. This activity will of necessity follow from the organizational work of the first component, which results in the stakeholders themselves welcoming and participating in the enforcement activity (co-management process).

The major constraint on implementation of the project is the unavailability of government counterpart funding to begin it. If implemented, the project will go a very long way to furthering the development of fisheries co-management.

CONCLUSION AND RECOMMENDATIONS

In Jamaica, socio-economic and demographic data are traditionally used only as a measurement of the socio-economic status of the Jamaican population in general. Coastal fishers, their families and other segments of the coastal population are not specifically targeted for socio-economic and demographic information unless there is a specific project or programme requiring such data.

Unfortunately, these important indicators are very rarely used, if at all, to monitor the impact of development and management regulations. Nevertheless, the use of social, economic and demographic information in the development planning process is gaining widespread acceptance, but such critical information pertaining to fishers and their communities is often overlooked in furthering the development of more powerful economic sectors (e.g. tourism).

There is a critical need to meaningfully incorporate into the planning and development process social, economic and demographic information on all stakeholders that may potentially be impacted by a given development.

It is also extremely unfortunate that natural resources management interventions are not routinely monitored and comprehensively assessed. At times some cursory assessment may be effected, again usually a requirement of a specific, externally funded project.

Notwithstanding the very best of intentions of our natural resource managers, there are several significant constraints that impede the total 'cycle': data collection, management, analysis, interpretation, dissemination and discussion of results; adjustment of the relevant development or management plan; and implementation. Among the constraints are:

- lack of funding;
- inadequate capacity within the relevant agencies;
- lack of legal mandates; and
- little or no capacity among primary stakeholder groups.

To ensure the routine collection and use of social, economic and demographic data in the management process of coastal and aquatic resources, the interventions needed include:

(a) Development of a legal framework mandating the relevant agencies to incorporate social, economic and demographic considerations into the planning and development process. This may be achieved by amending existing legislation. Critical to this is the empowerment of stakeholders through appropriate legislation, within clearly defined boundaries, to stall or totally stop certain developments or initiatives that will impact them negatively.

(b) An important, if not the most important, intervention is the building of the capacity of stakeholder groups, especially those within the so-called 'politically weak' sectors such as the fisheries sector. It is only an empowered stakeholder group, with the required capacity, that will be able to take full advantage of its new legal power and to match 'head on' the powerful interests in both the private and public sector.

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2. Mr Peter Espeut – Executive Director, Caribbean Coastal Area Management Foundation (C-CAM).

CASE STUDY

Saint Lucia

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Department of Fisheries
Ministry of Agriculture, Forestry and Fisheries
2004

4 Consideration of socio-economic and demographic concerns in fisheries and coastal area management and planning in Saint Lucia

GENERAL COUNTRY INFORMATION

Saint Lucia is a small island developing state (SIDS) with an area of approximately 616 km^2 and 158 km of coastline. The island is located within the eastern Caribbean between Martinique and Saint Vincent and the Grenadines. Being volcanic, Saint Lucia is mainly mountainous in nature, surrounded by a relatively restricted submarine island shelf.

Population

The last census (2001) estimated the population at 156 635, with a growth rate of 0.78 percent. Due to the topography, most people reside within coastal settlements located near the shoreline. Overall, 35.1 percent live in urban centres associated with various coastal towns and villages. The population is relatively young (the median age is 25) and 30.4 percent are under the age of 15 (Statistics Department, 2005).

Despite the level of development, the 2001 population and housing census indicated that 19.2 percent of the population lived in poverty (categorized as "far below average") and unemployment levels stood at 18.9 percent. The quality of health care is considered to be improving, and life expectancy has increased to 76 years. However, infant mortality rates in 2003 were approximately 14.2 per 1 000 (Statistics Department, 2004b).

Economy

GDP stands at EC$1 109.09 million (US$415.39 million). After a period of constant growth from 1990 to 2000, GDP has more recently declined, primarily due to difficulties within the banana industry resulting from a move towards trade liberalization (Government of Saint Lucia, 2002).

Saint Lucia is changing from a country that has been heavily dependent on primary agricultural production and export to one now largely supported by a growing tourism sector and a modest range of manufacturing and service industries. Fish exports remain minimal, with only 0.9 tonnes exported in 2003 according to Statistics Department records, mainly frozen lobster. Exports in 2003 comprised small quantities of fresh and frozen fish carried by travellers and small commercial exports to other Caribbean territories and the United States of America. Imports of fish for 2003 were valued at EC$8 871 559 and comprised 766 tonnes (Statistics Department, 2004a). Thus it is felt that there is considerable room for expansion of local fishing to satisfy demand, particularly for filleted and frozen fish (George, 1999). A significant proportion of imports involves salted, smoked and dried fish, which have traditionally been imported for the local market.

The contribution of the fisheries sector to total GDP (at factor cost) is estimated at 1.03 percent (Government of Saint Lucia, 2002) (compared with 0.82 percent in

TABLE 1
Estimated fish landings for 2003 (tonnes)

Site	Tuna	Dolphin	Wahoo	Flyingfish	Lobster	Conch	Snapper	Shark	Other	TOTAL
Gros Islet	9.25	8.11	2.42	32.6	8.82	36.55	2.89	1.17	54.11	**165.71**
Castries	40.95	3.76	0.87	7.27	0.24	0	12.91	2.64	62.80	**131.44**
Soufriere	29.42	4.11	1.01	0.04	0.10	0.00	3.09	0.00	56.13	**93.90**
Choiseul	39.64	2.97	1.58	4.66	0.00	0.00	1.19	0.00	10.95	**60.99**
Laborie	25.60	3.14	1.67	0.26	3.26	0.60	1.72	0.09	22.08	**58.98**
Vieux Fort	147.98	110.78	53.49	1.91	3.91	0.01	26.19	0.78	23.13	**368.16**
Micoud	12.64	16.55	9.41	0.78	0.00	0.00	0.60	0.07	5.55	**45.59**
Dennery	105.42	103.59	82.07	5.21	1.16	0.00	3.69	0.30	9.47	**310.90**
Other sites	42.28	33.60	16.79	22.74	5.89	0.00	4.90	0.88	81.24	**211.32**
TOTAL	**147.98**	**110.78**	**53.49**	**1.91**	**3.91**	**0.01**	**26.19**	**0.78**	**23.13**	**1436.65**

Source: Department of Fisheries, 2004.

TABLE 2
Registered fishers and vessels (31 December 2003)

SITE	Registered fishers			Registered vessels					
	Full-time	Part-time	**TOTAL**[1]	Canoe	Pirogue	Transom/ shaloop	Whaler	Longliner/ other	**TOTAL VESSELS**
Gros Islet	121	79	**200**	3	35	7	1	2	**48**
Marisule	8	13	**23**	4	2	8	0	0	**14**
Castries	140	108	**248**	0	43	8	3	2	**56**
Bannanes	41	40	**81**	10	20	4	1	1	**36**
Marigot	*registered with Anse la Raye*			1	3	4	0	0	**8**
Roseau	1	1	**2**	1	0	1	0	0	**2**
Anse la Raye	53	47	**100**	13	10	2	0	0	**25**
Canaries	52	37	**89**	18	7	5	0	0	**30**
Soufriere	93	62	**155**	47	36	24	0	0	**107**
Choiseul	102	37	**139**	24	20	1	0	0	**45**
River Doree	16	10	**26**	0	7	0	0	0	**7**
Laborie	74	44	**118**	3	27	1	0	0	**31**
Vieux Fort	237	121	**358**	39	106	2	1	2	**150**
Savannes	34	7	**41**	1	14	0	0	0	**15**
Micoud	106	107	**213**	0	20	0	1	2	**23**
Praslin	32	19	**51**	1	12	0	0	0	**13**
Dennery	140	93	**233**	3	56	0	0	0	**59**
TOTAL	1256	834	**2090**	168	418	67	7	9	**669**

Source: Department of Fisheries, as of 31 December 2003.
[1] Total column does not include registered boat owners who are not fishers.

1997 – Department of Fisheries, 1999). The ex-vessel value of the 2003 fish landings was US$5.91 million (Department of Fisheries, 2004c). However, such assessments underestimate the overall contributions to the economy from value-added processing and ancillary services. Thus the overall contribution to the economy likely is far greater.

Fishing also provides a primary source of employment in coastal villages. According to the 2003 landings data published by the Department of Fisheries, the highest fish landings occur at the southern town of Vieux Fort and the east coast village of Dennery (Table 1). With the traditional wooden canoe now comprising only 25.1 percent of the industry fleet, the majority of operators use the more stable and versatile fibreglass open pirogue, with a small number of larger vessels also operating in the fisheries (Table 2). As the two most productive landing sites, Vieux Fort and Dennery also have the largest number of registered pirogues and, along with Castries, support the highest number of full-time fishers.

In terms of employment, there are just under 2 100 fishers registered in commercial fishing activities, 66 percent of whom are full-time fishers (i.e. depend on fishing for the greater proportion of their income). A recent survey by the National Insurance Corporation (2004) indicated the following regarding the respective roles of people

involved in the sector: 8 percent boat owners; 23 percent boat owners/captains/crew; 15 percent captains only; 47 percent crew. Most fishers are men (only three women are registered as fishers). Although women are not heavily involved in the capture component, they often play a key role in assisting their spouse/common-law partner in the sale of fish at the landing site, and are also active within the fish vending and processing sectors (George, 1999). In addition, nine registered fishing vessel owners are women (Department of Fisheries, 2004d).

The current average age of people involved in fishing is 45 years (National Insurance Corporation, 2004). Younger people are moving into the fishing sector; however, this movement is most predominant within the two most productive fishing communities of Vieux Fort and Dennery. Concern remains that, for many coastal communities, the continued failure of young people to enter the fisheries sector within these communities will likely bring about a decline in overall production levels and sustainability of the sector.

The recent National Insurance Fisher Survey indicated that although 43 percent of fishers are between 15 and 40 years of age, 39 percent are between 41 and 60 and 18 percent are over 60. Thus the survey indicates that, on average, the fisher population is ten years older than the national male labour force, and that some 57 percent of fishers are due to retire over the next 20 years. The Government continues to support a young fishers training programme, targeting secondary-school leavers and other young people within rural coastal communities in order to generate interest in modernized and responsible approaches to fishing as a viable career path and lucrative livelihood.

The fisheries sector remains characterized by a considerable degree of seasonality. The 'peak season' in which most fishing activity and fish landings occur extends from December to June annually. During this time, migratory pelagics such as albacore, bigeye, blackfin and yellowfin tunas, Spanish mackerel, dolphinfish and wahoo are present in the eastern Caribbean region and dominate the catch. These species comprise 65–75 percent of annual landings and are primarily caught using hand-operated trolling lines. Other fisheries include:

- pot or trap fisheries (targeting near-shore and bank reef species including lobster);
- flyingfish fishery (using nets);
- a growing gillnet fishery (targeting reef demersals);
- a small conch fishery (with a select number of fishers authorized to use scuba gear);
- restricted speargun fisheries (also targeting near-shore reef fishes);
- fishery for small cetaceans, including the pilot whale and bottlenose dolphin (partly a target fishery, using harpoons, and partly an opportunistic fishery);
- seine/fillet net fisheries (targeting a variety of jacks and other coastal pelagics such as ballyhoo and operating primarily out of west coast communities);
- traditional sea urchin fishery in certain locations, operated as a community-based fishery.

Traditionally, primarily green and hawksbill turtles have also been fished as a source of food and turtle shell. Since Saint Lucia became signatory to the Convention on International Trade in Endangered Species (CITES) in 1986, trade in turtle shell and other turtle products was halted (as required due to the current listing of the respective species on Appendix I of CITES), and the fishery was continued until 1996 as a source of turtle meat for local consumption. From 1996 to 2004 a moratorium was in effect, as Saint Lucia decided to temporarily suspend the fishery as part of the global effort to stimulate recovery in sea turtle populations. It has just been reinstated, and revised draft regulations have been developed to create a more rigorously regulated fishery with a range of precautionary controls aimed at sustainability and optimized monitoring.

Aquaculture operates on a small scale, with approximately 20 acres of ponds in existence generating either cultured fish (hybrid *Tilapia* spp.) or farmed freshwater shrimp (*Macrobrachium rosenbergii*) (Department of Fisheries, 2004a). Nearly three-

quarters of aquaculture farmers are involved in other aspects of agriculture. Farmer produce is primarily sold to hotels and restaurants or the Saint Lucia Fish Marketing Corporation (George, 1999). In terms of mariculture, several species of marine algae (*Gracilaria* spp. and *Eucheuma*) are cultivated in a few coastal locations and used to generate a gelling substance for preparation of a popular local drink or ice cream.

Political, legal and administrative structure

As signatory to UNCLOS), Saint Lucia claims sovereign rights over its EEZ and seeks to ensure optimal utilization of EEZ living and non-living resources. Consequently, the Government of Saint Lucia recognizes the need to have an integrated policy on the marine space over which it exercises sovereignty. In this regard, there is a binding obligatory policy on developing the marine resources present within the EEZ. This policy states that there is no free access to the living marine resources and that they are to be managed for the long-term benefit of present and future generations (Department of Fisheries, 1999). The policy considers development of shipping or marine transportation, tourism and recreational aspects within coastal waters, along with a sound programme for coastal zone management and development. However, due consideration is also given to traditional users, i.e. fishers, and their right to compensation for loss of traditional fishing areas.

Saint Lucia adopted the St. George's Declaration of Principles for Environmental Sustainability in the OECS in 2001. The objectives of this instrument were seen as complementary to the national policy in that, as signatory to the declaration, Saint Lucia carries a national obligation to:

- manage marine resources, organisms and ecosystems for optimum sustainable productivity, while maintaining the integrity of natural and ecological processes and interrelationships between such systems and processes;
- cooperate in the conservation, management and restoration of natural resources that are shared among states or extend beyond any national jurisdiction;
- work with civil society to promote and facilitate national and regional natural resource management capability;
- collaborate to implement precautionary approaches to avoid environmental degradation and overexploitation within the eastern Caribbean subregion; and
- take measures within an appropriate legal and policy framework to ensure that conservation and management of natural resources are treated as an integral part of development planning at all stages and levels.

In terms of the national approach to planning, the 2001 Physical Planning and Development Act, the draft Physical Planning Regulations and the draft Environmental Impact Assessment (EIA) Regulations provide a comprehensive framework for rational planning and development control. However, these are new legal measures that demand significant institutional and operational changes for full implementation, and thus will be implemented incrementally (Ministry of Agriculture, Forestry and Fisheries – MAFF, 2002). The Physical Planning and Development Act deals with issues such as environmental protection, the requirements for EIAs and the designation of environmental protection areas.

INSTITUTIONAL AND LEGAL ADMINISTRATIVE STRUCTURE

Administrative arrangements for management, development and regulation of fisheries and aquaculture

Ultimate responsibility for the fisheries sector rests with the Minister of Agriculture, Forestry and Fisheries; however, the mandate for fisheries management and development resides with the MAFF's Department of Fisheries. The responsibilities of this department (George, 1999) include:

- modernization of fisheries infrastructure and fishing vessels;

- use of improved gear and methods;
- regulation of fishing gear;
- protection of marine and, to an extent, freshwater and coastal biodiversity;
- regulation of certain marine tourism activities such as scuba diving, snorkeling and commercial sportfishing; and
- provision of advice to the Government on mitigating the negative impacts of development on marine and coastal environments.

As signatory to key international instruments such as UNCLOS, the FAO Code of Conduct for Responsible Fisheries, and the Agreement for the Implementation of the Provisions of UNCLOS Relating to the Conservation and Management of Straddling Stocks and Highly Migratory Fish Stocks, the national policies, programmes and activities for fisheries management and development are steeped in the dual principles of sustainable resource use and responsible fisheries. The core legal framework is provided by two instruments (Table 3):

- Fisheries Act No. 10 of 1984 and
- Fisheries Regulations No. 9 of 1994.

These are reinforced by the:

- Fishing Industry (Assistance) Act No. 33 of 1972;
- Maritime Areas Act No. 6 of 1984; and
- Fisheries (Snorkelling Licence) Regulations No. 223 of 2000.

Other national legislation that bears some relevance to fisheries management and development include the:

- Saint Lucia National Trust Act of 1975 (preservation of areas of natural beauty/historic interest, including submarine areas);
- Wildlife Protection Act of 1980 (designation of endangered species); and
- National Conservation Authority Act of 1999 (management of beach areas and designation of protected areas).

Fisheries officers are designated enforcement officers under the Fisheries Act and Regulations, but they do not have power to arrest. It is important to note, however, that only two officers within the department (the fisheries wardens) have surveillance and enforcement as their primary focus. Thus the department depends heavily on the Marine Unit of the Royal Saint Lucia Police Force, which undertakes fisheries enforcement within the overall scope of maritime enforcement. The department also relies on support from community-based police officers for effective national enforcement of fisheries legislation. In addition, regions designated as marine management areas, including the Soufriere Marine Management Area (SMMA) and the Canaries/Anse la Raye Marine Management Area (CAMMA), employ marine rangers in a range of enforcement duties (including arrest), along with operational duties.

Governmental agencies that also play a role in sustainable fisheries development and regulation include the:

- Attorney General's Chambers (legal support and advice in fisheries matters);
- Customs and Excise Department (control of seafood imports/exports, fishing gear and vessels);
- Ministry of Communications, Works, Transport and Public Utilities (coastal infrastructure and mining);

TABLE 3
Scope of the Fisheries Act and Fisheries Regulations

Sections within Fisheries Legislation
• promotion of fisheries
• fisheries management and development plans
• Fisheries Advisory Committee
• regional cooperation in fisheries management
• fisheries access agreements
• fish import/export
• fishing licences (foreign/local commercial, sport fishing)
• fish processing establishments
• local fisheries management areas
• fishing priority areas
• leasing of land for aquaculture
• marine reserves
• fisheries research
• prohibited fishing methods/gears
• species/specific conservation measures (lobsters, turtles, corals/sponges/marine algae, conch, sea urchins, freshwater shrimp/crayfish)
• use of scuba/hooka and spearguns

- Development Control Authority (regulation of coastal development and coordination of physical planning and sustainable development);
- Ministry of Health (environmental health and pollution monitoring); and
- Saint Lucia Solid Waste Management Authority.

Coordination and collaboration with various NGOs also occurs, including the:

- Saint Lucia National Trust (management of certain designated protected areas adjacent to marine reserves);
- Soufriere Marine Management Area Association (responsible for the Soufriere Marine Management and Canaries/Anse la Raye Marine Management Areas);
- Aupicon Charcoal Producers Group (assistance in the management of the Mankote mangrove); and
- Desbarras Sea Turtle Watch Group (coordinates data collection and turtle watches on a nesting beach at Grand Anse).

There are eight functioning fishers' cooperatives (Gros Islet, Castries, Anse la Raye, Soufriere, Choiseul, Laborie, Vieux Fort and Dennery). These organizations provide services to members, including bulk purchasing and retailing of fishing gear and safety equipment, provision of fuel and education of members. The National Association of Fishermen's Cooperatives (NAFCOOP), although a legally established entity, has not functioned for a number of years due to past problems of mismanagement.

Several fishers' cooperatives are presently very active and growing, seeking to expand their range of services to members. These currently engage in bulk purchasing of fishing and safety gear and equipment and perform primary roles in the management of fish landing facilities within their respective communities. Women actively participate in fishers' cooperatives as members (mostly as owners of fishing vessels, rather than as fishers), staff and board members. Nonetheless, the National Insurance Corporation Survey (2004) indicates that a higher proportion of older age groups of fishers are cooperative members (i.e. in excess of 60 percent of fishers older than 50 years), whereas less than 39 percent of fishers 50 years old or younger are members. This suggests that the cooperatives are either failing to attract younger members or are not granting them entry.

The Department of Fisheries has a number of professionally trained people specialized in disciplines such as fisheries and marine biology, fisheries management and coastal zone management. Additionally, it has fisheries extension officers, aquaculture officers, fisheries technicians, data collectors and administrative staff. However, despite this labour force, personnel and other resources are considered scarce, given the broad mandate and emerging issues it faces. In order to effect its mandate, the department has long embraced both intersectoral and community-based approaches to resource and fisheries management.

Although the Fisheries Advisory Committee allowed by the Fisheries Act has never been constituted, the department has entered into a number of collaborative management arrangements with certain community-based organizations and resource users' groups (established as either local fisheries management authorities or marine management areas, or as partners in resource monitoring arrangements). Co-management arrangements have been established with fishers' cooperatives and other civil agencies for the management of upgraded fisheries facilities located in certain communities. Fishers' cooperatives also play a central role in the administration of duty-free concessions on fuel to members.

Administrative arrangements for conservation and rehabilitation of the coastal environment and aquatic resources

The approach taken to conservation and rehabilitation is articulated within the draft fisheries management plan (Table 4). Programmes are being implemented that focus on specific resources, habitats or fisheries (e.g. lobsters, turtles, conch, freshwater shrimp/

crayfish, reef fishes; coral reefs, mangroves, beaches; and conch and lobster fisheries). Programme activities are mostly undertaken by the Resource Management Unit, but strong operational linkages exist that allow such work to be integrated with the work of the Extension Unit (which focuses on fisher education and training, conflict resolution and fisheries regulation) and the Aquaculture Unit (which focuses on promotion and regulation of freshwater fish/shrimp culture and seaweed cultivation). Registration of fishers and registration/licensing of vessels for access to various fisheries and, in some cases, the use of specific gears, is jointly administered by the Extension Unit and the licensing/data management arm of the Resource Management Unit.

Wherever necessary, programmes in fisheries and marine resource management are set up and administered so as to ensure collaboration with relevant external agencies and stakeholders. For example, coral reef monitoring is conducted jointly with such entities as the SMMA and in collaboration with the Caribbean Natural Resources Institute (CANARI). Sea turtle monitoring is done in conjunction with community groups such as the Desbarra Sea Turtle Watch Group and the staff of many hotels and restaurants located along the coast. Data are collected on standardized forms and training is provided by the Department of Fisheries. Coastal water-quality monitoring is carried out with the Ministry of Health, and with assistance from community organizations such as the Laborie Development Foundation and the SMMA.

In certain cases, community groups have been designated as Local Fisheries Management Authorities under the Fisheries Act, and therefore granted certain management responsibilities along with opportunities to benefit from sustainable resource use. An example is the SMMA, which has been granted authority for day-to-day management for integrating coastal fisheries into a range of tourism and recreational activities (Pierre-Nathoniel, 2003).

Other management arrangements have been built with groups such as the Aupicon Charcoal Producers Group (granted access to the mangrove marine reserve for sustainable harvesting and for eco-tours within the habitat), the Debarras Turtle Watching Group (granted permission to conduct turtle watches and given the responsibility to collect nesting data), and the Saint Lucia National Trust (which assists in the management of marine protected areas congruent to protected land areas under National Trust jurisdiction).

Administrative arrangements for regional planning and development in coastal regions

Coastal zone management. As part of national efforts to facilitate the establishment of stronger national mechanisms for:

- maintaining the integrity and productivity of the coastal zone and resources;
- optimizing the contribution of the coastal zone to social and economic development through sustainable use of resources and equitable sharing of benefits;
- harmonizing uses of the coastal zone; and
- providing a framework for the management and resolution of resource use conflicts,

the Department of Fisheries, enabled by a project funded by the European Union, spearheaded development of a policy and guidelines for the use and management of the coastal zone (MAFF, 2004).

As a consequence, a new administrative arrangement has recently been agreed to by the Government. It will place the administration of coastal zone management (CZM) within a CZM Unit housed in the Ministry of Planning, Development, Housing and the Environment. An integrated approach will be achieved through a CZM Advisory Committee, comprising membership from ministries responsible for physical planning, environment, fisheries, forestry, agriculture, works, environmental health and tourism, as well as the National Emergency Management Office and the Saint Lucia Air and Sea Ports

TABLE 4
Scope of the fisheries management plan

Fisheries management objectives	
• developing and increasing potential living marine resources to meet human nutritional needs, as well as social, cultural, economic and developmental goals so as to ensure sustainable resource use; • promoting development and use of selective fishing gear and practices that minimize bycatch of non-target species and capture of juveniles for target species; • taking into account traditional knowledge and interests of coastal communities, small-scale artisanal fisheries and indigenous people in development and management programmes; • maintaining or restoring populations of marine species at levels that can produce maximum sustainable yield as qualified by relevant environmental and economic factors, taking into consideration relationships between species;	• preserving rare or fragile ecosystems, as well as habitats and other ecologically sensitive areas, especially coral reef ecosystems, estuaries, mangroves, seagrass beds, and other spawning and nursery areas; • ensuring effective monitoring and enforcement with respect to fisheries resources; • promoting scientific research; • protecting and restoring endangered marine species; • ensuring integration of fishing industry into policy and decision-making process concerning fisheries and coastal zone management; • cooperating with other nations in management of shared or highly migratory species.
Specific management plans	
• shallow-shelf and reef fishes • deep-slope fishes • large pelagics • coastal pelagics • lobster • conch	• sea urchins • sea-moss • flyingfish • turtles • freshwater shrimp

Authority. The committee will operate under the Physical Development and Planning Act No. 29 of 2001 and will help guide coordination among the respective governmental and non-governmental agencies and institutions involved in coastal management and development, within the context of broader national planning and development.

System of protected areas. The plan for a system of protected areas for Saint Lucia (Hudson, Renard and Romulus, 1992) was developed out of an extensive, broad-based consultative and collaborative approach among governmental and non-governmental organizations and civil groups. It identifies a number of areas of special natural, cultural and historical value that warrant a particular focus in terms of effective management, in order to ensure sustainable use. The objectives of the plan are to:

- conserve areas of critical habitat necessary to the maintenance of biological and cultural diversity through a broad network of marine and terrestrial protected areas;
- protect representative elements of natural and cultural heritage;
- sustain the productivity and quality of critical ecosystems, particularly in relation to forestry, fisheries and tourism;
- stimulate the rational use of marginal resources and the restoration of degraded lands;
- encourage research on national cultural and natural resources and contribute to public knowledge and understanding of this heritage;
- build self-esteem and love of country through appreciation of that heritage; and
- provide places for recreation, enjoyment and inspiration.

Physical planning controls. The regulation of national physical development will be carried out so as to achieve the specific objectives of the Physical Planning and Development Act. These include:

- ensuring that appropriate and sustainable use in the public interest is made of all publicly and privately owned land in Saint Lucia;
- maintaining and improving the quality of the physical environment in Saint Lucia, including amenities;

- providing for the orderly subdivision of land and the provision of infrastructure and services;
- maintaining and improving the standard of building construction so as to secure human health and safety; and
- protecting and conserving the natural and cultural heritage of Saint Lucia.

The Government of Saint Lucia is presently developing a national land-use policy and plan, building on existing policy and legal and administrative frameworks such as those mentioned previously.

Efforts in the field of co-management of fisheries and coastal aquatic resources

Since the 1980s, the Department of Fisheries has embraced the concept of co-management of resources as a means to effect sustainable conservation, empowerment of resource users, effective regulatory systems and community-based resource management. This approach is supported by the Fisheries Act of 1984, which allows for the establishment of Local Fisheries Management Areas. This enables the Minister of Fisheries to designate an area and an associated local authority (a body associated with the welfare/development of fishers) to regulate the conduct of fishing operations in the area. However, the department has balanced this more 'formal' approach with a number of less-formal, resource-based co-management arrangements, which have also produced some positive results. The range of co-management initiatives is illustrated below.

SMMA: a formal co-management arrangement. The Soufriere Marine Management Area was established as a result of intensifying resource use conflicts, coupled with declining resource quality and a perceived loss of economic opportunity. This occurred within an 11 km stretch of resource-rich, but space-limited coastal marine area, extending along the central west coast of Saint Lucia (SMMA, 2002).

The administering body for the SMMA, the Soufriere Marine Management Area Association, presently exists as a not-for-profit organization overseen by a multistakeholder board of directors. The board represents a blend of governmental and civil society organizations (each with some element of management responsibility within the area), along with the political representative for the district of Soufriere. The arrangement was initially established in 1995 as a less formal arrangement, agreed to after nearly three years of intensive consultation and negotiation among resource users, governmental and non-governmental agencies, and was ultimately endorsed by the Government.

At its inception, the area was set up with a variety of user zones, and was primarily managed by the community-based Soufriere Foundation. It enjoyed an extensive degree of technical support from the Department of Fisheries, under the guidance of a technical advisory committee comprising representatives of key management authorities and users' groups. The initiative to strengthen the SMMA involved adoption of a more formalized structure as a registered not-for-profit company, and designation of the SMMA as a local fisheries management authority under the Fisheries Act. This move was based on recognition of the inherent weaknesses of the earlier administrative/advisory structure and allowed the SMMA to establish a wider range of formal administrative and operational systems (to address the full range of fisheries- and tourism-related responsibilities).

The SMMA experience has not been one of smooth sailing, but rather one of adaptive management exercised in a continual effort to strive for the SMMA's stated mission: "… to contribute to national and local development, particularly in the fisheries and tourism sectors, through management of the Soufriere coastal zone based on the principles of sustainable use, cooperation among resource users, institutional collaboration, active and enlightened participation, and equitable sharing of benefits and responsibilities among stakeholders". Challenges to date (CANARI, 2001) have included:

- unintentional marginalization of certain subgroups of fishers in the early stages of the planning and negotiation process as a result of inadequate stakeholder identification;
- limitations in the degree of two-way communication with key users' groups through their 'representatives';
- management of inherent conflicts within the limited and highly sought-after coastal marine space through consistent application of fair and informed action for the management of conflicts; and
- impact of broader community/national social and economic dynamics that can greatly affect the level of support and compliance within a system of regulated use, e.g. incidents of large-scale unemployment in relatively small communities can quickly result in infractions such as fishing within marine reserves or unauthorized water-taxiing.

Despite the challenges faced, the collaborative approach of the SMMA has succeeded in bringing tangible benefits to resource users and agencies, including improved reef fish populations, higher fish catches, user fee generation, elimination of anchor-induced damage to reefs, and less intense, less frequent conflicts among users. Consequently, an adjacent marine management area has now been established to include coastal space from Marigot Bay southwards to the northern boundary of the SMMA. It is all administered from the SMMA office in Soufriere, working with the coastal communities of Soufriere, Canaries and Anse la Raye.

Co-management of sea urchins: an informal approach. White sea urchins (*Tripneustes ventricosus*) have traditionally been harvested in Saint Lucia, mostly taken close to shore by skin divers. The gonads of the urchin are considered a delicacy, and most of the catch is cooked and prepared for local sale. In the past, harvesting was primarily undertaken by family groups operating during the summer vacation period. Although family units still target this resource, the fishery now attracts a large number of young people from various coastal communities (e.g. Vieux Fort, Laborie, Anse Ger and Dennery).

The sea urchin is particularly prone to overfishing, as it occurs close to shore and is virtually immobile. Destruction of marine habitats (seagrass beds) caused by natural events and anthropogenic activities (including agricultural and industrial pollution, siltation and areas of dredging, illegal fishing with dynamite and other destructive gears) had negatively impacted this resource (Department of Fisheries, 1999).

At the same time, high demand had led to over-exploitation and this resulted in a ban on harvesting in 1987. In the following years stocks recovered to an extent, and the fishery was reopened in 1990 under a limited entry/co-management regime. However, it was closed again in 1993 and remained closed until 2001, due to poor juvenile recruitment and low adult abundance, with the exception of a brief open period in 1995. Recent recruitment has been high, and thus restricted harvesting took place during 2002 and 2003.

When the resource was less abundant (1990–1994), the management system carried out annual monitoring of resources (size structure, abundance, gonad ripeness) in key areas, in collaboration with traditional and potential sea urchin harvesters. In order to obtain a licence, a harvester must have attended discussions of the biology and licensing conditions (size limit, zone of operation, data collection) and participated in pre-harvest population surveys (Department of Fisheries, 1999). The number of fishing permits issued to any one community depended on the population density and size range in the respective harvest zones. Harvesters played a lead role in deciding who would get the limited number of permits. As a result of their close involvement, harvesters willingly agreed to fishery closures in 1993, 1994 and 1996–2000.

With the high abundance of this resource in recent years, the system has been adapted to allow for short 'open periods' in which anyone may harvest, but in accordance with a

range of harvest conditions including a size limit, the requirement to land urchins whole (to facilitate estimating numbers and sizes landed and proper waste disposal) and the provision of catch data to the Department of Fisheries. This approach was considered practical, because the human resource constraints within the Department of Fisheries and the short period during which the organism remains ripe restrict the degree to which area-specific, limited-entry management systems can be effectively administered. Zones have no longer been required and this had led to some intercommunity conflict due to competition and varying levels of compliance with the conditions.

This new approach has meant that the department must maintain a heavier presence at the full range of landing areas during harvest in order to secure data and ensure that the conditions are being adhered to by harvesters. However, levels of compliance have been generally good, except for one community in which there appears to be more widespread disregard for laws and law enforcement in general. This reality illustrates the importance of strong community-based policing as a means to engender compliance and enable effective fisheries restrictions.

Each harvesting group usually comprises three to four people, who skin dive to collect the urchins (use of scuba is prohibited due to its potential for causing overfishing). An additional two to four people operate on shore to break and clean the urchins and prepare the final product roasted on an open fire (urchin shells stuffed with baked roe). Women play a key role in urchin preparation on shore; however, the harvesting and vending of the urchins (either on the roadside or within nearby communities) is primarily carried out by men. Sea urchin harvesting is still seen as a lucrative seasonal activity that can generate considerable income for those involved in the fishery, with the timing of the fishery (based on seasonal ripeness of the eggs) usually coinciding with the opening of the school year, thus providing much sought-after income for rural coastal communities.

Efforts undertaken to integrate fisheries and coastal aquaculture into coastal area management, planning and conservation

SMMA. The case of the SMMA, mentioned in the preceding section, illustrates a successful approach to integrating fisheries in a coastal area in which new and emerging uses are creating confrontations among users and leading to declining resource availability. Regionally and internationally renowned as a 'success story', the SMMA is now able to play a key advisory and advocacy role within ongoing coastal zone management and integrated resource management initiatives at the national level and beyond.

Coastal zone management policy and guidelines. A number of policy, legal and institutional arrangements are in place to facilitate sustainable development of the island's natural wealth, and there is heavy dependence on coastal and marine resources for social and economic well-being and progress. In spite of this, the recently adopted Coastal Zone Management Policy states that arrangements to date are inadequate and coastal resources remain vulnerable to overexploitation and the impact of natural disaster. The new CZM policy affirms that in order "to ensure an integrated approach to CZM in Saint Lucia, the roles of regulatory and other agencies need to be comprehensive and clear, all stakeholders must be informed of, and sensitized to, CZM issues, and CZM-related information must be made readily available to inform decision-making.

"To achieve this effectively, a coordinated approach is needed, and formal linkages must therefore be created among planning and management authorities." The framework established for CZM comprises an interagency coastal zone management advisory committee, which would operate as the decision-making body, and a coastal zone management unit (not yet established), which would act as secretariat to the committee and provide technical advice, information dissemination and public education. According to the policy, the objectives of the framework are to:

- serve as a mechanism for coordination among agencies and institutions involved in coastal zone management and development;
- allow for integration of coastal issues into the national planning and development framework;
- assist in minimizing duplication of functions of management agencies and in addressing gaps;
- provide a forum for conflict resolution and management; and
- conduct specific programmes and activities that do not currently fall within the mandate of existing organizations.

The policy goes even further to embrace an 'island systems approach' to management, recognizing that many of the problems being experienced in the coastal area are the result of land-based activities, which will have to be tackled at the broader level if they are to be addressed effectively. The policy presents a "… regional planning approach with strategies and actions that take into consideration the environment, as well as cultural, social and economic needs. This approach should be flexible, providing direction for development within regions and their components. It should incorporate, among other things, the concept and practice of watershed management."

The policy proposes the division of the island into four regions, based on a combination of watershed boundaries, resource issues, and development and management trends: the northwest coastal region, the central west coastal region, the northeast coastal region and the south to southeast coastal region. The policy sees all components of the regional approach as 'pieces of the same puzzle' and stresses that it is imperative that CZM be guided by a national vision for development, an economic development strategy and a comprehensive national land-use plan.

People and the Sea Project. On a smaller scale, an example of fisheries and aquaculture being integrated into coastal area planning is that of the People and the Sea (PAS) Project, a three-year research project (2000–2003) undertaken as a joint venture by the Laborie Development Planning Committee, the Department of Fisheries and the Caribbean Natural Resources Institute. The project focused on the community of Laborie, which continues to depend heavily on coastal marine resources for its livelihood, e.g. reef fishing, seaweed (sea-moss) cultivation and sea urchin harvesting. The project aimed to investigate the role of active stakeholder participation in sustainable coastal resource management. It assessed a range of coastal resources, their present and potential uses, user perceptions regarding these resources, local experience in resource management, and how such resources could be better managed for sustainability, both by organizations and by resource users (CANARI, 2003).

The PAS Project managed to produce a wide range of detailed biological and socio-economic information on a relatively small area of high relevance to a coastal community. The initiative was able to produce baseline surveys of the reef resources, as well as studies of the reef and sea urchin fisheries and traditional harvesting of sea-moss. Information was also produced regarding coastal pollution and potential opportunities within the tourism sector. With user/community stakeholder involvement, monitoring was undertaken for sea urchin stocks, water quality, coral cover, reef fishery activity and institutional change throughout the project lifespan.

The outcome of the project has partially been that government and community-based management and development agencies now have a wide range of current information to factor into management and development decisions for the community of Laborie. The degree to which this happens will depend on the extent to which the Laborie Development Planning Committee and the people of Laborie require that such agencies use project outputs in their future work with the community.

Such in-depth focus would no doubt be beneficial to other coastal communities; however, it is a costly exercise, both in terms of time and resources. The PAS Project was

made possible through funding assistance provided by DFID. It placed considerable demands on agencies such as the Department of Fisheries and the Ministry of Social Transformation in terms of consistently allocating expertise and manpower at the level of project planning and execution. Nonetheless, the experience and insight gained will have positive effects on approaches taken in future work, in both national and community initiatives.

CONSIDERATION OF SOCIO-ECONOMIC AND DEMOGRAPHIC CONCERNS

Availability of socio-economic and demographic information on coastal fishing communities

2001 national census. The most recent national census conducted by the Government was carried out in 2001. All communities were assessed, including coastal communities in which fishing is either a primary or at least a significant source of livelihood. Information generated included:

- sex, age, education level, religious affiliation and employment;
- housing density, number of people per household, access to solid waste disposal, electricity, water and other basic services, property tenure and union membership;
- type of toilet facilities, lighting, fuel used; and
- access to television, computers, telephone services and vehicles.

Socio-economic survey of fishers. The limited availability of detailed socio-economic information specific to fishers and their families led the Department of Fisheries, in 2001, to conduct an island-wide survey to gather such information (Department of Fisheries, undated). The survey was carried out in 12 selected fishing communities by sampling 20 percent of registered fishers, selected randomly, with the number of people sampled in any one site being proportional to that site's contribution to total registered fishers. Information gathered included demographic data such as age, marital status and number of dependents, but focused on pertinent socio-economic data, including access by households to electricity, water and sanitary facilities, and ownership of property (land, house), vehicles, fishing boats, etc.

The survey was broad and also gathered input from fishers on their length of involvement in fishing, the percentage of total income earned through fishing, other sources of livelihood, personal savings and financial liability, and details of average costs and revenues from fishing. Fishers were asked about their perceptions regarding the level of service received from the Department of Fisheries, their cooperative and the Saint Lucia Fish Marketing Corporation. Although assessment of the results has been completed and a report is being compiled, final interpretation and reporting is still pending owing to human constraints. This is a concern, because the information becomes more and more dated with the increasing time lag between the survey and the resultant report.

Fishers survey by the National Insurance Corporation. Another recent initiative is a survey undertaken by the National Insurance Corporation with the guidance of a multiagency advisory committee established by the Government of Saint Lucia. The survey data were to serve in the development of a pension scheme for farmers and fishers, and the Department of Fisheries was part of the committee. The survey considered a range of factors relevant to such a scheme: status and income of the fisher, level of existing access to employment-pension and insurance coverage, number and type of dependents, existing health status, level of access to medical care and various social indicators, such as access to basic sanitary services, property ownership, etc. Results of the survey are highlighted within the various sections of this paper.

Study of the social and economic impact of the SMMA. In 1998, an assessment was carried out within the SMMA to determine the social and economic impact of

the marine management area (CANARI, 1998). Stakeholders interviewed included fishers and other users, such as the dive operaters and hoteliers. The questionnaire sought perceptions about whether the SMMA had reduced user conflicts, displaced local users, allowed for equitable benefits, or assisted in an increasing understanding and appreciation of the marine environment and its resources. Reported results were not disaggregated by user, thus responses attributed to the fishing community cannot be specifically determined from the report. However, it did note some of the verbal responses by fishers or other groups regarding their perceptions of the impact of the SMMA on fishers, which in general alluded to their earlier feelings of being marginalized by tourism interests, and more recent perceptions that real benefits were being generated for the fisher community.

Use of socio-economic and demographic indicators in the preparation of coastal area profiles and management/development plans

Fisheries management plan. The current fisheries management plan (related to the period 2000–2005) is focused on resource-specific management plans and cannot be considered a plan for the fisheries sector *per se*. The plan does, however, give basic national demographic and economic parameters and outlines the fisheries management process as one that incorporates consultation with industry and other stakeholders at the early and middle stages of development of fisheries-specific management plans. In their present form, the individual fisheries plans do not systematically identify partners within the management framework.

Neither socio-economic nor detailed demographic data were used in the process of compiling the current fisheries management plan. The document was prepared based on a template provided by the Caribbean Community (CARICOM) Fisheries Resource Assessment and Management Programme (CFRAMP), funded by the Canadian International Development Agency (CIDA), which assisted member countries in the development of such plans, as required by national legislation. The Department of Fisheries is presently conducting a review of the plan, given its impending expiration, and has suggested that it be made broader to reflect the status and potential management role of all stakeholders. Results of the recent socio-economic survey conducted by the department could be used to broaden the information base on which specific fisheries are interpreted and options selected for specific management approaches.

The present plan stipulates as one of its primary objectives: "developing and increasing the potential living marine resources to meet nutritional needs, as well as social, cultural, economic and developmental goals in a manner which should ensure sustainable resource use". Despite this, it does not specify these goals, nor does it indicate to what degree present production by fisheries and aquaculture meets the nutritional needs of the country. A broader sector plan would need to indicate the present status and provide indicators, targets and strategies to meet key sector objectives, expressed within national policy, to:

- develop the fishing industry in terms of modernization of fisheries infrastructure and fishing vessels and use of improved fishing gear and methods;
- promote self-sufficiency through increased production from capture fisheries and the aquaculture sector;
- advance the social and economic welfare of fishermen and their families; and
- improve nutrition nationally through the provision of increased volumes of fish protein.

Development of fisheries infrastructure. As part of its initiative towards establishing improved fisheries infrastructure in fishing communities, the Government has benefited from a partnership with the Government of Japan through which fish landing facilities have been established in most landing sites on the island. In developing the

project proposals for these facilities, the data used include trends in fish catches and the number of vessels and fishers, using both past and current figures, generated though the department's data collection, licensing and registration programmes. In-house databases can generate such information at the national level and for individual communities. This information is then used to estimate present and potential catch rates and to anticipate demand for berthing space, locker rooms, ice-making and cold storage capacity, etc. The level of employment in fishing (indicated by fisher registration figures for the landing site) and the range of ancillary employment (boat boys, vendors, processors) are estimated using current data or best estimates – usually generated by extension officers and fisheries data collectors who work regularly in the particular landing area.

Estimating the value of the fisheries sector. As with many countries in the region, little has been achieved in determining the real economic contribution of the fisheries sector to the country. Earlier reference was made to the limitations of present estimates of the contribution of fisheries to GDP. The Department of Fisheries has attempted to produce annual estimates of the value of the fish catch, by species groups (listed in Table 2), based on average market prices for individual species. However, this is only a rough estimate of ex-vessel values and does not include significant gains made in processing and wholesaling/retailing. For these to be recorded, interagency collaboration among fisheries and economic agencies will be required.

A range of government agencies (responsible for economic planning, national budgeting and social/community development), financial institutions (banks, credit unions), and local and regional/international funding agencies also use available information on catch and effort trends and catch values to plan for or selectively initiate development within the fisheries sector and fishing/coastal communities (George, 1999). Obviously, more comprehensive and realistic social and economic information on the fisheries sector would greatly assist effective planning at both the community and national level. The results of the recent survey by the National Insurance Corporation, although somewhat limited in extent (16 percent of fishers interviewed from a population of 2 163), should be made available for use in guiding investment and development initiatives within the sector, whether by public or private interests.

Preparation and implementation of special projects and activities – in the context of fisheries and coastal area management and conservation programmes – that also aim to improve the socio-economic well-being of coastal fishers and their families

The mandate of the Department of Fisheries necessitates the implementation of programmes and activities designed to achieve both the conservation of natural coastal and marine resources and the socio-economic development of fishers and their families. This can be challenging, given the very limited resource base (species, habitat and ecosystems) on which such economic activities depend. Some examples of such integrated approaches follow:

Sea-moss farming developed as an alternative to wild harvest. Sea-moss (various indigenous *Gracilaria* spp.) used to be common in shallow coastal waters. However, increasing harvesting for local use and a burgeoning export market to nearby islands such as Martinique led to over-harvesting in the 1970s and early 1980s and heavy reductions in local sea-moss stocks in many areas (Smith and Gustave, 2001). In the early 1980s, the Government developed methods for the culture of local sea-moss species, with funding and technical assistance from the Government of Canada. This technology was introduced in several communities, including Praslin (on the central east coast), Vieux

Fort and Laborie. More recently, with assistance from CANARI, work has been carried out to identify the most productive sea-moss strains (including a species of *Eucheuma*) and processing techniques and the marketing potential, both locally and abroad. Women have remained key participants, both in farming and processing. In addition, the activity remains at a cottage-industry level, with family groups still providing the primary modus operandi within the various participating communities.

Despite development initiatives within the industry, total production remains quite low, as few locations presented ideal cultivation conditions (in terms of adequate water clarity and quality, low levels of herbivory by fish, settlement of epiphyte, and space competition/conflict with other users – such as recreational bathers, fishing activities, coastal marine traffic, etc).

Nevertheless, several farmers have continued in this activity, which constitutes their main source of income. Farmers were encouraged to produce processed products (e.g., sea-moss punch with milk for local retailing, or concentrated gel for sale to hotels and restaurants, the local distillery and ice cream manufacturers). Some have taken up this challenge, while others prefer to sell the sun-dried product to local retailers or overseas markets. Despite instances of business training and other technical support, the industry remains small.

Fisheries infrastructure development and community-based management. As indicated earlier, in order to establish appropriate fisheries facilities in the main fish landing sites of the island, the Government received significant assistance from the Government of Japan. The Japanese involvement in Saint Lucia's fishing industry began in 1988, when the main cold storage and fish processing facility was built in Castries, along with fish landing facilities in Castries and five fishing villages. Fibreglass vessels and modern fishing gear were also provided. Two of the facilities built in coastal villages were equipped for some level of ice-making/cold storage and fish processing (Embassy of Japan, 1997). More recently, Japan assisted the Government of Saint Lucia in the construction of sizable fisheries facilities at Dennery, Vieux Fort, Choiseul and Soufriere and refurbished the Gros Islet facility. Each facility includes gear lockers, washrooms, a fuel station, a fish market and a marine mechanics workshop. Some of the facilities include office space for the resident fishers' cooperative and another for staff of the Department of Fisheries, cold storage and coastal protection (breakwaters/revetments) for both the shoreline and vessels (Department of Information Services, 2003).

Many benefits have accrued to fishers, vessel owners and fisher cooperatives through this sort of investment. The complexes provide hygienic and safe environments for the daily landing and sale of fish. This also benefits consumers as fish quality is improved. Although ice is available at minimal cost, few vessels use ice at sea, apparently due to the added cost and space it requires. Community-based multistakeholder committees have been established to manage these facilities, with fishers' cooperatives playing a lead role. Maintenance costs are largely defrayed by the fees charged for fish vending, use of toilet/shower facilities, purchase of ice and the landing of fish.

These external forms of assistance have been supplemented with education and training undertaken by the Department of Fisheries with financial and technical assistance from the Governments of Canada, Japan and France. Such assistance has largely been responsible for a steady increase in fish landings over the past 15 years (from 442 tonnes in 1989 to 1 528 tonnes in 2003) (Department of Fisheries, 2004b) – along with an increase in the number of fishing craft and steady conversion from wooden canoe to fibreglass pirogue. Thus the overall value of landings has increased and fishers enjoy better operational facilities. It may be assumed, therefore, that such changes have resulted in better livelihoods for fishers and their families, reflected by the continuing movement of people into the sector. However, specific studies to verify this have yet to be carried out.

Measures to ameliorate negative economic impacts in the establishment of the SMMA. As stated earlier, the fishers of Soufriere had found themselves in increasing conflict for space and living marine resources, due to expanding tourism activities such as diving and yachting within the Soufriere area. The establishment of the SMMA brought a range of benefits for Soufriere fishers (representation on the SMMA administrative and advisory bodies, further establishment of priority fishing areas for use by seine fishers, and marine reserves as nursery/breeding grounds for fish population recovery). However, fishers also lost direct access to some of the most productive reef areas and had to wait several years before seeing the benefits of fish-stock recovery in the form of increasing fish catches (Pierre, 2000). It should be noted that, according to the 2001 national census results (Statistics Department, 2005), 73 percent of households in the district of Soufriere contain members without a secondary-school leaving certificate or higher academic qualification. Thus a large percentage of the population is likely to find it difficult to transfer to occupations that require some form of formal education beyond a primary school level. As a result, fisher households often depend heavily on the income and subsistence provided by fishers within the household. The high average age of fishers, particularly in communities such as Soufriere, suggests that individuals may not be easily transferable into other occupations at this stage in life.

Soon after the SMMA was established, the closure of two key sources of employment in the community of Soufriere (a local factory and a major hotel) led to increased unemployment and an influx of people into the fisheries. Many of these were not committed to respecting the marine reserves and this led to an upsurge in illegal fishing activities, both by new entrants and by traditional fishers, who now faced higher levels of competition for a reduced range of legal fishing areas. In the light of the above, the Government of Saint Lucia took several measures to cushion this difficult transition period, including the provision of a small stipend (EC$400) to 20 of the most dependent pot fishers, who had been substantially displaced by the establishment and active enforcement of the marine reserves. The stipend alleviated this pressure somewhat, and people caught fishing illegally faced the loss of their stipend.

The French Government also helped fund a project, which included the placing of fish aggregating devices (FADs) offshore to encourage Soufriere fishers to leave overfished, declining reef areas and to fish offshore for pelagic fish species. FAD sites were soon embraced by fishers because they could generate a guaranteed catch year round and cut the cost of an average offshore fishing trip. The project also provided a small revolving fund offering fishers small loans (up to EC$6 000) to engage in activities such as deep-sea fishing and tourism) (Pierre, 2000). Over the years, all such initiatives have jointly assisted in the rehabilitation of reefs and reef fish populations in Soufriere. In the space of five years, scientific studies have shown that reef fish populations and catches in Soufriere have both increased significantly (Gell, Roberts and Goodridge, 2002).

The People and the Sea: recognizing the socio-economic importance and potential of coastal marine resources to the people of Laborie. As indicated previously, the PAS Project managed to generate a wide range of information and considerable community and agency involvement in determining the potential for improving coastal livelihoods in the village of Laborie. As with the coastal community of Soufriere, Laborie comprises a high percentage of households (72%) whose members lack a secondary education (Statistics Department, 2002). Thus traditional livelihoods (fishing and agriculture) continue to provide important sources of employment for a large proportion of the community. In assessing the past, present and potential impact of coastal resources on livelihoods in Laborie, the PAS Project aimed to understand the relationship between poverty and the environment better, while viewing poverty in a broad context. That is, it looked not only at income, but also at access to assets

(land, property, equipment, education and skills), social services, dignity, self-esteem, the capacity for choice, and opportunities to participate in decision-making and development (CANARI, 2003).

From its household survey, individual studies and field observations, the project showed that unemployment in Laborie is high and has grown significantly over the past few years, affecting young people in particular. According to the 2001 census (Statistics Department, 2005), Laborie has the second highest unemployment rate for the male population (19.3 percent), second only to the village of Canaries (25.2 percent). Additionally, 21.9 percent of the women in Laborie were unemployed in 2001.

This situation has resulted in the contraction of the community's population over the past ten years and a dramatic decrease in the number of young people within the community, especially young men, as they had either emigrated or moved to other parts of the country (the 2001 census shows that, between 1991 and 2001, just over twice as many men left the community as women). The PAS project showed, in particular, that the community had lost people possessing a variety of marine-based skills, especially within the field of water sports. The upward skewing of the population in age was seen to place additional burdens on the community in terms of health-care needs and social support services.

The project did show that coastal resources played an important role in the livelihoods of older people within the community, many of whom were or are fishers. It also concluded that non-"area-related" coastal zone management approaches (other than marine parks or similar, zoned management systems) are valid in terms of achieving coastal resource conservation. This is particularly true in coastal areas in which there are neither strong institutional organizations nor intense levels of resource use to generate user revenues, both of which are important for administrative and financial sustainability of marine parks and the like. Additionally, the limited availability of pro-poor approaches to coastal area management and governance was recognized. It was felt that such approaches would better address the needs of people and thus would:

- generate greater conservation support;
- use more appropriate science and technology that relates positively to popular knowledge and perceptions;
- enhance people's livelihoods and resource sustainability;
- protect uses, activities and opportunities for the community and its members, rather than succumb to powerful outside interests.

As was mentioned earlier, this project now provides a valuable case study for work in other areas and communities. It should also allow the organizations that work in Laborie to make more informed development and management decisions in the short to medium term.

FAD development programme: moving fishers away from the reef. The Department of Fisheries continues to operate a FAD development programme in order to attract fishers away from vulnerable reef areas and towards offshore fishing. The department has benefited from assistance in the demonstration and establishment of this technology over the past ten years from the Governments of Japan and France, and more recently through a project funded by the European Union.

In the early years, there was considerable vandalism of FADs by local fishers – they reportedly felt that the devices had been set in national waters by foreign fishers. However, the fishers and their cooperatives are now fully supportive of the FAD programme and cooperatives are financial partners in such ventures. The benefits include reduced focus on near-shore reef resources, particularly during the low season (June to November), when migratory fish stocks were otherwise thought to be in short supply. This can result in more consistent landings of large pelagics during the second half of the year. However, FADs can be expensive considering their relatively short

life span, and the Department of Fisheries is now working with local fishers and their cooperatives to determine the suitability and durability of locally available, recycled materials.

Use of socio-economic and demographic indicators in monitoring the impact of management regulations and measures on the socio-economic well-being of coastal fishers, their families and other segments of the coastal population

As can be seen from the information provided so far, there are extremely few cases in which socio-economic assessments for demographic indicators for coastal communities or fishing industry stakeholders have been conducted with the objective of better understanding: levels of dependency on coastal and marine resources; costs and derived benefits; or the opportunities available to further develop and improve livelihoods through sustainable use and management of such resources. Neither has there been substantial work in monitoring the impacts (both positive and negative) of management regulations on the socio-economic well-being of coastal fishers and their communities.

To glean a broader picture at the community level, such specific factors as resource-use patterns, stakeholder characteristics, perceptions/behaviours, gender issues, organizational and institutional arrangements and the influence of market factors would need to be assessed and better understood. To monitor socio-economic change (in terms of fisheries development/management or other intervention), suitable indicators for such changes over time (positive and negative) would need to be selected. Lack of appropriate baseline socio-economic studies would likely lead to erroneous conclusions and inappropriate management decisions.

CONCLUSION AND RECOMMENDATIONS

The limited integration of socio-economic considerations and demographics into management and conservation planning and action does not mean that the management and conservation work outlined in earlier sections has failed to bring tangible benefits to fishers, their families and communities. Communities heavily dependent on fishing as a source of employment and sustenance have progressed in terms of physical development and social services, although it has not been determined to what extent these assets have been generated through fisheries-based earnings and employment.

In most communities, more and more fishers are interested in becoming active participants in resource and fisheries management, fisher education and training programmes, and negotiations with other marine users. This is a good sign, and such changes need to be constantly encouraged and supported. Nonetheless, fishers' cooperatives continue to complain of lack of unity among fishers in their respective communities. As coastal uses increase and fisher communities compete with business-oriented individual companies and organizations within alternative economic sectors, fisher unity and strong fishers' organizations will be required in order to secure continued benefits to the fisheries sector.

Education programmes run by the Department of Fisheries and other governmental and non-governmental organizations have led, over time, to a better integration of coastal marine issues into school curricula and have created a younger generation that is more aware of marine resource issues. However, illegal fishing still occurs (e.g. the capture and sale of lobster, the use of dynamite and poisons, fishing in the closed season, illegal killing of nesting turtles and collection of their eggs). Are the majority of fishers and coastal residents involved in such practices? Probably not. But educational activities, targeting specific groups such as fishers, schoolchildren, etc., need to be sustained and updated with new information and new technology as time evolves. Education also needs to be supported by effective enforcement, whenever necessary, so as to provide a real deterrent to those who are informed yet choose to be non-compliant.

TABLE 5
Target activities for integrating socio-economic and demographic indicators into coastal and fisheries management

Need/constraint to be addressed	Activity	Implementing agency	Support agencies
• Need for country-specific estimates for economic and social contribution of fisheries sector/individual fisheries to GDP and to national development	• Creation of survey format to guide national baseline studies (for assessing range of factors and identifying appropriate indicators for long-term national monitoring)	• Caribbean Regional Fisheries Mechanism (CRFM): draft survey format; provide implementation guidelines/ training; seek funding to support national efforts	• National governments (ministries/departments responsible for fisheries, trade, economic, social development)
	• Facilitation of focused socio-economic/demographic graduate/post-graduate studies related to fisheries sectors by students enrolled in educational institutions	• CRFM working with relevant tertiary education institutions within region and beyond: provide study grants for priority research areas	• National governments to generate country-specific priority areas for such research
• More effective integration of socio-economic and demographic considerations in fisheries/coastal area planning and development	• Improved sharing of information among fisheries authorities and economic planning authorities	• National fisheries agencies; economic/social agencies: production and circulation of annual/biannual statistics/ information	• Funding and technical assistance: – CRFM/OECS/FAO – Donor governments – Other national/regional/ international agencies
	• Improved integrated planning among agencies responsible for fisheries, coastal and national development through joint planning and review initiatives	• CZM advisory committee/ permanent/ad-hoc national economic and social advisory bodies	• Fisheries Department; other departments/units and community/user organizations responsible for elements of coastal and marine use and management
	• Providing support to projects that assess and integrate socio-economic factors for sustainable coastal and marine resource use and management	• Fisheries Department, community development organizations, fishers' organizations • Donor agencies: national, regional and international	• Government and community organizations assisting in design and implementation of such projects
• Integration of socio-economic and demographic factors into national fisheries management and development plans (FMPs)	• Provision of guidelines to countries on integrating socio-economic and demographic factors and indicators into revised/new fisheries management plans	• CRFM: provision of format for revising/developing FMPs (advancing prior CFRAMP initiative and products in this regard) • Fisheries Department: revising FMPs	• Fishers' organizations
	• Strengthening/supporting integrated planning at national level	• CRFM/OECS: provision of guidelines on integrating fisheries and coastal development into sustainable national development (with particular emphasis on issues relevant to SIDS)	• International/regional funding agencies
• Information-sharing on case studies in which socio-economic and demographic factors have been integrated into fisheries and coastal area planning and management	• Use of existing electronic mailing links in circulating relevant documents	• Caribbean fisheries electronic network	• CRFM/OECS/CANARI/ national agencies/ university and other research institution libraries
	• Provision of relevant current books/scientific papers to expand existing libraries at Fisheries Department	• CRFM	• Funding support from donor governments and agencies where such texts are available
• Improvement of fisheries data systems to include relevant socio-economic and demographic data collection/use	• Development of systems to collect data for socio-economic and demographic indicators	• Fisheries Department • CRFM: upgrade of existing Caribbean Fisheries Information System (CARIFIS) database (if necessary)	• Technical and financial assistance from CRFM • National economic and social agencies
• Identification of likely socio-economic costs and benefits with development of common fisheries regime within CARICOM	• Conduct of relevant consultancies for undertaking of cost/benefit analysis of common fisheries regime and provision of recommendations relevant to way forward	• CRFM with donor countries/ agencies: funding of consultancies	• National agencies providing relevant quantitative and qualitative information

As more youth enter the sector as fishers, boat owners, aquaculture farmers and the like, they may benefit the sector through their higher education levels and greater capacity for innovation, but may also bring lower levels of awareness and respect for national laws and resource limitations unless adequately sensitized and trained to use the resource base sustainably and responsibly. Thus both formal education and new fishers remain critical ongoing needs for the viability of the fisheries sector.

In the context of Saint Lucia, little effort has been devoted to establishing the link between regulation/management and livelihood benefits. This appears to be largely due to the limitations in human and financial resources faced by small island states, which prevent in-depth focused work, involving the full range of environmental indicators/factors. As a result, it is difficult to establish consistent monitoring programmes that collect, analyse and interpret relevant information to feed into adaptive management approaches. In the future, such constraints will continue to require the development of effective community-based management arrangements, wherever suitable institutional and user environments allow for formal delegation of authority to competent community organizations.

Small islands such as Saint Lucia will need to continue pursuing project opportunities such as the PAS Project, in which a wide range of environmental factors can be assessed for a given time period in order to better select management and monitoring priorities for particular communities or resources. The final option is to continue conservation and resource management work in spite of the limited ability to monitor specific levels of biological, social or economic impact – confident that many outcomes will be positive for both the resources and the people that depend on them.

Target activities for integrating socio-economic and demographic indicators into coastal and fisheries management. In order to better integrate the use of socio-economic and demographic indicators into coastal and fisheries management, the following initiatives are suggested (Table 5). Although they are specifically relevant to Saint Lucia, they may well be applicable to other countries within the region.

The degree to which past/current practice has integrated socio-economic issues and demographics into fisheries and coastal area management and planning varies among CARICOM states. In many cases it has been limited, but, as has been shown in this report, there are important lessons to learn. The consideration of case studies from the Caribbean region and beyond can provide an important starting point. For more consistent progress, however, social and economic disciplines must become integral to our fisheries management practice. This will require that such expertise exists within fisheries or planning departments. It also means that the range of information we routinely gather on the fisheries sector and the way we develop and assess national fisheries development management plans and programmes will need to be broadened. In order to achieve a fundamental shift in national and regional capacities and approaches, avenues must also be provided for reporting to and influencing the decisions of the political directorate, at both national and regional levels.

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CASE STUDY

Trinidad and Tobago

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2004

5 Consideration of socio-economic and demographic concerns in fisheries and coastal area management and planning in Trinidad and Tobago

GENERAL COUNTRY INFORMATION[1]

Population

Trinidad and Tobago is an archipelagic state comprising the two southernmost islands of the Lesser Antilles. It is located on the northeast coast of Venezuela between 10 ° 02' – 10 ° 50' N latitude and 60° 55' – 61° 56' W longitude. Trinidad is separated from Venezuela at its nearest points on the northwestern and southwestern peninsulas by the approximately 13 km strait of the Gulf of Paria, which is an enclosed basin bounded on the east by Trinidad and on the west by Venezuela. A distance of 32 km separates the two islands of Trinidad and Tobago.

Total land area is 5 128 km^2, of which Trinidad covers 4 828 km^2. The total coastline of Trinidad and Tobago is 362 km. Maritime boundaries, in keeping with UNCLOS II (1982), are a 200 nautical mile (nm) EEZ, 200 nm continental shelf or to the outer edge of the continental margin, 24 nm contiguous zone and 12 nm territorial sea. However, maritime boundaries with Grenada and Barbados are being negotiated.

The estimated population in 2000 was 1 290 000 (Central Statistical Office (CSO), 2004). The gender ratio is roughly equal, with the ratio of men to women being 1:1.1. It is estimated that 70 percent of the population is between 15 and 65 years old and comprises 403 202 men and 370 498 women, while 8.1 percent of the population is 65 years and over and comprises 39 762 men and 48 765 women. The overall median age for men and women is 30.4 years.

The population growth rate is -0.7 percent, with the birth and death rates estimated at 12.8 births and 9 deaths per 1 000 people. The net migration rate is -10.8 migrants per 1 000 people. The total fertility rate is estimated at 1.8 children born per woman, with the overall infant mortality rate estimated at 24.6 deaths per 1 000 live births.

The main ethnic groups are East Indians, a local term referring to immigrants from India (40.3 percent), and people of African descent or blacks (39.5 percent). Other groups are mixed (18.4 percent), white (0.6 percent), and Chinese and other (1.2 percent).

Adult literacy, defined as the ability to read and write at age 15 and over, is estimated at 93.8 percent, with a youth literacy rate of 97.5 percent (CSO, 2004). Literacy rates for men and women are 99.1 and 98 percent respectively. Estimated enrolment rates are highest at the primary and secondary school level at 99 and 74 percent respectively, while enrolment in tertiary education averages 8 percent.

The labour force is service oriented, with 64.1 percent of the population employed in services, 14 percent in manufacturing, mining and quarrying, 12.4 percent in

[1] The Central Statistical Office (CSO) is the main source of published demographic, social and economic statistics. It should be noted that, depending on the particular parameter, statistics are available for various time periods and attempts were made to represent the most current and verified ones.

construction and utilities and 9.5 percent in agriculture (1997 estimate). Average monthly income in 1999 for men and women working in the agricultural, forestry and fisheries sectors was approximately 1 137 and 577 Trinidad and Tobago dollars (TT$) respectively. The unemployment rate is 10.9 percent (2003 estimate). The estimated participation rate of women in the labour force is lower than that of men, averaging 44 percent for women and 75 percent for men. It was estimated that 21 percent of the population lived below the poverty line in 1992.

In the 2000 Human Development Index, based on life expectancy, school enrolment, literacy and income, Trinidad and Tobago was ranked as the 50th most developed country among 173 countries. This ranking placed it in the group of countries with a high level of development, which includes Singapore, Norway and Barbados (Ministry of Finance, 2002).

The Gulf of Paria coastal zone, on the west coast of Trinidad, is the site of the major settlements, and it is estimated that 90 percent of the population lives in this area. The population is concentrated in the northwest and in and around San Fernando in the southwest. The clustering of ethnic groups by geographic location is notable, with people of East Indian descent predominantly in rural and more agriculturally oriented areas. In Tobago, the population is concentrated in the southwest of the island.

Based on a 1992 CSO survey of living conditions, the poorest households were found in rural areas, where 20 percent of the population was determined to be poor, compared with 15.6 percent of the urban population (Ministry of Agriculture, Land and Marine Resources [MALMR], 1999). The country was not divided into rural and urban areas. However, based on geographical boundaries, the major concentrations of rural poverty appear to be in seven of the nine regional government areas: Rio Claro/Mayaro, Sangre Grande, Princes Town, Siparia, Penal/Debe, Tunapuna/Piarco and Couva/Tabaquite/Talparo. Large households, those with unemployed elderly people and households headed by women were among those affected by poverty, which was only significant for the dominant ethnic groups.

Economy

General economy

The economy is heavily dependent on the production and export of petroleum and gas. The average contribution of the petroleum sector to the gross national product (GNP) was 25 percent over the period 1991–1998 and 27 percent for the period 2000–2002. Within recent times, there has been a shift in emphasis away from crude oil production to take advantage of abundant natural gas reserves, which are used in the production of methanol and ammonia for export. The energy sector has also been boosting development in some subsectors, namely, distribution, transportation and construction, and heavy industries such as iron and steel have been developed (Ministry of Finance, 2002).

The per capita GDP is US$7 345, with a real growth rate of 4.5 percent (2002 estimate). GDP composition by sector is: agriculture 1.6 percent, industry 43.2 percent and services 55.2 percent. Total exports for 2002 were valued at approximately US$3.0 billion. The main export commodities were petroleum and petroleum products such as fuels and lubricants at a value of US$1.8 billion, chemicals and related products such as ammonium fertilizers at US$500 million, manufactured goods (excluding oil refining and petrochemical industries) at US$362 million and food and live animals at US$115 million.

Total imports and exports for 2002 were estimated at US$3.7 billion and US$3.9 billion respectively, with a trade balance of US$191 million (Central Bank of Trinidad and Tobago, 2002). Approximately 42 percent of exports are destined for the United States of America and 19 percent for Caribbean Community (CARICOM) states. Tourism, primarily for Tobago, accounts for 2.5 percent of GDP.

Agriculture is described as a sector with the potential to generate sustainable increases in output, income and employment. The main cash crops are sugar, coffee, cocoa and citrus. The contribution of agriculture to GDP over the period 1985–2002 ranged from 5 percent in 1985 to 1.6 percent in 1999, with a steady decline in the last three years to 1.2 percent in 2002. The contribution of fisheries to agricultural GDP averages 10 percent, and the fisheries sector contributes 0.2 percent to GDP.

***Fisheries sector*[2]**

Marine fisheries. The marine fisheries of Trinidad and Tobago are characterized by a high diversity of species harvested by many gear types and fishing fleets, including commercial and recreational components. Because of their location on the Brazil-Guianas continental shelf, the marine resources off Trinidad are diverse, including soft substrate and hard substrate demersal species, small coastal pelagics and large migratory pelagics. Off Tobago, the prevailing oceanic conditions are favourable to small coastal pelagics and highly migratory pelagic species, and to a lesser extent, reef species. A number of the fish stocks are migratory and common to northern South American countries as well as to the Caribbean islands chain.

The fishing industry has traditionally been an artisanal one, based on resources occurring in coastal and territorial waters. However, there was a trend in the 1980s in Trinidad and in the early to mid-1990s in Tobago towards the development of larger, more industrial vessels, targeting traditional fisheries, in areas inaccessible to the artisanal fleet.

There are an estimated 1 570 fishing vessels in the national fleet of Trinidad and Tobago, of which 1 491 are artisanal vessels operating in in-shore coastal waters, 35 are semi-industrial, multigear vessels operating in in-shore and offshore areas, and 25 are industrial vessels operating off the west and south coasts of Trinidad (Kuruvilla *et al.*, 2002).

Artisanal vessels, or pirogues, are 7–10 metres (m) in length, made of wood or fibreglass, and powered by outboard or inboard engines (Henry and Martin, 1992). The artisanal, multigear fleet comprises vessels that fish daily in coastal areas, targeting pelagic or demersal species, and are equipped with gillnets, lines or fish pots. Gillnet and pelagic lines are used to target mackerels (*Scomberomorus brasiliensis, S. cavalla*) and sharks (*Sphyrna tudes, Rhizoprionodon lalandii, Carcharhinus porosus*, *C. limbatus*).

Non-target species include a diversity of small coastal pelagics (*Selene vomer, S. spixii*, *Oligoplites saurus, Caranx hippos, C. crysos*) and demersal species (groundfish), which include croaker (*Micropogonias furnieri)*, weakfish (*Cynoscion* spp., *Macrodon* spp.*)*, snook (*Diapterus* spp.), snappers (*Lutjanus* spp.), grunts (*Haemulon* spp., *Genyatremus luteus, Orthopristis* spp.), and catfish (*Arius* spp., *Bagre* spp.). Demersal lines are used to target snappers (*Lutjanus* spp.) and sharks, while fishpots target snappers and groupers (mainly *Epinephelus* spp.).

The Tobago pirogues are similar in design to those in Trinidad, but range from 6.7 to 12.1 m in length, with engines of from 15 to 100 horsepower (h.p.) (Potts, Thomas and Nichols, 2002). The fleet specifically targets four-winged flyingfish (*Hirundichtys affinis*) and associated pelagic species such as dolphinfish (*Coryphaena hippurus*) and wahoo (*Acanthocybium solandri*) and in the late 1990s comprised from 100 to 126 pirogues.

Semi-industrial multigear vessels operate within territorial waters and the EEZ. These vessels are 10–14 m in length and are equipped with: fish pots to target snappers (*Lutjanus purpureus, Rhomboplites aurorubens*) and groupers; live-bait equipment for king mackerel and dolphinfish; surface longlines to target swordfish (*Xiphias gladius*), tunas (*Thunnus albacares, T. obesus*) with marlins (*Makaira nigricans*, *Tetrapturus*

[2] The Fisheries Division of MALMR is the primary source of data on the fisheries sector, while the CSO is a source of complementary data particularly related to trade. Various statistics on the fisheries sector are available for different years and those presented here represent the most current or verified ones.

albidus), wahoo, dolphinfish and sharks caught as bycatch; and gillnets and lines for flyingfish and associated pelagics.

In Tobago the semi-industrial, multigear (iceboat) fleet operates mainly off the west and northwest coasts. Iceboats range from 6 to 12 m in length, with inboard diesel engines of from 75 to 335 HP. They target mainly four-winged flyingfish and associated pelagic species with monofilament gillnets and pelagic lines (Samlalsingh and Pandohee, 1992; Potts, Thomas and Nichols, 2002; and Martin and Soomai, 2004).
The demersal trawl fleet targets shrimp (*Farfantepenaeus subtilis, F. notialis, F. brasiliensis, Litopenaeus schmitti*, *Xiphopenaeus kroyeri*). Groundfish of commercial importance commonly caught in trawl gear are species of croaker, weakfish (locally called salmon), snook, snappers, grunts and catfish as caught in the gillnet and line fisheries. The fleet comprises artisanal, semi-industrial and industrial trawlers. Trawlers operate on the west (Gulf of Paria) and south (Columbus Channel) coasts of Trinidad and for three months in a designated area on the north coast. Trawl fleets of Trinidad and Tobago and Venezuela target the same stocks of shrimp and groundfish in the Gulf of Paria and Columbus Channel (Ferreira, Martin and Soomai, 2004).

Artisanal fishing vessels land at about 65 sites in Trinidad and 32 in Tobago. Semi-industrial and industrial vessels generally operate out of a few major sites on the west coast of Trinidad. Most vessels are individually owned, although a few individuals may own several vessels. There are no company-owned fleets in Trinidad and Tobago, and processing plants and export companies usually purchase from individually owned vessels through a system of wholesale buyers.

The marine fishing sector employs an estimated 5 978 people, of which 3 908 are fishers, 1 225 are involved in the processing industry, 1 245 in fish marketing and distribution and 80 in vessel and gear construction and maintenance (Kuruvilla *et al.*, 2002). The participation of women in the industry is not well documented; however, women are more likely to be involved in processing and marketing activities.

Total annual landings for the fisheries of Trinidad and Tobago for 2003 were estimated at 11 000 tonnes with an ex-vessel value of US$6.75 million (Fisheries Division unpublished data). In addition, fish exports for 2003 were estimated at 3 082 tonnes, valued at US$8.1 million.

There is a transshipment port in Trinidad, owned by Taiwanese interests, that services two Taiwanese longline fleets operating in the south Atlantic. These vessels transship tuna through Trinidad to international markets.

International trade in fish and fisheries products is based mainly on the export of shrimp, snappers, swordfish, tuna, flyingfish and other pelagics. Fisheries products are exported mostly chilled or frozen and are limited to primary processing and packaging. Approximately 4 000 tonnes of fish valued at US$10 million (TT$62 million) was exported in 2000, of which over 40 percent in revenue terms went to CARICOM markets, 30 percent to the United States of America and 22 percent to Canada (CSO, 2000). Trinidad and Tobago has not been eligible to export to the European Union since 1999 and is at present taking measures to meet the required quality-control criteria.

Aquaculture. Aquaculture in Trinidad and Tobago has traditionally operated at the subsistence level, and commercial food fish production has been marked by numerous unsuccessful ventures. Aquaculture has not been developed to its full potential, and formulation of a national policy on aquaculture is an important initiative to be pursued by the Government. In 1999, 57 aquaculture operations were identified, of which 43 were subsistence or small-scale farmers of *cascadura* (*Hoplosternum littorale*). Tilapia (*Oreochromis nilotica*) production was not practiced on a wide scale, even though some farmers have attempted polyculture with the species (Kuruvilla *et al.*, 2002).

The ornamental fish industry has a longer history than food fish production, and there are an estimated 20 producers, who rear several exotic and indigenous species,

and eight exporters. A significant quantity of the ornamental trade is local; however, there is great demand for indigenous freshwater fish and exotics on the export market, mainly CARICOM countries and the United States. Export of ornamentals is the only economically important component of the aquaculture sector. Ornamental fish exports for 1999/2000 had an estimated value of US$610 000. Some 72 percent of the ornamental fish exported during this period were local species, with exotic species contributing to the remainder. An estimated 64 people are employed in the ornamental fish trade (Kuruvilla *et al.*, 2002).

Fisheries subsidies

A 2002 study of the impact of subsidies on the fisheries sector showed that government support consisted largely of the provision of government services at no cost, which was probably feasible because of the relatively small size of the sector in relation to earnings from the energy sector (Kuruvilla *et al.*, 2002). The study showed that government support was still focused on encouraging an increase in primary production (total landings), rather than on improvements in post-harvest handling, processing, quality assurance and marketing or on development of alternative, underutilized or less preferred species. This focus was reflected in the support given by the state to employment at the level of primary producers, the majority of whom are viewed as subsistence/artisanal operators in the aquaculture and capture fisheries subsectors. This was consistent with the Government's view of the fisheries sector as a supporter of the more disadvantaged rural economy.

Political, legal and administrative structure[3]

The two islands became one state in 1888 and gained independence from Britain in 1962. At this time, the country became a member of the Commonwealth, a voluntary association of primarily former British colonies. In 1976 the twin-island state became a republic, and the Constitution of the Republic of Trinidad and Tobago Act provides for the President as head of state. Executive power lies with the Prime Minister and the Cabinet. The legislature is a bicameral parliamentary system consisting of an elected House of Representatives and an appointed Senate. Tobago has a unicameral system with considerable autonomy under the Tobago House of Assembly, which is responsible for most of the island's domestic affairs.

Laws and ordinances of the country are made by Parliament and administered by a Supreme Court comprising the high court of justice, the court of appeal and magistrates courts. At present, the highest court of appeal is the Privy Council in London; however, CARICOM is working towards establishment of the Caribbean Court of Justice, the Caribbean's first indigenous court, to replace the judicial committee of the Privy Council. The agreement establishing this court entered into force in 2002, and the court will function as both an international court and an appeals court.

There are no administrative courts in Trinidad and Tobago, but there are provisions for an ombudsman under the constitution. The local government system consists of 14 corporations made up of two cities, three boroughs and nine regional corporations.

National planning: economic and regional planning

National planning in Trinidad and Tobago was initially for socio-economic development. There have been a series of five-year development plans focusing on economic growth,

[3] The names of government ministries and divisions usually change with a change in administration after a general election or due to periodic Cabinet 'reshuffes' within a political term. During this process, divisions are often relocated under different government ministries. The institutional and administrative arrangements presented here refer in general to the situation at the start of the current political term, which began in 2002, and not to subsequent reshuffles within the last few years.

GDP, employment, income, balance of payments and other measures designed to increase output and improve welfare on a sectoral basis. The Third Five-Year Development Plan (1969–1973) introduced the concept of regional planning into the national planning and development process.

It was thought that physical and economic planning should be integrated on a regional basis, that is, the Government's social and economic plans would be assessed on their spatial implications. Regional planning was expected to facilitate coordination of capital budgeting for projects and the integration of private development into the process, thus resulting in a reduction of regional imbalance and disparities (Town and Country Planning Division, 1974). The development plan identified regions within the western coastal areas, namely, Port of Spain, San Fernando and the central area, as suitable for regional planning.

Legislation of development planning and control

The Town and Country Planning Division of the Ministry of Finance and Planning is responsible by law for development planning and control and coastal zone management in Trinidad and Tobago.

The Town and Country Planning Act, Chapter 35:01 (formerly the Town and Country Planning Ordinance, No. 29 of 1960) empowers the minister to "… frame and execute a comprehensive policy with respect to the use and development of all land in Trinidad and Tobago in accordance with a development plan …". The act makes provisions for the orderly and progressive development of land in both urban and rural areas in order to preserve and improve related amenities; for the granting of permission to develop land; and for other powers of control over the use of land.

It concentrates on the control of land development and does not specifically address marine areas. However, it acknowledges the need to control activities that will impact on the marine environment, and mention is made of the "allocation of land for the protection of marine life" and "prohibiting, regulating and controlling the deposit or disposal of waste materials and refuse, the disposal of sewage and the pollution of rivers, lakes, ponds, gullies and the seashore".

The Town and Country Planning Division interprets the act as giving the division responsibility for any development activity that may take place within the whole of Trinidad and Tobago. This includes the territorial seas, although the act does not address actual sea use as opposed to land use, which is the only aspect of coastal zone management that the act does not address.

National Physical Development Plan

The National Physical Development Plan, formulated by the Town and Country Planning Division, was approved by Parliament in 1984. The plan provides a framework for the preparation of regional and local land-use plans, and for the integration of spatial planning into socio-economic, sectoral policy-making (Town and Country Planning Division, 1989).

The plan examines the problems of interregional allocation of resources and of national settlement patterns. It also attempts to assess the needs and demands of individual regions and to correlate them with national priorities and capabilities.

It identifies environmental problems such as the pollution associated with the disposal of solid, liquid and gaseous wastes; defacement of landscapes by quarrying and unplanned settlement patterns; land-use conflicts; lack of adequate legislation of environmental management; and lack of proper environmental standards. The plan suggests that an environmental policy is needed, and that it must be complemented by a strategy for environmental planning and conservation.

Coastal zone management in Trinidad and Tobago

As they yield to increasing demands for industrial, housing and tourism development, the coastal areas of Trinidad and Tobago are a critical natural resource. Trinidad's Gulf of Paria zone on the west coast is most affected by these developmental pressures, because it is the most populated area of Trinidad and Tobago, where most economic activity takes place. The Town and Country Planning Division, although charged with responsibility for coastal zone management, does not include the disciplines that deal with the marine environment. In addition, adequate institutional arrangements do not exist for dealing with the complexities of coastal area management. A need was therefore seen for establishment of a multidisciplinary agency to deal with coastal zone management.

In 1984 the Institute of Marine Affairs (IMA) was identified as a suitable multidisciplinary agency, and the Town and County Planning Division and IMA collaborated in the integration of their efforts with regard to national development. A Coastal Area Planning and Management Division was included in the IMA research programme. It was mandated to conduct a multidisciplinary coastal area planning and management study in order to develop a Coastal Area Plan for Trinidad and Tobago, using the western coastal area of Trinidad as the pilot area. The major objectives were to identify and gather information related to the planning and management of coastal resources and to undertake research leading to the development of a model coastal area planning and management scheme, which would provide effective criteria, policies and management strategies (McShine-Mutunhu, 1985).

Subsequent to the establishment of IMA, it was apparent that a multidisciplinary agency, while being able to address the institutional problems and the lack of knowledge and expertise, could not resolve the jurisdictional problems. An example of the complexity of the jurisdictional problem is the one of 'beach area'. Existing land-use management policy (Ministry of Planning and Development, 1993) dictates that local government such as the County Council has responsibility up to the high-water mark, while land administration, rather than land management, is undertaken from the high-water mark seawards to the extent of the EEZ by the Commissioner of State Lands under the Ministry of Planning and Development.

Further, if beach facilities are constructed, they are the responsibility of the Tourist Board. Construction and maintenance of coastal protection structures fall under the jurisdiction of the Ministry of Works and Transport. Construction of fish landing facilities is the responsibility of the Fisheries Division of MALMR, and if the beach is fringed by mangroves or is a site for turtle nesting, the area is the responsibility of the Forestry Division in the Ministry of Public Utilities and the Environment. An additional jurisdiction involved may be the Ministry of Energy and Energy Industries with regard to exploited petroleum and gas reserves.

In 1995, the Government announced its intention to foster and encourage ecologically sustainable development based on commitments made at the United Nations Conference on Environment and Development (UNCED), or Earth Summit, held in Rio de Janeiro in 1992. As a result of this, the Environmental Management Act Number 3 of 1995 was enacted, and the Environmental Management Authority (EMA) was established in the same year.

The act provides "for management of the environment within Trinidad and Tobago through the establishment and operation of the EMA, an Environmental Trust Fund and an Environmental Commission to define the powers and duties thereof, and for related matters". It defines environment as "all land, area beneath the land surface, atmosphere, climate, surface water, groundwater, sea, marine and coastal areas, sea bed, wetlands and natural resources within the jurisdiction of Trinidad and Tobago". The act promotes an integrated approach to sustainable development and provides for environmental impact assessments, protection of natural resources, control of

pollution and hazardous substances, appointment of inspectors and other enforcement personnel, and the payment of user and licence fees towards an Environmental Trust Fund.

The National Physical Development Plan of the Town and Country Planning Division remains the overall plan for the coastal zone of Trinidad and Tobago. Currently, IMA continues to carry out aspects of the multidisciplinary coastal area development study within this context. In fulfilling its statutory mandate to coordinate and oversee environmental management functions, EMA entered into memoranda of understanding with other agencies that traditionally dealt with one aspect or another of environmental management. These memoranda are intended to facilitate a collaborative and coordinated approach to dealing with the country's environmental problems.

Over time, a number of ad hoc and cabinet-appointed committees, chaired by the Ministry of Planning and Development, have been established to deliberate on general land administration issues. These committees are often provided with little financial and technical support for conducting appropriate studies. Currently, development standards and policies are in a preliminary stage and have been prepared by the West Coast Master Plan Committee (Mohammed, 2003).

INSTITUTIONAL AND LEGAL ARRANGEMENTS FOR THE MANAGEMENT, DEVELOPMENT AND CONSERVATION OF FISHERIES, AQUATIC AND OTHER COASTAL RESOURCES

Administrative arrangements for the management, development and regulation of fisheries and aquaculture

The Government's management objectives in the fisheries sector and main policy directions are outlined in a draft marine fisheries policy document (Fisheries Division and FAO, 1994) and the goals outlined in the draft strategic plan (Fisheries Division, 2002). The management objectives and main policy directions for the fisheries sector incorporate the principles of co-management and integrated management involving local fishing communities, non-fishing coastal communities, coastal zone users and international communities.

The Government's management objectives are to:

- implement efficient and cost-effective management;
- ensure, through proper conservation and management, that fisheries resources are not endangered by overfishing;
- ensure that the exploitation of fisheries resources and the conduct of related activities are consistent with ecological sustainability;
- maximize economic efficiency of commercial fisheries;
- ensure accountability to the fishing industry and the community at large for fisheries management; and
- achieve appropriate cost-sharing arrangements among all beneficiaries of sound fisheries management.

Institutional arrangements. A number of public- and private-sector agencies and committees at the national level, regional and international organizations and foreign governments provide support for the fisheries sector. The Fisheries Division interacts with these agencies in implementing its programmes and meeting its responsibilities. The agencies that play a lead role in the administration of the fisheries sector, including resource and coastal zone management, are listed below. Details for the government agencies, interministerial and intersectoral committees are provided in sections 2.1–2.3.

Government agencies

- Ministry of Agriculture, Land and Marine Resources (MALMR)
  Fisheries Division, Caribbean Fisheries Training and Development Institute,

Sugar Cane Feed Centre (SFC), National Agricultural Marketing Development Company (NAMDEVCO), Agricultural Development Bank (ADB) and stakeholder organizations

- Ministry of Works and Transport
  Port Authority, Maritime Services Division (MSD)
- Ministry of Public Utilities and the Environment
  Institute of Marine Affairs (IMA), Environmental Management Authority (EMA), Environmental Commission, Forestry Division
- Ministry of Health
  Chemistry, Food and Drugs Division, Public Health Division
- Ministry of Trade and Industry
- Ministry of Finance
  Customs and Excise Division
- Ministry of National Security
  Trinidad and Tobago Coast Guard
- Ministry of Foreign Affairs
- Office of the Prime Minister
- Tobago House of Assembly (THA)
  Marine Affairs Section

Interministerial/intersectoral/stakeholder committees

- National Monitoring Committee on Foreign Fishing and Related Matters
- Monitoring and Advisory Committee

Regional organizations

- Caribbean Community (CARICOM)
- Caribbean Regional Fisheries Mechanism (CRFM)
- University of the West Indies (UWI)

International organizations

- United Nations agencies, Global Environment Facility (GEF)
- Foreign donor governments – European Union, Japan

Laws and regulations specific to the fisheries sector

The principal legislation governing domestic fishing in Trinidad and Tobago is the Fisheries Act of 1916 and subsequent amendments to the act: the Fisheries (Amendment) Act 1966 and Fisheries (Amendment) Act 1975. The act applies to all rivers and tidal waters in Trinidad and Tobago and to the 12-mile territorial sea, and empowers the minister responsible for fisheries to make regulations prescribing mesh size of nets; restricting the size of fish, shrimp, crabs and turtles caught, and prohibiting their sale or preventing the catching of these species, either absolutely or by season or area. Fisheries regulations are made under Section 4 of the act.

The Fisheries (Amendment) Regulations 1998 defined the increase in mesh size for multifilament gillnets and the restriction on the importation and operation of monofilament gillnets. As a result of the lack of support from the fishing industry, a moratorium has been placed on implementation of these regulations pending further research. The Fisheries (Amendment) Regulations 2002 specifies the restriction on the mesh size of monofilament and multifilament gillnets.

The Fisheries [Control of Demersal (Bottom) Trawling Activities] Regulations 1996 and the Fisheries [Control of Demersal (Bottom) Trawling Activities] (Amendment) Regulations 1998 specify restrictions on the areas of operation of the different trawler fleets, according to a depth zoning regime, and prescribe a minimum stretched mesh size for the cod end of the trawl nets. Also with regard to trawling, a 1988 decision

of the Cabinet restricts entry of new vessels, both artisanal and industrial, into the fisheries.

The Fisheries (Conservation of Marine Turtles) Regulations 1994 require that semi-industrial and industrial trawl fleets use turtle excluder devices (TEDs) on their nets.

The Fishing Industry (Assistance) Act 1955 makes provisions for granting financial assistance to the fishing industry by such means as fuel rebates, tax waivers and subsidies on fishing equipment.

The Marine Areas (Preservation and Enhancement) Act of 1970 provides for the designation of restricted areas, and the Marine Areas (Preservation and Enhancement) Regulations 1973 require permission from the minister to enter and remove fauna from the restricted area. The act is currently applied only to the management of coral reefs. A National Parks and Other Protected Areas Bill has been drafted, which, when enacted, will have an effect on the Marine Areas (Preservation and Enhancement) Act.

The Archipelagic Waters and Exclusive Economic Zone Act of 1986 provides for the declaration of archipelagic waters and the establishment of a 200-mile EEZ. The act charges the minister with responsibility for the conservation and management of living resources. Within this context, it provides for determination of the allowable catch for each fishery in the EEZ, and for determination of the proportion to be harvested by citizens of Trinidad and Tobago. Access of foreign fishing vessels to the archipelagic waters, territorial sea or EEZ is allowed only through licences issued by the minister, who also provides the authority for surveillance and enforcement of regulations pertaining to foreign fishing.

The Fish and Fishery Products Regulations 1998, under Section 25 of the Food and Drugs Act Chapter 30:01, authorize the minister with responsibility for health to grant licences for the import and export of fish that have been handled and packed under conditions conforming to the health and safety standards prescribed under the act. The regulations specify requirements for handling fish, general and specific operating requirements for establishments handling or processing fish, and requirements for vessels used for fishing or transporting fish and for vehicles and equipment used for unloading, handling, holding and transporting fresh fish for processing. As a consequence of non-implementation of the regulations, fish and fisheries products originating in Trinidad and Tobago were banned from export to the European Union in 1999.

A fisheries management bill prepared in 1995, whose final title will be the Marine Fisheries Management Act, will repeal the Fisheries Act of 1916 and the relevant sections of the Archipelagic Waters and Exclusive Economic Zone Act of 1986. This act will provide for the preparation of fisheries management plans and, in accordance with these plans, will control and limit access to fish resources through the establishment of a licensing system for both local and foreign fishing vessels.

Ministry of Agriculture, Land and Marine Resources

The Fisheries Division of MALMR manages sustainable development of the fisheries sector of Trinidad and Tobago, while conserving the environment and incorporating the principles of responsible fisheries. It is specifically responsible for assessment, management and conservation of the marine fisheries resources of Trinidad and Tobago and the provision of extension and specialized information services on the fisheries.

The division administers the fisheries regulations in accordance with the existing Fisheries Act Chapter 67:51; Control of Importation of Live Fish Act Chapter 67:52; Archipelagic Waters and Exclusive Economic Zone Act No. 24 of 1986; and Fishing Industry (Assistance) Act 1955 Chapter 85:03. It is also responsible for implementing state obligations under regional and international conventions concerning fisheries or related matters and collaborates with relevant state organizations, parastatal agencies and non-governmental organizations (NGOs).

The Fisheries Division is comprised of four functional units: administration, extension, aquaculture and research. There is also a fisheries training institute, the Caribbean Fisheries Training and Development Institute (CFTDI).

- The administrative unit oversees the work of the units of the Fisheries Division.
- The extension unit is responsible for information dissemination and technology transfer to the fishing industry. It provides extension services through the administration of fiscal incentives, licensing and registration of fishing vessels and fishers, provision and maintenance of physical infrastructure at major beach landing sites, assistance in the formation of fishing associations and cooperatives and in the area of conflict and problem resolution in the fishing industry. The division also provides extension support through the training of fishers, marketing personnel and aquaculturists on fishing methods and gear, fish handling and processing through CFTDI.
- The aquaculture unit is responsible for implementing the division's aquaculture programme. The Government's current focus on aquaculture involves training, establishment of community-based aquaculture projects, and extension and administration of the ornamental fish trade (Fisheries Division, 2001).
- The research unit, or the Marine Fisheries Analysis Unit (MFAU), is responsible for implementation of ongoing fisheries monitoring programmes. These involve catch and effort, economic and biological data collection on the major commercial fish species for use in stock assessments and development of fisheries management plans. The unit is also responsible for maintenance of the Fisheries Management Information System (FISMIS), which is a system of in-house, marine computerized databases and an extensive library reference collection providing specialized information services on the marine fisheries of Trinidad and Tobago and the wider Caribbean area.

The Fisheries Division is involved in negotiating fishing access agreements with other countries. Trinidad and Tobago has had bilateral fishing agreements with Venezuela and Barbados. The current Trinidad and Tobago/Venezuela Fishing Agreement provides for a common fishing zone south of Trinidad and north of Venezuela for a range of vessel types from both countries. The agreement with Barbados, in force for only one year (1990), provided for access by the Barbados fishing fleet to the resources of flyingfish and associated species off Tobago. There is no other history of granting fishing licences for foreign fishing in national waters.

Under the THA Act 40 of 1996, the Tobago House of Assembly (THA) coordinates management of the fishing industry in Tobago, although legislative authority for the sector lies with the Minister for Agriculture, Land and Marine Resources. The act gives THA authority to manage coastal waters up to three miles from the coastline. The Marine Affairs Section under THA is responsible for marine affairs in Tobago, primarily fisheries.

Under MALMR, there are several statutory agencies responsible for providing specialized services to the fisheries sector as part of their overall mandate. The main agencies are the Sugar Cane Feed Centre (SFC), National Agricultural Marketing Development Company (NAMDEVCO) and the Agricultural Development Bank (ADB).

- SFC is responsible for the provision of aquaculture seed stock, training in seed stock production, advice on aquaculture enterprise development and extension services in aquaculture. Its main focus is research on integrated farming.
- NAMDEVCO conducts market research and is responsible for identifying local and export markets for local agricultural commodities and fish and for establishing linkages among buyers, sellers and producers. It is also responsible for daily collection of agricultural data/information, including prices of fish, and managing wholesale fish markets.

- ADB provides financing to the agriculture sector, including fisheries. Loans are provided for any aspect of fisheries with the exception of trawlers and new pirogues (artisanal vessels).

Stakeholder organizations

Fisherman's organizations. These are of two types, fishing associations and fishing cooperatives, and they are generally composed of fishers that operate from a particular beach, landing site or fishing area. They were traditionally formed to give fishers a collective voice and lobbying power for matters that directly impact their fishing activities and livelihood. However, individual members of each of these groups are often involved in different fisheries.

Of the two, cooperatives are the more organized, with formal registration at the Ministry of Labour, and are managed by a board of directors. Fishing associations are informal groups, with no legally binding commitments. In 1988 an umbrella organization of fisheries related groups – the National Organization of Fishermen and Allied Cooperatives Society Ltd – was formed to coordinate representation of the fisheries sector. Its effectiveness has been severely limited by a general lack of organization at all levels in the industry and poor representation in the fishing communities.

There are currently 34 fishing organizations (9 cooperatives and 25 associations) in Trinidad and Tobago – 24 in Trinidad and 10 in Tobago. However, they are not well managed (Picou-Gill, 2003). In Trinidad, the Cedros Fishing Cooperative is currently the most successful organization. It services the needs of families in the southwestern peninsula whose main source of income is fishing. The organization maintains a fishing complex and operates a gas station, post office and lottery outlet.

In Tobago, developments in the fishing sector during the 1980s spurred the Tobago House of Assembly to encourage the formation of fishers' organizations. Investment is mainly from the private sector, due to the lack of government financial support. In 1999 the All Tobago Fisherfolk Association was formed as a legal entity. Based on its achievements, an umbrella organization, the National Organization of Fishers of Trinidad and Tobago was also formed.

Cabinet-appointed committees. There are two cabinet-appointed committees funded entirely by the state and comprised of representatives of the fishing industry and other stakeholders. Both committees are chaired and administered by the Fisheries Division.

The Monitoring and Advisory Committee (MAC) comprises primarily representatives from the artisanal fisheries sector and includes representatives of government agencies and research institutions. MAC is the only existing formal structure for fishing industry consultation. The committee was established in 1997 to resolve conflicts between the artisanal (non-trawling) fishing communities of the north coast and the industrial trawl fisheries.

MAC was mandated to ensure implementation of an "agreement to promote the sustainable management and optimal utilization of the in-shore/coastal fisheries on the north and south coasts and in the Gulf of Paria" (Fisheries Division, 1997). Under the agreement, regulations were drafted for closure of the fishing grounds to the trawl fisheries in the disputed area. The membership and mandate of the committee have broadened since its inception.

The second cabinet-appointed committee is the national Monitoring Committee on Foreign Fishing and Related Matters, which was established in 1998. The terms of reference of the committee include, *inter alia*: monitoring of the operations of foreign fishing vessels in Trinidad and Tobago waters, including compliance with conditions of access; monitoring the characteristics of foreign fishing vessels that use Trinidad and

Tobago for transshipment or landing to ensure compliance with international law and agreements; and informing the minister about industry activities that might adversely affect the conservation and management of living resources. Membership includes representatives of government agencies, a research institution, an environmental NGO and a fishing industry association.

Other government agencies

The main agencies under the Ministry of Works and Transport are the Port Authority of Trinidad and Tobago and the Maritime Services Division (MSD). The Port Authority is responsible for all coastal property within the designated geographic zone of the Port of Port of Spain, Trinidad, and Scarborough Port, Tobago. It provides advice on port development and considers applications for use or development of port facilities within the designated area, on the recommendation of the relevant ministries.

MSD is responsible for registration of vessels under the Shipping Act for vessels over 24 m in length and under the Motor Launch Register for vessels under 24 m in length. Currently, only a few fishing vessels are registered with MSD. It also produces tide tables and provides information and navigational warnings for small craft. Under the ministry, there are nine state-owned Regional Cooperations with wide-ranging responsibilities, including management and maintenance of retail markets in the municipalities within the cooperation's jurisdiction. Many of these markets include retail outlets for fish and associated species.

Under the Ministry of Health, the Chemistry, Food and Drugs Division is the designated competent authority to implement the provisions of the Fish and Fishery Products Regulations, 1998. It is also responsible for monitoring fish and fish products for safety and sanitation standards and certification for export. The Public Health Division is responsible for ensuring that people involved in food handling are certified to handle fish safely and that disposal of wastes does not pose a health hazard.

The Ministry of Trade and Industry administers laws governing local and international trade, including trade agreements and export processing zones, among other responsibilities. It also provides general and special ministerial licences for import or export of fish (including crustaceans and molluscs) and fishing vessels.

Under the Ministry of Finance, the Customs and Excise Division administers customs law with regard to duty payments for imports of fish and fish products and equipment, duty waivers, fish export or re-export and transshipments.

Under the Ministry of National Security, the Trinidad and Tobago Coast Guard is responsible for maritime surveillance and monitoring and enforcement of fisheries regulations and rules under fisheries agreements. It is a major participant in marine delimitation negotiations and carries out inspections of fishing vessels under the Turtle Excluder Devices Regulations.

In the Ministry of Public Utilities and the Environment, the Forestry Division has authority under the Wildlife Act for the conservation of wildlife and implementation of relevant regulations. It also has authority over protected areas, including wetlands. The division is responsible for administration of the country's accession to CITES, as well as of the Specially Protected Areas and Wildlife Protocols of the Cartagena Convention. Species addressed under CITES include marine species harvested locally.

Regional and international organizations and foreign donor governments. CARICOM is an institution of regional integration established as the Caribbean Community and Common Market by the Treaty of Chaguaramas, signed on 4 July 1973. By treaty revision, effective February 2002, the successor entity is now the Caribbean Community, including the CARICOM Single Market and Economy. The principal organs of the community are the Conference of Heads of Government, responsible for determining policy directions for CARICOM, and the Community Council of

Ministers, responsible for strategic planning and coordination in the areas of economic integration, functional cooperation and external relations.

Four ministers' councils assist these principal organs in the performance of their functions. Among these is the Council for Trade and Economic Development, which promotes this type of development and oversees operations of the CARICOM Single Market. Matters relating to agriculture and fisheries are discussed at annual council meetings, and decisions are made on fisheries management and sustainable development at the regional level. The CARICOM secretariat is responsible for providing leadership for development of the community and ensures close interaction with member states at technical and political levels.

The Caribbean Regional Fisheries Mechanism (CRFM) was formally established in 2003 and is the successor to the CARICOM Fisheries Resource Assessment and Management Programme (CFRAMP), which promoted sustainable use and conservation of the fisheries resources of CARICOM member states from 1991 to 2003. CFRAMP was funded largely by the Canadian International Development Agency, with contributions by member states of CARICOM. Before 1991 the regional fisheries desk was hosted at the CARICOM secretariat.

The CRFM mission is to promote and facilitate the responsible utilization of the region's fisheries and other aquatic resources for the economic and social benefit of current and future populations of the region. Membership is open to all CARICOM countries and special provisions are made for other countries in the region to become associate members. Trinidad and Tobago is a member. The CRFM is composed of a ministerial body, the Caribbean Fisheries Forum, the main technical and scientific decision-making unit, and the Caribbean Fisheries Technical Unit, which functions as the secretariat.

The CRFM also functions as a project management agency on behalf of the region, implementing a number of projects such as the ACP/EU project for Strengthening Fisheries and Biodiversity Management in ACP Countries and the Integrated Caribbean Regional Agricultural and Fisheries Development Programme (ICRAFD). Policy and activities are approved by the Council for Trade and Economic Development, which functions as the ministerial body.

The University of the West Indies is responsible for tertiary level education and for fisheries and aquaculture research and coastal studies, in addition to the Centre for Research Management Studies (CERMES), which specializes in natural resource management studies.

The Food and Agriculture Organization of the United Nations provides financial and technical support for a number of fisheries projects related to management and sustainable development of fisheries resources. The United Nations Environment Programme provides support for activities that benefit fisheries indirectly. The Global Environment Facility (GEF) is an independent financial organization that provides grants to developing countries for projects that benefit the global environment and promote sustainable livelihoods in local communities.

The United Nations Development Programme (UNDP) and GEF often provide financial support to implementation of FAO projects, with the latter providing the technical support. Trinidad and Tobago is currently participating in the following projects:

- FAO/UNDP Project EP/GLO/201/GEF, Reduction of Environmental Impact from Tropical Shrimp Trawling, through Implementation of Bycatch Reduction Technologies and Change of Management (2002–2007), which is a global project aimed at reducing finfish discards from catches of the trawl fleet. The main project activity is testing of bycatch reduction devices, with a view to their introduction in the fisheries, and awareness-building on the issues of bycatch and discards.
- FAO/Japan Project GCP/RLA/140/JPN, Scientific Basis for Ecosystem-Based Management in the Lesser Antilles, Including Interactions with Marine Mammals and Other Top Predators (2002–2007), involving modeling of the pelagic

ecosystem in the eastern Caribbean. One of the objectives of this project is development of ecosystem-based management plans for the pelagic waters of the EEZs of participating countries, specifically for key species resources that are shared in the region.

A number of subregional working groups are maintained by FAO under the Western Central Atlantic Fisheries Commission (WECAFC), among which are the FAO/WECAFC Ad Hoc Working Group on Shrimp and Groundfish Resources of the Guianas-Brazil Continental Shelf and the Working Group on Small Pelagics and Flyingfish. Trinidad and Tobago is a member of both working groups.

The European Union has provided grant funding at national and regional levels under the African, Caribbean and Pacific States/European Union (ACP/EU) arrangements. Grants have been provided for infrastructure development at the national level. In addition, grants have been approved to facilitate preparedness for implementing sanitary and phytosanitary standards for fish and fish products for export to EU markets. At the regional level, grants have been provided for implementation of the ACP/EU project, Strengthening Fisheries and Biodiversity Management in ACP Countries, and the ICRAFD project.

Since 1994, the Japan International Cooperation Agency (JICA) has implemented the Project for the Promotion of Sustainable Marine Fisheries Resource Utilization, which includes components in marine engineering, fish handling, seafood technology, fishing technology and the training of government fisheries staff and fishers of Trinidad and Tobago and the region. The project includes provision of equipment, vessels and overseas attachments in support of project activities.

Scientific working groups

The marine resources in the waters of Trinidad and Tobago are thought of as shared, because stocks of some commercially important fish species are also found in waters of neighbouring countries. Thus recruitment and population dynamics of local fisheries are affected by harvesting activities in neighbouring fisheries. Demersal species, primarily shrimp and groundfish, are considered as shared with other countries on the Guyana-Brazil continental shelf.

Large pelagic species are transboundary, occurring in or migrating into the EEZ of all or most of the CARICOM coastal states and northeastern South American states and extending into international waters. The distribution of large pelagic species harvested by local fleets goes beyond the WECAFC area and may be transatlantic.

Trinidad and Tobago participated in several of the working groups for the assessment of fisheries resources established under CFRAMP. The groups were as follows: small coastal pelagics and flyingfish; large coastal pelagics, reef and slope; and shrimp and groundfish. In some instances, due to the shared nature of the resources and with some of the neighbouring states being non-CARICOM states, CFRAMP collaborated with the FAO/WECAFC ad hoc working groups in conducting the assessments. More recently, the CRFM has stated that the management of shared stocks is one of its highest priorities and has formed similar working groups to ensure continuity in the assessment work initiated under CFRAMP and FAO/WECAFC. The CRFM coordinated its first scientific workshop in June 2004.

Under the framework of the FAO/WECAFC shrimp and groundfish working group, CFRAMP and FAO conducted a series of subregional workshops involving Brazil, French Guiana, Guyana, Suriname, Venezuela and Trinidad and Tobago to assess shared stocks of shrimp and groundfish.

Results of studies using data derived from the fishing fleets of countries on the Guianas-Brazil shelf have indicated the need for a comprehensive management strategy at the subregional level and the need to regulate effort in the fisheries. The move towards the incorporation of economic data has also been initiated under the FAO/

WECAFC shrimp and groundfish working group, in which bio-economic assessments of commercially important species have been completed.

The shrimp and fish resources in the Gulf of Paria and Columbus Channel are considered to be shared stocks, exploited by the fleets of both Trinidad and Tobago and Venezuela. Thus it is essential that the country collaborate with Venezuela on the development of a joint management regime for the fisheries resources. The current Trinidad and Tobago/Venezuela fishing agreement outlines a collaborative approach to the management of shared resources. However, the protocol on fisheries research, outlined under the agreement, has not yet been fully activated.

The International Commission for the Conservation of Atlantic Tunas (ICCAT) has a mandate to manage most of the large coastal pelagic and oceanic large pelagic species. ICCAT is an international fisheries management organization responsible for assessment, management and allocation of quotas among the nations and fishing entities harvesting tuna, billfish and associated species in the Atlantic. Within the Caribbean, in 2000 the CRFM established a Working Group on Large Pelagic Fish Resources. Since then, the group has held two large pelagic fish stock assessment meetings during which data analyses were conducted on coastal and pelagic species.

Administrative arrangements for the conservation and rehabilitation of the coastal environment and aquatic resources

Coastal zone management

The key agencies involved in environmental and coastal zone management, including efforts in rehabilitation of the coastal environment, were introduced in the previous section (pp. 97–98). These are the Institute of Marine Affairs (IMA) and the Environmental Management Authority (EMA) under the Ministry of Public Utilities and the Environment.

IMA is a statutory entity established by the Act of Parliament 1976. It also receives funds from non-governmental sources including fees collected for technical advisory services. Responsibilities include advising the Government on various aspects of marine affairs, as well as assistance with legal aspects and implementation of research programmes. Major programme areas are environmental research, fisheries and aquaculture, legal research and technical advisory and information services. IMA focuses on research into fish diseases and breeding and grow-out techniques in intensive systems for both marine and freshwater species.

EMA is a statutory board established in 1995 under the EMA Act, which also provided for establishment of the Environmental Commission. EMA has legislative authority for the control of noise and water pollution, waste management, handling of hazardous substances and notification of unauthorized releases and other incidents. It administers environmental education and related public awareness programmes and issues certificates of environmental clearance to new development projects that may impact the environment. In some cases, an environmental impact assessment (EIA) may be required by the developer.

EMA also responds to emergency incidents and spills in conjunction with other government agencies, providing technical and investigative support to response teams. It takes the lead role on behalf of the Government of Trinidad and Tobago in implementing global and regional environmental agreements, including the Convention on Biodiversity, Convention on Climate Change and Basel Convention (EMA, 1997).

The Environmental Commission is a tribunal responsible for judicial review of decisions of EMA. These include decisions with regard to the designation of environmentally sensitive areas or species and denial of issuance of a certificate of environmental clearance.

Conservation and rehabilitation of aquatic resources

Efforts oriented towards conservation and rehabilitation of aquatic resources are quite limited. The implementation of some fisheries legislation can be considered to be

conservation oriented, despite the primary impetus being access to foreign markets. The same reasoning applies to the implementation of some data-collection programmes in which efforts by the Fisheries Division to monitor catches for stock assessment purposes were unsuccessful until the threat of international trade sanctions compelled fishers to submit data on fishing operations.

Demersal trawl fisheries. The 1994 Fisheries (Conservation of Marine Turtles) Regulations requiring the use of turtle excluder devices by the trawl fleet can be considered conservation oriented. These regulations were drafted under Section 4 of the Fisheries Act, Chapter 67:51, in response to legislative requirements of the United States of America by which access to the US market for shrimp became dependent upon annual recertification by the US Department of State and which is based on complete compliance with the use of TEDs by all semi-industrial and industrial shrimp trawl vessels.

The Fisheries Division has a continuous monitoring regime, which assists the national programme for the protection and conservation of marine turtles. This programme was implemented in collaboration with the Trinidad and Tobago Coast Guard, with a memorandum of understanding being signed between the Fisheries Division and the Coast Guard for cooperative monitoring of trawlers at sea to ensure TED compliance. Selected officers of the Coast Guard were empowered under the Fisheries Act 1916 to enforce the regulations governing the use of TEDs. New regulations were also drafted to address the type and specifications and proper installation of TEDs (Fisheries Division, 2001).

In the trawl fisheries, the high incidental catch and discard of non-target finfish species impact negatively on the environment and on the sustainability of the resources. The incidental fish catch may be as high as 90 percent for the artisanal trawl fisheries, and most of these fish are juveniles of other important coastal fisheries. This aspect of trawl fisheries is also the most important source of conflict between the trawl fisheries and other coastal fisheries in national waters. Trinidad and Tobago is one of the participating countries in the global project EP/GLO/201/GEF, Reduction of Environmental Impact from Tropical Shrimp Trawling through the Introduction of Bycatch Reduction Technologies and Change of Management. This five-year project, inaugurated in 2003, is funded by GEF and coordinated by FAO.

The project intends to introduce bycatch reduction devices and appropriate trawl gear modifications – as being more responsible fishing gear and techniques – and will consider the development of the necessary legal and management frameworks to ensure the use of such devices.

In Latin America and the Caribbean, Trinidad and Tobago is expected to collaborate with Columbia, Costa Rica, Cuba, Mexico and Venezuela. The overall work plan of project EP/GLO/201/GEF involves consultation with commercial shrimp-trawler fleets and other stakeholders, and collection of specific baseline data on the operations, catches, bycatch and discard rates of the present, commercial shrimp-trawl fisheries, as well as related socio-economic data (Kuruvilla, Ferreira and Soomai, 2000). These project activities support government initiatives to introduce sustainable fishing methodologies to the existing trawl fisheries.

Small coastal and large pelagic species. Trinidad and Tobago became a contracting party to ICCAT in 1999 and, in so doing, demonstrated its commitment to global fisheries initiatives in conservation and management, including compliance with the precautionary principle and responsible fishing practices.

A trip reporting system was implemented for the offshore longline fleet in 2001 to enable Trinidad and Tobago to submit catch and effort data to ICCAT for incorporation in species stock assessments. The Government, through the Fisheries Division, issues certificates of eligibility for Atlantic swordfish caught by locally flagged vessels and

exported to the United States of America in accordance with the US law Title 50, Code of Federal Regulations, Part 630. Each shipment of swordfish bound for the United States of America is inspected to ensure compliance with specified size and catch limits.

Adherence to ICCAT's swordfish rebuilding programme is achieved through a combination of government non-issuance of export licences – upon meeting catch quantities agreed upon by the owners and the Government in relation to Trinidad and Tobago's catch limit (as stipulated by ICCAT) – and voluntary action by the industry to cease targeting the species. These measures have been successfully implemented (Martin and Soomai, 2004).

The country's obligations to observe ICCAT port state responsibilities are being addressed through a memorandum of understanding between MALMR and the private company that owns and manages the facilities located at the transshipment port. The memorandum was drafted to facilitate monitoring of landings, transshipment activities and vessel activity at the port.

Marine protected areas. The Marine Areas (Preservation and Enhancement) Act of 1970 and the Marine Areas (Preservation and Enhancement) Regulations of 1973 are conservation oriented. However, the act is currently applied only to the management of coral reefs. The Buccoo Reef area in Tobago is the only area that has been designated a restricted area under the act. The Buccoo Reef has traditionally been a major tourist attraction in Tobago and is impacted by a number of socio-economic and environmental factors. In 1990, under an IMA/THA Coral Reef Project to conduct ecological surveys of the reefs around Tobago, a management plan was proposed for Buccoo Reef Marine Park. The project had several components that studied the environmental conditions of the reef, and included public education and awareness as well as socio-economic aspects (IMA 1994a, 1994b).

In 1999 a research project on Buccoo Reef Marine Park was initiated, in a collaborative effort between the University of East Anglia, the University of the West Indies and THA (Brown *et al.*, 1998; 1999). The research project was perceived by THA and local stakeholders as an important contribution to implementing sustainable coastal resource use, as outlined in the management plan for the park prepared by IMA. This was a case of a marine protected area in which uses and users had been in conflict for a number of years. The situation was one of conflicting management, ineffective enforcement, suspicion and non-communication among stakeholders, including resource managers.

The aim of the project was to develop and promote sustainable resource-use strategies, using participatory techniques, through an analysis of the conflicts and trade-offs between different uses and users of marine protected areas. Multicriteria analysis was used as the framework for assessing the resource-use strategies and for quantifying the impacts of coastal zone management options on the urban and rural communities in the coastal zone. Research included collection of economic, social and ecological data to perform an environmental and economic evaluation of Buccoo Reef Marine Park. Social and economic data collection was based on a survey of consumer surplus from recreational use of the marine park, a census of informal business vendors, and a series of semi-structured interviews. Ecological data including fish counts by species, mangrove leaf fall, water quality and plankton tows were used to estimate productivity. The Tobago tourism sector was modeled to determine the economic costs and benefits of various tourism development options.

Results of the surveys showed a high degree of consensus among stakeholders, which demonstrated the potential for co-management. Future work will seek to address how the participatory processes can be institutionalized. The Town and Country Planning Division has expressed an interest in this methodology, which can also be applied to urban planning. EMA, IMA and the Caribbean Natural Resources Institute have also expressed interest in collaborating in the continuation of activities.

Monitoring, surveillance and enforcement. The Fisheries Division established a monitoring system for fish imports and exports in the late 1990s, primarily to be able to provide current, reliable export data. The system requires exporters to return export licences of previous shipments of fish and fisheries products certified by customs prior to approval being granted for additional licences. This system is used to verify data from CSO.

In June 2004, cabinet approval was obtained for a proposal, prepared by the Fisheries Division, for establishment of a monitoring, surveillance and enforcement unit, which will address enforcement of fisheries legislation.

Administrative arrangements for regional planning and development in coastal regions

Planning and development of the coastal area are not approached on a comprehensive basis institutionally, functionally or geographically. Statutory land-use planning is conducted by the Town and Country Planning Division of the Ministry of Planning and Development. Land-use development plans have been prepared using population projections, labour force and employment land requirements for economic growth.

The mandatory certificate of environmental clearance issued by the EMA for most development activities can be considered an attempt at regional planning. The submission of an EIA by the developer, for review and approval by the Town and Country Planning Division, also facilitates regional planning and development.

Macroeconomic policy often determines sectoral priorities in situations of multisectoral use of natural resources. Coastal waters are important for maintaining fisheries production, and this is particularly important for the artisanal gillnet and line and trawl fisheries of Trinidad and Tobago, which sustain communities along the Gulf of Paria. The economic and social profiles of the fisheries sector, together with national perceptions, dictate the extent to which fisheries can influence development decisions that impact the environment and ultimately the resources upon which these communities depend. Some progress was made in 1995 through the Government of Trinidad and Tobago/UNDP/FAO project INT/91/007, Integrated Coastal Fisheries Management of the Gulf of Paria. As a result of the project, the sector has been included in the review process for coastal development proposals.

To date, however, information collected from administrative systems within the Fisheries Division, such as the registration of fishers and fishing vessels and fishing vessel censuses, has not been used for planning purposes.

Co-management of fisheries and coastal aquatic resources

Guided by Chapter 17 of Agenda 21 (adopted at the 1992 UNCED), FAO and UNDP implemented INT/91/007. The project aimed to contribute, over the long term, to the improved well-being of coastal communities through better management of marine and land-based resources and through the protection of coastal ecosystems. The Gulf of Paria was used as a pilot site in the region, with other project pilot sites in the Philippines and the Gambia (Fisheries Division and FAO, 1995a and b).

The Gulf of Paria is a semi-enclosed estuarine sea, completely delimited by Trinidad and Tobago and Venezuela, and downstream of the Orinoco River. A significant coastal and marine fishery exists in the gulf, and there is a considerable amount of interaction between fishing and non-fishing uses of the coastal and marine areas. Within the fishing industry, there are six main methods in operation, involving artisanal trawlers, gillnet, lines, semi-industrial multigear vessels, and semi-industrial and industrial trawlers. Non-fishing uses include the petrochemical industries, manufacturing, agriculture, tourism, housing, service industries and, combined with these multiple uses, the resulting waste disposal and pollution.

Non-fishing uses of the coastal zone were increasing at a faster rate than fisheries development, and preliminary stock assessments completed for commercial species

indicated full exploitation, with probable growth and economic overfishing. The 'open access' situation (with the exception of regulations for the trawl fisheries), multiple use of the coastal zone and bilateral implications of stocks shared with Venezuela present special problems for management. The situation is further compounded by the fact that the fishing communities were among the most impoverished, vulnerable and disadvantaged coastal communities (Fisheries Division and FAO, 1995a and b).

INT/91/007 recognized the multisectoral and multidisciplinary characteristics of integrated coastal fisheries management and was of an investigative and experimental nature. It presented three main elements: (i) information gathering and research; (ii) awareness-building; and (iii) integrated planning, coordination and consultation. The project focused on the coastal communities, since no significant progress in the management of fisheries, the coastal zone or the environment can be made without the active participation of the communities concerned.

Output from the project included: development of a computerized bibliographic database on the Gulf of Paria (GULP) and a pilot geographic information system for the gulf coastal zone; hosting of the National Workshop on Information Networking on Fisheries and the Coastal Zone; a pesticide survey to determine types of usage patterns in the coastal area; and gathering of local environmental/resource knowledge through community surveys. The project prepared a video highlighting the uses of the gulf coastal zone and the fisheries management issues involved, along with other awareness-building materials such as a fisheries alphabet and a brochure on the effect of plastics on the environment.

The country's first Clean Coast Day was held: volunteers from schools and the general public focused on removing litter from beaches in the Chaguaramas area in the northwestern peninsula of Trinidad. The project hosted a workshop on integrated planning, involving the Ministry of Planning and Development as well as other key agencies, at which the roles of the various sectors in the integrated management of the gulf coastal area were discussed.

Integration of fisheries and costal aquaculture into coastal area management, planning and conservation

There are significant directed efforts to integrate fisheries and coastal aquaculture into coastal area management, planning and conservation. The Town and Country Planning Division has developed several land-use plans for Trinidad and Tobago that identify how areas are to be used. There are, however, significant gaps in information on the natural processes of the environment and resource utilization, which is necessary to guide coastal zone planning. Local knowledge of the coastal zone of the Gulf of Paria, for both public- and private-sector agencies, generally tends to be sectoral and resource oriented.

In addition, availability of and access to expertise are unbalanced between traditional sectors such as the fishing industry and more highly technological sectors such as the petroleum industry (Town and Country Planning Division, 1989). The common result is the restriction of development to the high-income and employment-generating energy and manufacturing sectors. The artisanal fisheries provide stability to rural coastal communities, where it is estimated that 3 000 fishers are directly employed in the trawl, gillnet and line fisheries. Thus the socio-economic importance of artisanal fisheries must also be a major consideration in decision-making.

CONSIDERATION OF SOCIO-ECONOMIC AND DEMOGRAPHIC CONCERNS

Socio-economic and demographic information on coastal fishing communities

Population censuses. Demographic data is available from CSO through periodic general population censuses. CSO also conducts a series of continuous surveys of the population during the periods between general censuses. Demographic information

is collected according to administrative boundaries and under broad categories and is not collected specifically for fishing communities. Thus relevant data has to be disaggregated or compiled from the available statistics as needed and may be limited in details specific to the fishing community. CSO also collects socio-economic information through special surveys targeting particular sectors of the economy such as agriculture. Information on the fisheries sector is commonly included in statistics for agriculture, and a special request must be made to CSO to obtain information on this sector.

Fisheries censuses. In 1991 a national vessel census was conducted by the Fisheries Division under an FAO/UNDP-funded project, Establishment of Data-Collection Systems and Assessment of Marine Fisheries Resources. Details were recorded of vessel and engine specifications, gear utilized and species targeted in order of priority and seasonality (Fisheries Division, unpublished data). A vessel census was conducted in Trinidad in 1998 (Chan A Shing, 1999), and more recently one in 2003 (Fisheries Division, unpublished data) in which this information was updated.

The data are currently used with catch statistics to generate estimates of total landings by species. Data collected on the number of fishing vessels are used to derive estimates of total fishing effort, which are then used to raise estimates of landings to totals for the country. The number of fishers helps describe the size of fisheries by gear type and landing site, but little additional information has been extracted from the previous censuses.

Licensing and registration system. The voluntary system of fisher and vessel registration, which is implemented by the Fisheries Division, has the potential to provide valuable socio-economic information on the industry.

At its inception this system was not linked to fisheries management or the fishing communities, and hence the optimum level of information was not extracted.

With the exception of the trawl fisheries, the system is not used for management purposes. It is linked to the Government's fiscal incentives programme, and the only criteria for the award of subsidies are that applicants must be fishers, fishing vessel owners or fishing proprietors, citizens of Trinidad and Tobago, and registered with the Fisheries Division. Almost all fishing vessels are registered by the Fisheries Division and assigned a registration number at no cost to the owner/fisher.

The vessel registration form records the details of the vessel, including physical characteristics such as length, width, depth, colour, method of propulsion, engine horsepower and manufacturer, as well as year of construction, costs of vessel and engines, and dates of purchase. The fisher registration form records personal information (name, date of birth, address and general physical characteristics), details of background (family size, level of education, fisheries-related training), and fishing operations (fishing methods employed, number of boats, engines and vehicles owned). The data are being computerized using the Caribbean Fisheries Information System (CARIFIS) supported by the CRFM. The processing of fisher and vessel registration for the industry in Tobago is currently conducted by the Fisheries Division (Trinidad), while the Department of Marine Affairs and Fisheries (Tobago) is responsible for collecting the information.

Ad hoc surveys and special projects. The Fisheries Division has conducted a number of ad hoc surveys and has implemented projects to develop profiles or fisheries descriptions for commercially important marine species for use in fisheries stock assessments. Most of these reports focus on the technical aspects of fisheries (biological, economic and bioeconomic assessments). However, they include different levels of detail with regard to the social and economic aspects of the particular fishery and the associated fishing communities. Data is available for the fishers and fishing communities associated with the shrimp and groundfish, large pelagic, flyingfish and small coastal pelagic fisheries.

Many of these studies, including country reports, were prepared under the CFRAMP, FAO/WECAFC and CRFM working groups for submission to ICCAT.

Regional initiatives. In the late 1990s, the Fisheries Division participated in the CFRAMP Community Education Subproject. Awareness materials geared towards fishers were produced on issues related to fisheries management, and technical advice was given on methodologies for the collection of socio-economic data.

A research project funded by the International Development Research Centre (IDRC) and coordinated by the CRFM – Project on Community-Based Coastal Resource Management – provided support for Caribbean scholars undertaking interdisciplinary research on solutions to problems of coastal resource management. From 1999 to 2001, the project provided small grants for projects in various Caribbean countries, and Trinidad and Tobago received funds for one project. Executed by IMA, the project focused on a fishing community on the east coast of Trinidad.

Use of socio-economic and demographic indicators in the preparation of coastal area profiles and management/development plans

Local knowledge, community and household surveys. Under INT/91/007, profiles were prepared for two fishing communities in the Gulf of Paria coastal zone, in the towns of Orange Valley, located in the Couva/Tabaquite/Talparo Regional Cooperation, and Otaheite, further south in the Penal/Debe Regional Cooperation. The main source of socio-economic and demographic data was CSO. Data were extracted from records of the 1990 Population and Housing Census for the enumerated districts that comprised each study area. Secondary socio-economic and demographic data were collected from fishing communities through interviews conducted by the Fisheries Division. Analyses focused on comparisons between the fishing and non-fishing communities within each area and with the national average, where possible.

Rural profiles were completed for the two fishing communities (Mohammed, 1995), with the fishing community defined as including all those who reside in fisher-headed households, that is, where the fisher is the main breadwinner. The total population of Orange Valley was 43 640, of which the fishing community comprised 1.5 percent, or 636 people. The total population of Otaheite was 26 407, of which the fishing community comprised 1.7 percent, or 438 people. The mean household size was higher for the fishing community than for the non-fishing community, averaging five people as compared with four. The fertility rate was higher in the fishing community, with women bearing children at an earlier age and having more children throughout their life.

Regarding education, fewer people in the fishing community achieved senior secondary education compared with the non-fishing community, and none in the fishing community received tertiary education. In addition, fewer people within the fishing community received training (trade/craft and industry, service and trade, commerce and business) compared with the non-fishing community. Regarding land tenancy, fewer people within the fishing community owned land (20 percent in Orange Valley, 13 percent in Otaheite) compared with the non-fishing community (45 percent in Orange Valley, 38 percent in Otaheite). In general, a lower standard of living was experienced in the fishing communities of Orange Valley and Otaheite compared with the non-fishing communities in these areas.

Community profiles were also completed for the two communities under the project (Ramjohn, 1995), and it was noted that the fisheries in these two communities were strongly dominated by shrimp trawl activities. In both non-fishing communities, the focus was on wholesale and retail trade and restaurants, construction, and community and personal services. At Otaheite, fishing activities were essentially artisanal and the occupational structure of the population not involved in fishing was diverse, following

the range of the aforementioned activities in addition to involvement in the petroleum and gas production sector. At Orange Valley, fishing activities ranged from artisanal to industrial, and most of the population not involved in fishing was associated with the operations of the state-owned sugar producer Caroni (1975) Limited.

There was a direct correlation between the level of fishing and the levels of income generated from fishing: Otaheite appeared to be a very depressed community with declining activity, while Orange Valley showed significant signs of growth and development. Stakeholder perceptions of factors considered to constitute major threats to fishing activity were also studied in the fishing communities. All fishers emphasized pollution from national as well as regional sources as the greatest threat to productivity. Non-trawler owners stated that trawling posed the greatest threat to fishing activity in the Gulf of Paria, while trawler owners identified pollution as the primary threat.

A household survey (Camps-Campins, 1995) was conducted that was directed at the fisherman's wife. It focused on employment within households and general perceptions regarding the fishing industry, and did not directly address gender issues. In over 50 percent of the households interviewed, the fisherman was the only wage-earner. Of the remainder, less than half had the fisherman's wife as the only wage-earner besides the fisherman, and the others had individuals that did not contribute financially to the household.

Employment was mainly associated with fishing activities, including fishing at sea, marketing of catch and manual labour. Employment in fishing was full time. A small proportion of households had members employed at Caroni (1975) Limited or the resident carbonated soft drink factory. This employment was seasonal or part time and supplemented by work in the fishing sphere.

Regarding the impact of changes in the fishing industry, over 75 percent of the households acknowledged negative changes in the community's fishing industry during the period 1984–1994. This was characterized by a decrease in catches and fish size, an increase in operational costs, an increase in the number of people entering the fishing industry and inability to obtain employment outside the fishing industry. These changes had negatively impacted fishers economically.

The perception of the fishing industry in over 50 percent of the households was that there was little future for the industry and that they would discourage young members from continuing. The other respondents still recognized a future in fishing, but only given cooperation within the community.

Ad hoc surveys and special projects. A frame survey of gillnet fisheries was conducted in 2000 to determine the status of monofilament and multifilament gillnet usage and to investigate the use of alternative gears (Nagassar, 2000). The survey was in response to the industry's refusal to accept new regulations promulgated by the stakeholder committee, the Monitoring and Advisory Committee (MAC), which proposed to ban the sale and use of monofilament gillnets. The information, which was collected from fishers, sought to quantify the number of fishers and vessels involved in the fisheries. Similar types of data were collected for the 1998 census of fishing vessels, as well as for the fisher and vessel registration system, in order to determine the socio-economic background of the fisher. Economic data were also collected on the costs of the operation of gillnets.

Results showed that there were 1 404 fishers involved in gillnet fisheries, with 1 368 operating in Trinidad and 36 in Tobago. In addition, there were 280 net menders and 90 vendors involved in the fisheries. Gillnet usage, in terms of numbers of fishers, is highest on the south coast. In Trinidad, 73 percent of the fishers interviewed fished full time, compared with 79 percent in Tobago. The average age of the fisher was 38, and approximately half of those interviewed had at least a primary school education. The average fisher employed in gillnet fisheries would have difficulty in accessing alternative employment due to the lack of additional skills. Fishers on the south coast

of Trinidad are especially affected, since they represent the largest numbers with the most limited options for alternative employment.

Environmental impact assessments. Socio-economic and demographic data have been used in preparing coastal profiles, mainly as a component of an EIA for a particular region in which development work is proposed. This is a requirement for any development work in Trinidad and Tobago and needs the approval of the Ministry of Planning and Development and EMA. These data are usually obtained from a range of agencies. Data on the fisheries sector are extracted from fishing vessel census reports, cost and earnings surveys, resource assessments, local knowledge surveys of fishing communities and ad hoc studies conducted by the Fisheries Division. Other sources of information on the fisheries sector may be primary data collection through interviews conducted by consultants. However, these reports are not available to the public, because the information is considered the property of the consultant and treated as confidential.

Special projects – in the context of fisheries and coastal area management and conservation – aimed at improving the socio-economic well-being of coastal fishers and their families

Community-based turtle management in Trinidad. In the absence of adequate legislation and enforcement to protect turtles, in 1989 a community-based, co-management approach for nesting turtles was introduced by the Wildlife Section of the Forestry Division (then under MALMR). The main project objective was to promote both conservation and ecotourism through education of rural communities, in areas where there was a high incidence of wildlife, on the need to conserve wildlife through sustainable economic use, primarily for the benefit of the communities themselves (James and Fournillier, 1992).

Every year female leatherback turtles nest on the beaches on the northeast and east coasts of Trinidad. The turtle population is threatened by poaching of adults and eggs, destruction of nesting habitats and sand mining. Under the Wildlife Act, three beaches, Matura and Fishing Pond in 1990 and Grand Riviere in 1997, were declared prohibited areas, requiring permits for entry and allowing access to turtle nesting beaches for a limited number of visitors each night. 'Turtle tourism' was developed to stimulate community participation by encouraging income-generating activities such as lodging and the sale of food, drinks and souvenirs, in addition to conducting turtle-watching tours.

Volunteers from the community were trained as nature tour guides, and they later formed an organization (Nature Seekers Incorporated) that protected turtles and their nesting habitat and managed tours for tourists and locals. With assistance from government agencies, villagers were able to upgrade the beach facilities.

These co-management efforts were largely successful in reducing the killing of nesting turtles on the three protected beaches and in making neighbouring villages aware of the benefits to be derived from the conservation of turtles. Furthermore, the educational impact of turtle-watching tours increased awareness of the need to protect leatherback turtles among large segments of the population in Trinidad and Tobago. Media support contributed to the success of the ecotourism project, and public response was so strong that there was an extremely high demand for permits, resulting in substantial income being generated annually.

Nature Seekers Incorporated has since grown into an active NGO for conservation. They are also involved in public awareness programmes and fundraising activities for projects in the area. They continue to assist the Wildlife Section with beach patrols and data collection on nesting activity. In late June of 1998, Nature Seekers began a tagging programme on Matura beach, supported by the Wildlife Section and WIDECAST with cofinancing from UNDP/GEF and the Government of Canada.

Community-based aquaculture. Over the period 1999–2000, the Fisheries Division initiated two community-based aquaculture projects for demonstration and training purposes (Fisheries Division, 2001). The primary objective of the projects was to encourage income-generating activity by creating opportunities for self-employment in rural communities. The principal targets were unemployed youth, fishers displaced from traditional fishing areas, aging agricultural workers and women. Particularly targeted were fishers in the southwest peninsula of Trinidad, who were displaced as a result of the withdrawal of access to the shrimp resources in the Orinoco Delta under the 1997 Trinidad and Tobago/Venezuela fishing agreement.

The long-term objective was to facilitate establishment of commercially viable and sustainable food-fish projects in depressed rural communities. Selection of communities was based on a number of criteria: community interest, existence of a cohesive community structure or organization, willingness of the community to undergo a period of training, availability of suitable land and of an adequate water supply of good quality.

The projects consisted of two main elements: first, they focused on community sensitization, training in aspects of fish culture and establishment of community-management units, and second, the actual aquaculture project involved rearing tilapia (*Oreochromis nilotica*) in earthern ponds. A 20.25 m^2 pond was constructed in Barrackpore and a 12.15 m^2 pond in Point Coco, Cedros – both located in the southwestern peninsula of Trinidad.

The projects were each promoted as vested in the community, with cooperation and the sense of ownership essential to success. However, the Government bore the cost of pond construction and all production costs for the first stocking and harvesting of the ponds, while all monetary and other benefits derived from the project went to the community. Land for the project in Point Coco belonged to the Point Coco Agricultural Cooperative Society Ltd, and the aquaculture project was one component of a more expansive agricultural project envisioned for the area, comprising 44 acres of the cooperative's agricultural land. The cooperative had 227 members, and the committee in Barrackpore 17.

Start-up of the aquaculture projects was well supported by the communities of Barrackpore and Point Coco. After the first harvest, the communities assumed responsibility for management of the projects, but there is no information on their current status.

Other projects. The Rural Poverty Alleviation Programme, under the Office of the Prime Minister, provides services focusing on fishing programmes to all communities. This Adopt-a-Community Programme involves the Government, the community and a corporate donor (Ministry of Agriculture, Land and Marine Resources, 1999). Under this programme, there is a steering committee of farmers, fishers and others, who determine and prioritize the needs of the community.

The Small Business Development Company Ltd, under the Ministry of Labour and Small and Micro-Enterprise Development, promotes the establishment of small and medium business enterprises. It will guarantee up to 85 percent of the loan for a small business, including vessels, equipment for fishing, processing, marketing and aquaculture.

A number of UNDP/FAO projects have been implemented in the areas of fisheries resource assessment and management and integrated coastal fisheries management. UNDP provides an avenue for accessing funding under GEF. In addition, there is the UNDP Small Grant Facility, which targets community projects aimed at stakeholder empowerment. It recently supported fishers on the north coast of Trinidad through the provision of funds to replace panels of net that had been cut and removed to facilitate timely release of endangered sea turtles.

Use of socio-economic and demographic indicators in monitoring the impact of management regulations and measures on the socio-economic well-being of the coastal population

These indicators have been used in monitoring the impact of management regulations on the trawl and the gillnet fisheries. In Trinidad, the artisanal fisheries provide stability to rural coastal communities, where an estimated 195 fishers are directly employed in trawl fisheries and 464 in gillnet fisheries (1998 figures). Traditionally, resource assessments for the target species of the trawl and gillnet fisheries were conducted to determine the status of resources.

There have generally not been any focused studies on how the exploitation of natural resources and management recommendations or regulations affect the socio-economic well-being of both fishing and non-fishing segments of coastal communities. However, the socio-economic importance of the artisanal fisheries must be a major consideration in decision-making, although over-exploitation must be avoided in order to foster sustainable sources of food and employment (Ferreira and Soomai, 2000).

Primarily information related to the trawl fishery is available, as it is the most regulated fishery. Several studies have gathered local knowledge, information and the perceptions of fishers on fisheries and management from the trawl communities as part of this country's participation in the FAO/WECAFC shrimp and groundfish working group and in international projects such as INT/91/007 and EP/GLO/201/GEF.

Bioeconomic assessments of resources. Cost and earnings studies were conducted for the shrimp and groundfish fishery and were used in a bioeconomic assessment conducted under the working group (Seijo *et al.*, 2000; Soomai and Seijo, 2000). The surveys were based on interviews conducted with vessel owners/fishers. Economic parameters such as average vessel revenues, operating costs and net profits to the owner were estimated for 1997 for each of the three trawl fleets (Ferreira, 1998a). Economic parameters for the fleets operating monofilament and multifilament gillnet, banking, a-la-vive and palangue lines were obtained from a similar study conducted in 2000 (Soomai and Seijo, 2000).

Bioeconomic analyses for the shared Trinidad and Tobago/Venezuela shrimp fishery for 1995–1998 indicate that, at current levels of effort, there is a 39 percent probability of the biomass of *F. subtilis* falling below sustainable levels (Seijo *et al.*, 2000; Ferreira and Soomai, 2000). The studies suggested that the shrimp resources were overexploited and a reduction to 80 percent of current levels of effort would reduce this probability to 15 percent and improve profits to the fishery by 12 percent.

Bioeconomic analysis of the artisanal groundfish fishery showed that a major decline in yield, net revenues and biomass of *M. furnieri* and *C. jamaicensis* is expected if an 'open access' fishery is continued. The gears in use target the more abundant and commercially important pelagic and shrimp species, and this is the major driving force in the levels of existing effort for each fleet. The recommended management option is to limit the effort of all fleets in order to maintain the resource and the profits to the fishery at sustainable levels (Soomai and Seijo, 2000).

In multispecies, multifleet fisheries, the level of effort at which the biomass of less abundant species is not threatened should be established. Groundfish species such as *M furnieri* and *C. jamaicensis* generally have lower biomass levels than the targeted pelagic and shrimp species and, in order to sustain yields, it is fundamental that the effort of the artisanal fleets is limited in this multispecies context. If effort is allowed to increase, these species, and other less abundant ones, can be threatened with depletion, resulting in a decrease in species diversity. The recommended management decision, therefore, is to limit the effort of all fleets to current levels (Soomai and Seijo, 2000).

Perceptions of fishers in general. A local knowledge survey of 100 fishers operating out of sites on the west coast of Trinidad was carried out by the Fisheries Division in 1994 under INT/91/007 (Ramjohn, 1995). The survey aimed to document the views, perceptions and attitudes of the fishing industry on resource management issues in the coastal area. The interviews were carried out through a questionnaire on a sample of 5 percent of the estimated population of fishers, stratified by fishing method based on a 1991 census.

The results of the 1994 survey indicated that the fishers interviewed perceived the greatest threat to the Gulf of Paria to be the trawling activity occurring there. All respondents noted a decline in individual catches, and the majority thought that damage to the sea floor and destruction of juvenile fish by trawling were mainly responsible. Trawl respondents indicated that the major cause was pollution. However, 39 percent felt that trawling was responsible, with artisanal trawlers holding industrial trawlers responsible and industrial trawlers blaming the in-shore activities of artisanal trawlers.

The fishers interviewed were generally of the view that the Government should introduce controls in the form of zoning, restricted areas and times of operation, and open/closed seasons for this particular fishing method in the Gulf of Paria. It was also noted that fishers employing other methods considered trawling to be separate from other types of fishing, and this perception affected their response to questions on the possible effects of overfishing in the gulf. They did not perceive that there could be overfishing by other methods.

Perceptions of fishers involved in the shrimp fishery. A survey of key individuals in trawl fisheries was carried out in November 1999, in the preparatory phase of EP/GLO/201/GEF, to examine the perceptions of individuals in the shrimp industry of issues related to shrimp exploitation and the impact of this fishery on the resources and environment (Kuruvilla, Ferreira and Soomai, 2000). The project interviewed key fishers operating at the major trawl landing sites on the west coast.

All fishers interviewed were generally of the view that pollution of the in-shore area, due to industrial and agricultural run-off, has resulted in a significant decrease in fish populations. Many fishers were also of the view that trawling for shrimp in in-shore areas, which is prohibited under national legislation, is responsible for a further decrease in resources, due to the removal of large amounts of juvenile fish as bycatch and physical damage to fishing grounds. It is the common view of all trawl fishers that there is an urgent need for the Government to enforce the regulations governing area/zone restrictions, particularly regarding artisanal vessels.

The view was commonly held that shrimp and fish resources can be managed by the implementation of a closed season for trawling, as well as by limiting fishing effort through monitoring the entry of new trawlers into the fisheries. Artisanal fishers also believe that educating younger fishers in resource management and increasing awareness of the impacts of fishing and land-based activities on the marine environment will contribute to the management of marine resources.

A National Workshop on Shrimp and Groundfish Fisheries held in 2000 reiterated these views and emphasized the importance of collaboration between the industry and the Fisheries Department – in improving data- and information-collection systems in order to inform management approaches – and the need for regular consultation with the fishing industry. The industry recommended a review of current fisheries consultative arrangements and increased stakeholder participation in management decision-making (FAO and Fisheries Division, 2001).

There is still inadequate data and information available on the socio-economic importance of bycatch to the fishing industry and the communities supported by that industry. Additional information will be gathered under the project to inform management decisions and to ensure the economic viability of the fisheries.

CONCLUSIONS AND RECOMMENDATIONS

As they yield to the increasing demands for industrial, housing and tourism development, the coastal areas of Trinidad and Tobago are a critical natural resource. The west coast of Trinidad and the Gulf of Paria are most affected by these developmental pressures. Many studies have focused on this area because of its importance as a fishing ground and as a site for industrial activity, agriculture and shipping. The important role of fisheries in terms of social cohesion and employment of people in coastal communities has also been recognized.

The Town and Country Planning Division of the Ministry of Planning and Development is the responsible agency for coastal zone management. However, it does not include those disciplines that deal with the marine environment, and adequate institutional arrangements do not exist to deal with the complexities of coastal area development. IMA and later EMA were established as multidisciplinary agencies to deal with coastal zone management in Trinidad and Tobago. Despite this, institutional arrangements for resource management and coastal zone planning are still fragmented.

Currently, the state of coastal land administration and management in Trinidad and Tobago is quite poor. Government policies still favour development of the lucrative energy and related sectors, and little has been done to upgrade government management and administrative capabilities in preservation of the environment. There is also no systematic development planning or studies for the sustainable management of coastal or marine lands, and the only existing standards and policies are still in a preliminary stage. This situation clearly indicates the urgent need for a national plan or policy for the environment. The National Physical Development Plan recognizes that an environmental policy is needed and that it must be complemented by a strategy for environmental planning and conservation.

The sectoral approach to the management of coastal activities seldom takes into consideration the interrelatedness of activities, and the approach has not been effective in managing the coastal and marine environment. Establishment of certain interministerial and intersectoral committees for adopting and implementing the policies on management of the marine and related environment does not ensure consistency and continuity. It is essential, therefore, that all sectoral components of coastal zone planning are placed under one umbrella, and that an adequately funded, dedicated administrative unit be established to ensure effective coordination among agencies in the implementation phase. There may also be the need to enact appropriate legislation to govern the coastal zone.

There is an urgent need to pursue the requirements for integrated coastal zone management by building on past research projects, such as INT/09/007, which used the Gulf of Paria as the study area. It is essential that the Government allocate or source the technical and financial resources needed to facilitate such studies in order to develop standards for development and management objectives.

The major legislation for management of biological resources and ecosystems in Trinidad and Tobago consists of regulations permitting exploitation rather than sustainable management, and both primary and supporting legislation are antiquated and ineffective, with low penalties. Management of resources and assessment of the well-being of coastal communities require interdisciplinary research similar to that of the natural and social sciences.

With regard to a global perspective as it relates to trade, it has been noted that an integrated approach to development, including infrastructural development, is urgently needed to assist industry in maximizing opportunities afforded by a liberalized trading environment. This will demonstrate seriousness in addressing environmental concerns and ensure that the development process considers the coastal environment, and it minimizes the impact on coastal and other resources in the interests of sustainability (Fisheries Division, 1995a; Kuruvilla and Chan A Shing, 2002).

The socio-economic and demographic analyses on fishing communities collected under INT/91/007 remain the only focused and accessible studies of the significant role of fisheries in poverty alleviation. Even though the studies were specific to two communities in which trawling is the primary fishing activity, the results of the demographic and socio-economic analyses can generally describe other coastal fishing communities, particularly in the artisanal sector. That is, the standard of living is considerably lower for the fishing component of the community than for the non-fishing component; the number of people per household is higher than the national average; low levels of education are prevalent and, consequently, the ability to seek alternative forms of employment is limited. This situation, understandably, explains the government's continued welfare approach to management of the fisheries, but this is not consistent with fisheries management approaches in the context of the sustainable use of natural resources.

Community profiles prepared under INT/91/007 and data collected by private agencies have been incorporated primarily into environmental coastal assessments. This inclusion of the fisheries sector in development plans under review by EMA is only an initial step in the development of an integrated approach to coastal development. Sufficient data on the fishing communities are not available for inclusion in decisions for land-use plans. It is evident that there is a need for adequate, sustainable social and economic data-collection programmes.

It has been recognized that fisheries play a significant role in rural poverty alleviation in coastal communities. Traditionally, fisheries data collection and research focused on biological data. However, fisheries assessments incorporating social, economic and biological data in dynamic models are more indicative of changes in the performance of the fisheries and more useful in quantifying the impact on the well-being of fishing communities. The Fisheries Division, although benefiting from technical advice on the collection of socio-economic data, as was provided under CFRAMP for example, currently lacks the technical expertise and human resources to effectively implement and conduct detailed socio-economic data collection and analyses of fishing communities.

However, the greatest challenge in strengthening the use of socio-economic and demographic indicators in coastal zone management, planning and conservation is the change in attitudes by both Government and resource users. The general lack of trust and suspicion that fishers hold for Government can only be removed by building greater awareness and understanding of each party's activities, which can be accomplished through establishment of an operational extension unit within the Fisheries Division. This would require enhancing its institutional capacity in terms of administrative structures and the human resource capabilities to deliver adequate extension services to fishing communities.

At present the Extension Unit of the Fisheries Division mainly provides administrative services linked to licensing and registration of fishers and vessels and the provision of beach landing infrastructure. Effective extension services would ensure that there is a two-way transfer of information between the Government and the fishing industry. The Government needs to focus on the ongoing education of fishers to keep them abreast of government activities in fisheries research and administration. This could be done through preparation of resource-management and conservation information and advisories as an aid to communication and to the building of awareness within the fishing industry. The Government also needs to continue documenting the local knowledge of fishers. This system would improve relations between the fishing industry and the Government and foster a new environment of trust.

To complement the establishment of an operative extension unit, government support must be given to strengthening users' organizations. It is essential to examine the critical factors that contribute to the success of these organizations and the histories

of failed initiatives. Ferreira (1998b) and Boodoosingh (1995) suggest an approach that focuses on commonalities, so that the formation of fishing organizations can be encouraged based on homogeneity of fishing activities and shared issues are more likely to be vigorously pursued – for example, establishing an 'association' of artisanal trawler owners. Consideration should also be given to the co-management approach to managing fisheries.

It is therefore apparent that the national issues regarding fisheries and aquatic resources and coastal zone management that require immediate action are:

1. finalization of the draft fisheries management bill and implementation of the new Marine Fisheries Management Act. This will allow for development of a cooperative/integrated approach to fisheries management;
2. approval and implementation of the proposed restructuring of fisheries administration. This will provide the institutional and administrative structure to efficiently manage the fisheries sector and provide for fisheries extension services;
3. strengthening the institutional capabilities of MALMR, and specifically the Fisheries Division, to enable socio-economic data collection from fishing communities and relevant analyses;
4. formulation of a national plan or policy for the environment. This will provide for environmental planning and conservation and institutional restructuring to enable the positioning of all sectoral components of coastal zone planning under one administrative unit in order to coordinate activities and prevent jurisdictional problems. It will also provide for enactment of appropriate legislation to govern the coastal zone;
5. establishing of formal linkages between the Fisheries Division and other government agencies with primary responsibility for the collection of social, economic and demographic information. These institutions include the Central Statistical Office and the Ministry of Community Development, Culture and Gender Affairs;
6. formulation of special projects focused on consolidation of socio-economic data and information for both fishing and non-fishing communities in the coastal zone. These projects should include the development of databases covering all relevant information, which often exists as 'grey-literature', and identifying institutional sources of data, information and technical expertise. This will provide government agencies and NGOs with a comprehensive basis on which to plan and implement programmes of coastal zone development and management;
7. government commitment to incorporate socio-economic issues in coastal zone planning and the allocation of financial and technical resources to conduct interdisciplinary research to provide the technical basis for the management of natural resources and assessment of the well-being of coastal communities. Where necessary, external financial aid and technical expertise should be sourced from regional organizations such as the CRFM and international organizations such as FAO and GEF;
8. further investigations, in terms of socio-economic information, into the role of women and children in the fisheries sector, especially with regard to their contribution to the labour force and the conditions of employment.

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CASE STUDY

Turks and Caicos Islands

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6 Consideration of socio-economic and demographic concerns in fisheries and coastal area management and planning in the Turks and Caicos Islands

GENERAL COUNTRY INFORMATION

The Turks and Caicos Islands (TCI) is a small group of low lying calcareous limestone islands situated on three distinct platforms: the Caicos, the Turks and Mouchoir Banks. The archipelago is located to the southeast of Florida (United States) at the end of the Bahamas island chain and to the north of Hispaniola.

The Turks and Caicos Islands is made up of two distinct groups: the Turks Islands and the Caicos Islands, which are separated by the Turks Island Passage, a 35 km wide, 2 134 metre (m) deep channel. The country comprises six populated and two unpopulated islands and a series of uninhabited cays totaling 491 km^2 in land mass area. The marine area is far more significant, accounting for more than 90 percent of the TCI's territorial extent. There are three fishing banks within this marine territory: the Turks Bank, approximately 299 km^2, the Mouchoir Bank, approximately 958 km^2, and the Caicos Bank, which is the largest of the three, measuring some 6 000 km^2.

Population

The latest national census conducted by the Department of Economic Planning and Statistics (DEPS) in 2001 documented the population of the TCI at 20 014. However, it is suspected that there are approximately 3 000 illegal migrants not accounted for in the census data (Clerveaux, 2004). The population is unequally dispersed over the main islands. The two most developed islands, Grand Turk, the nation's capital, and Providenciales, the hub of the tourism industry, support the bulk of the population, accounting for approximately 85.5 percent of the total population. The more rural areas, South Caicos (the fishing capital), Middle Caicos and North Caicos house the remaining 14.5 percent. Table 1 presents a summary of the population distribution.

The Turks and Caicos Islands population is growing at a rate of 3.1 percent per annum (2003 estimate). It is predominantly young, with only 3.7 percent over the age of 65 years. The greater part of the population (63.7 percent) is within the 15–64-year age group, while 32.5 percent of the population is below the age of 14 (Figure 1).

As a small island developing state that has just begun to mature, the TCI derives a high percentage of its labour force from outside the country, although usually from within the region. Given this, the ethnic composition of the resident population is relatively diverse. Over 87 percent of the population is black, while Caucasians make up 7.9 percent (Figure 2).

Economy

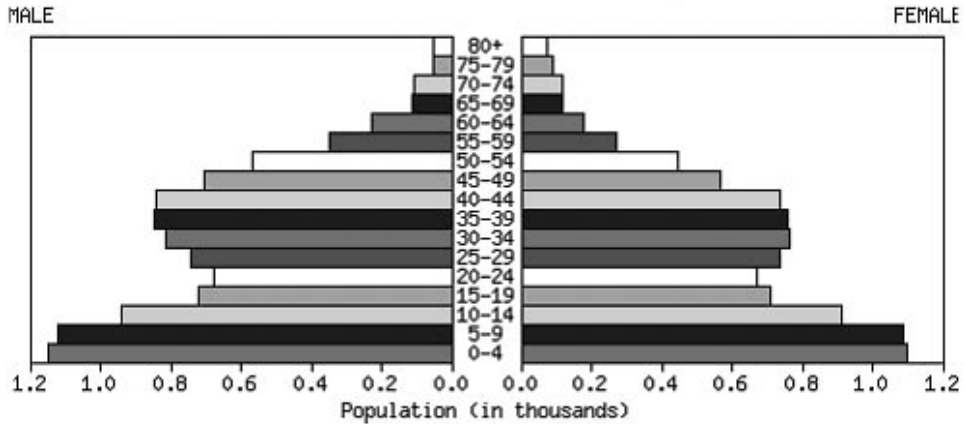
As with most other islands throughout the region, the TCI economy is based predominantly on tourism, fishing and offshore financial services. Most food for domestic consumption is imported. However, there is some subsistence farming –

TABLE 1
Distribution of resident population by islands (2001 census)

Island	Area (km²)	Population	Population density
Grand Turk	11	3976	361
Salt Cay	5	120	24
South Caicos	13	1063	82
East Caicos	29	-	-
Middle Caicos	77	301	4
North Caicos	66	1405	21
Providenciales	61	13021	213
Uninhabited cays	77	-	-

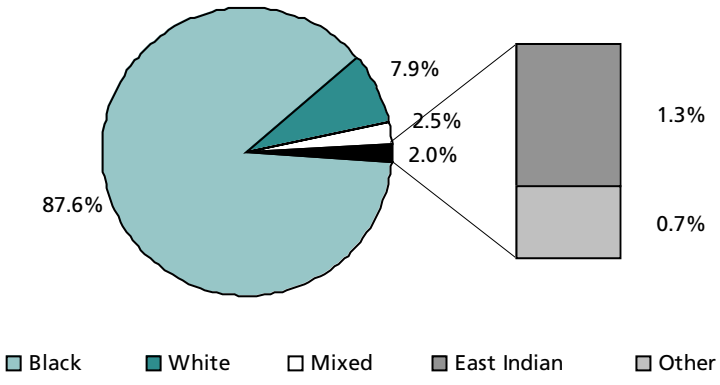
Source: 2001 Census, TCI Department of Economic Planning and Statistics. (unpublished)

FIGURE 1
2003 estimates of age composition of the resident population of the Turks and Caicos Islands grouped by gender category



Source: U.S. Census Bureau, International Data Base, and TCI Department of Economic Planning and Statistics.

FIGURE 2
Ethnic composition of the resident population of the Turks and Caicos Islands



mainly corn, cassava, citrus and bean – on the island of North Caicos. Major sources of government revenue include fees from offshore financial activities and customs receipts, as the islands rely on imports for nearly all consumer and capital goods.

The Turks and Caicos Islands has an average annual income of approximately US$9 million through exports, primarily in the food sector, including lobster, dried and fresh conch and finfish. Yearly expenditures on import commodities such as food and beverages, tobacco, clothing, manufactures and construction average US$177.3 million.

TABLE 2
Value and distribution of imports, exports and re-exports for the 2003 financial year

SECTORS	Imports (US$)	Exports (US$)	Re-exports (US$)	Balance of visible trade (US$)
Food	30 319 593	3 786 521	0	-26 533 072
Beverages and tobacco	7 569 488	0	1 290	-7 568 198
Crude materials, inedible except fuel	5 480 086	260 572	1 380	-5 218 134
Mineral fuels, lubricants, etc.	14 650 249	281	0	-14 649 968
Animals and vegetable oils and fats	279 035	0	0	-279 035
Chemicals	11 432 962	25 897	5 378	-11 401 687
Manufactured goods	31 868 290	371 675	135 188	-31 361 427
Machinery and transport equipment	47 507 359	3 749 961	195 918	-43 561 480
Miscellaneous manufactured articles	19 607 132	1 192 015	95 329	-18 319 788
Miscellaneous transactions	4 420	0	0	-4 420
ALL SECTIONS	168 718 614	9 386 922	434 483	-158 897 209

Source: TCI Department of Economic Planning and Statistics.

Given that the TCI imports over 95 percent of its food, beverage and manufactured materials, there is a large trade imbalance. Expenditure on imports far outweighs revenue derived from exports – by a factor of 17. In 2003, the TCI generated a combined total of US$9.8 million in exports and re-exports, while accruing US$168.7 million in imports (Table 2).

Sixty-six percent of the resident population of the TCI earns more than US$10 000 annually, while only 34 percent earns US$10 000 or less. The TCI has an average annual gross domestic product (GDP) purchasing-power parity of approximately US$231 million, and a per capita purchasing-power parity of US$9 600 (2000 estimates, TCI Department of Economic Planning and Statistics). The thriving economy is attributed primarily to the vibrant tourism industry, creating investment and employment opportunities. In 1997, the Caribbean Development Bank (CDB) estimated an unemployment rate of only 10 percent, and the rate, for the most part, has declined, despite the increase in population.

Although its contribution to GDP over the years appears somewhat miniscule (approximately 2.5 percent per annum), the fisheries industry is of significant socio-cultural importance, providing a ready supply of fresh marine product for local consumption, the tourism industry and export (Figure 3). The industry directly employs 1.5 percent of the country's labour force as fish farmers, fishers and workers

FIGURE 3
Fisheries exports by product type

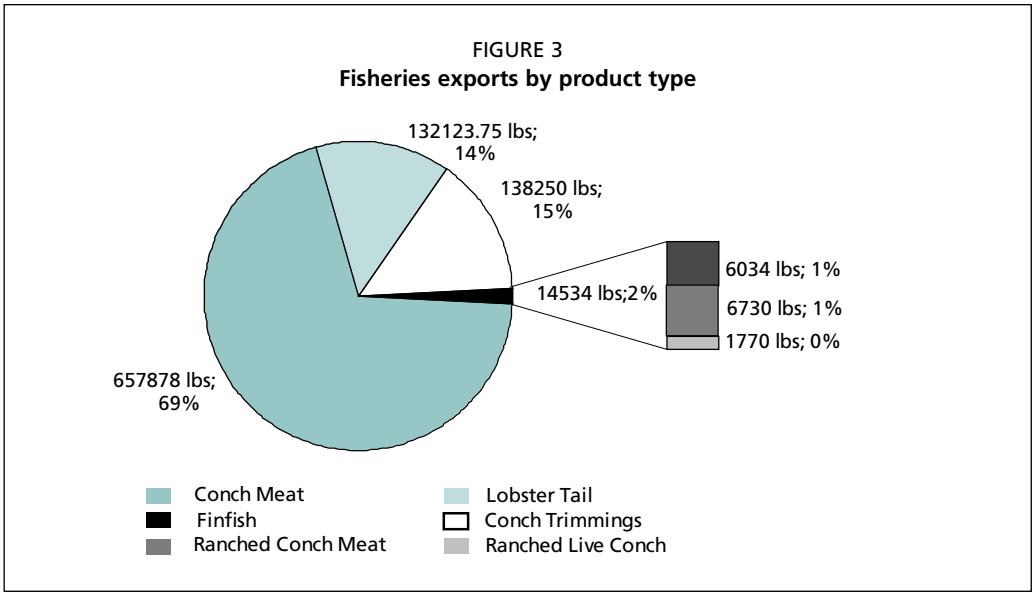


TABLE 3
Annual employment and production of the TCI fisheries sector

Parameters	Fishing seasons			
	2000–2001	2001–2002	2002–2003	Units
Primary employment (fishers)	353	370	448	individuals
Secondary employment (e.g. plant managers, plant workers)	240	246	205	individuals
Total production (lobster, conch, finfish)	1108.7	1052.1	839.6	MT
Export (lobster, conch, finfish)	445.5	397.4	405.1	MT

BOX 1
Government

Type: Constitutional parliamentary democracy

Capital: Grand Turk

Administrative divisions: Centralized administration

Independence: Overseas territory of the United Kingdom

Constitution: Introduced 30 August 1976, suspended in 1986, restored and revised 5 March 1988

Legal system: Based on laws of England and Wales, with a few adopted from Jamaica and the Bahamas

Head of State: Queen Elizabeth II (since 6 February 1953), represented by a Governor

Head of Government: Chief Minister

Executive branch: Executive Council consists of three ex officio members and five appointed by the Governor from among the members of the Legislative Council

Legislative branch: Unicameral Legislative Council (19 seats, of which 13 are popularly elected; members serve four-year terms)

Judicial branch: Privy Council, Supreme Court and Magistrates Court

in the fish processing industry (2001 Census) (Table 3). The importance of the industry is further accentuated in the less developed islands such as South Caicos, Middle Caicos and North Caicos, in which there are few alternatives to fishing.

Political, legal and administrative structure: See Box 1.

INSTITUTIONAL AND LEGAL ARRANGEMENTS FOR THE MANAGEMENT, DEVELOPMENT AND CONSERVATION OF FISHERIES, AQUATIC AND OTHER COASTAL RESOURCES

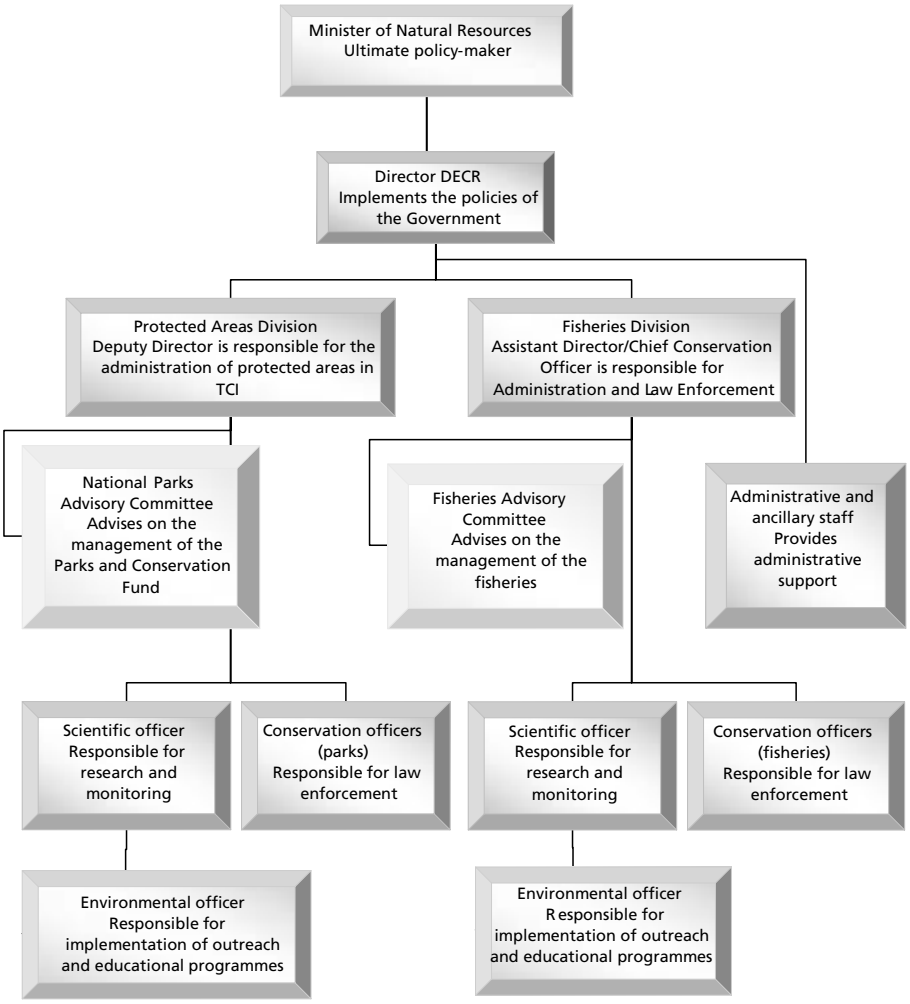
Administrative arrangements for management, development and regulation of fisheries and aquaculture

The management of all natural resources, including fisheries and aquatic resources, falls under the responsibility of the Ministry of Natural Resources, which is headed by an elected official, the Minister for Natural Resources.

The minister responsible for fisheries and natural resources conservation and management serves as the ultimate policy maker. Through a consultative process with various stakeholders and interest groups, s/he and the other ministers of the Executive Council develop policies that direct the conservation, use and development of the islands' natural resources.

The policies and directives of the minister are filtered down to the Department of Environmental and Coastal Resources (DECR) through the Permanent Secretary

FIGURE 4
Organigram of the Department of Environmental and Coastal Resources



of Natural Resources, who is also responsible for overseeing and ensuring that the minister's various policies are executed.

Attached to the Ministry of Natural Resources, DECR has been designated to assist the minister in managing environmental protection activities in terms of policy-making and the development of related legislation, strategies, planning and plans. Its director has overall responsibility for formulating strategies to ensure sustainable utilization of natural resources and protect and promote biodiversity and economic prosperity, in keeping with the overall environmental policies.

The department is divided into the Protected Areas Division and the Fisheries Division (Figure 4). The Fisheries Division is headed by an Assistant Director/Chief Conservation Officer, who develops and implements resource management plans consistent with the policies of the minister. S/he oversees the Protected Areas Division, and has responsibility for the overall management of the 34 TCI protected areas (including national parks, nature reserves, sanctuaries and sites of historical interest).

Both divisions have conservation officers, the law enforcement arm of the department. They strive to ensure compliance with the range of fisheries and environmental conservation laws, while scientific research and monitoring are carried out by scientific research officers.

Alongside enforcement and research, the department has an established public awareness policy. Education is viewed as an integral part of the department's work

programme, as education is a tool by which knowledge can be disseminated to the community and awareness raised on conservation issues. Environmental officers carry out this programme.

In addition to the department's permanent staff, there are several established committees that act as advisory bodies to DECR. A scientific authority guides the type of research conducted throughout the islands. S/he plays an integral role in setting or recommending guidelines and standards for fisheries and other research, aquacultural development and environmental impact assessments. This authority also serves as the scientific authority for the Convention on Trade in Endangered Species (CITES), and is responsible for recommending the total allowable catch for the queen conch fishery, among other functions outlined in the draft wildlife and endangered species bill.

The fisheries legislation makes provision for the establishment of a statutory body, the Fisheries Advisory Committee (FAC). This body is comprised of five to six members. They are generally stakeholders or community members with an interest in the TCI fisheries resource. FAC has the responsibility of advising the minister on aspects of management and development of the fisheries resources. Correspondingly, the National Parks Ordinance provides for the establishment of a similar committee.

Legal arrangements. There are several pieces of legislation and legal documents that form the legal basis for DECR programmes.

- **Environmental Charter (2001)**. This is a formal agreement between the United Kingdom and TCI to develop and implement sound environmental management practices. The charter outlines the roles and responsibilities of the British Government, the TCI Government, the private sector, non-governmental organizations and local communities in the conservation and management of the environment.
- **Fisheries Protection Ordinance. Chapter 104**. This is the main legislation providing the legal basis and regulations for managing the fisheries resources of the Turks and Caicos Islands. The provisions of this legislation guide the licensing, harvesting, conservation and management processes of fisheries in the TCI.
- **Fishery Limit. Chapter 105**. Defines the territorial waters and economic exclusion zones of the Turks and Caicos Islands.
- **Coastal Protection Ordinance. Chapter 85**. This legislation protects the coastal zone by restricting the extraction of materials (living and non-living) from the coast without a licence.
- **National Park Ordinance. Chapter 80**. Provides the legal basis for the establishment and management of a protected areas system, which includes national parks, marine reserves, sanctuaries and areas of historic interest.
- **Mineral (Exploration and Exploitation) Ordinance. Chapter 79**. Protects the marine habitat from direct mining impact or indirect terrestrial mining activities.
- **Endangered species bill (draft)**. On completion, this legislation will provide the legal basis for protection of endangered species in the Turks and Caicos Islands.

Administrative arrangements for conservation and rehabilitation of the coastal environment and aquatic resources

The islands are relatively small; consequently, the entire state is considered as the coastal zone and is managed as such. Management of the islands takes a multidisciplinary approach that requires strong interagency collaboration. The three main government departments involved in conservation, management and rehabilitation of the coastal environment are DECR, the Planning Department and the Environmental Health Department. DECR, as stated previously, deals mainly with conservation issues. The Planning Department plays a key role in land-use planning and managing infrastructural development, while the Environmental Health Department monitors and regulates waste management (solid, liquid and hazardous waste). While there are no formal legal

mechanisms for vertical or horizontal integration of these departments, in the majority of cases, they try to work together when dealing with large-scale development.

The TCI is one of the fastest growing islands in the region, owing to its strategic geographical location and rich historical, cultural, economic and ecological values. However, rapid economic development brings about environmental problems, such as pollution from domestic and industrial sources, booming tourism, habitat and biodiversity loss and overexploitation of resources, which threaten the integrity of coastal and marine ecosystems. The Government acknowledges that development of the islands and protection of the coastal and marine ecosystems and their resources must be mutually supportive in order to promote sustainable development. It has implemented several strategies that are in harmony with the Environmental Charter so as to safeguard natural resources and ensure the conservation of natural features as far as possible.

The enactment of the Physical Planning Ordinance (1989) was one such strategy. The ordinance provided a code of conduct for development activities, to ensure that conservation and management of natural resources are treated as an integral part of development planning. It mandated the production of a development manual, which provides stringent regulations to minimize development impact on the environment. These regulations include setback limits for coastal development, guidelines for land clearance and the requirement of an environmental impact assessment (EIA) for large-scale development. DECR and the Planning Department work closely together to formulate the terms of reference for EIAs, which are guided by predetermined development priorities and well-formulated environmental protection objectives.

Apart from efforts to ensure that the development process is holistic and does not compromise the natural environment, a protected areas system was legislated in 1992 to safeguard key natural features. Of the 34 protected areas in the TCI, 56 percent have a marine component spanning great distances along the coast. The potential development and pollution threats to the fragile marine ecosystems within these protected areas are of great concern in their effective management. Given this, the Protected Areas Division plays an instrumental role in the management, conservation and rehabilitation of the coastal environment and aquatic resources.

The management of these systems is financed by the Conservation Fund, which was legally established in 1998. This fund is reserved for environmental management programmes and is financed by a 10-percent share of the Accommodation Tax. The fund supports most of the operational costs of the DECR Protected Area Division. It also supplies core funding to the National Trust and provides funds to community-based conservation projects.

The rehabilitation of the coastal system is based on the 'polluter pays' principle, which is embodied in several pieces of legislation. Which agency is responsible for ensuring that compensation is obtained for restoration depends on the type of environmental degradation or damage committed. For instance, violations within the protected areas system and the fisheries limit would be handled by DECR. Incidents that involve breach of the environmental health or planning regulations would be dealt with by the Environmental Health Department and the Planning Department respectively. All three departments have the support of the Royal Turks and Caicos Police Force if required.

Administrative arrangements for regional planning and development in coastal regions

In recognition of the need to preserve and develop coastal and marine resources, in recent years the TCI has been a very active participant in a number of important regional initiatives. Besides participating in several regional workshops and conferences on sustainable development and environmental conservation issues, it is party to several regional bodies that address development and environmental conservation concerns in coastal regions.

Most recently, the TCI has signed on to the Caribbean Regional Fisheries Mechanism (CRFM), launched in March 2003. It is an active partner in this regional initiative, which promotes the sustainable use of fisheries and aquacultural resources. Through collaboration with the CRFM, the TCI is in the final stages of formulating a fisheries policy and management plan.

In 1998, the Turks and Caicos Islands became a member of the Caribbean Planning Association and has since actively participated in this regional body, which assists member countries in formulating planning policies and preparing land-use regulations. The association's objective is to encourage planning that will meet the needs of people and society more effectively.

The TCI is also a member of the Caribbean Environmental Health Institute, which is a regional body providing technical and advisory services in all areas of environmental management. This includes but is not limited to environmental quality monitoring, watershed and coastal area management, waste management and environmental health information.

Other regional initiatives that have helped shape the development process in the TCI include various United Nations funded projects. For example, collaboration with Coast and a project funded by the United Nations Educational, Scientific and Cultural Organization (UNESCO), resulted in the decision to increase the setback limit for coastal development to 100 ft from the vegetation line.

Through these arrangements, the TCI is able to work with neighbouring territories to better understand and meet the challenges of sustainable development.

Past and present efforts in the field of co-management of fisheries and coastal aquatic resources

Over the course of the years, there has been a varying degree of co-management, that is, shared management between government and the fisheries. Probably the greatest degree of co-management was the institution of FAC, established under the Fisheries Protection Ordinance. Representatives of the fisheries industry, public members and DECR sit on this committee, which advises the minister responsible for fisheries and/or the Governor on the overall management of the industry. This body therefore has a great deal of influence in the management, conservation and development of fisheries.

In another effort towards co-management of coastal aquatic resources, DECR works closely with formally established community groups. For example, the Hotel and Restaurant Association and the Water Sports Association are quite involved in the conservation efforts of the department. These groups assist DECR with dive mooring installation and maintenance, research initiatives and educational programmes.

Advice is also sought from the general public on management issues through periodic consultations. They take the form of community meetings and radio and television talk shows. This strategy allows the general public to voice their concerns and share their views on matters regarding the development and management of the islands' natural resources.

Despite these initiatives in garnering stakeholder participation, community involvement is generally limited to the same individuals. The department finds it difficult to gather wide community input into the management of the fisheries and other coastal aquatic resources.

However, DECR plans to convene more frequent community meetings in the hope that the increased presence will make individuals more comfortable and improve public trust in the department.

Past and present efforts in the field of integration of fisheries and coastal aquaculture into coastal area management, planning and conservation

Prior to 1994, the Fisheries Department was responsible for fisheries and aquaculture management, while the then Environment, Heritage and Parks Department took the lead

in managing protected areas systems and the general environment. The two departments shared many common objectives; consequently, their merger was designed to maximize limited resources and enhance the islands' ability to manage their natural resources.

This holistic approach to coastal area management has increased human resources and funding and has reduced overlap in management efforts, thereby improving overall management effectiveness.

ACCESSIBILITY AND UTILIZATION OF SOCIO-ECONOMIC AND DEMOGRAPHIC INFORMATION

Availability of socio-economic and demographic information on coastal communities

Literature that focuses largely on the socio-economics and demographics of fisheries has been difficult to obtain. This is partly due to the limited research in this area, but also to the fact that the documentation that does exist is largely found in the 'grey literature' – literature that remains within research organizations or various government departments. Still, very few formal publications have been identified that speak specifically to the socio-economic, demographic and political characteristics of fisheries resource users and uses in the TCI. The following is a list of research that outlines socio-economic aspects of the TCI fisheries industry.

Bennett, E. and Clerveaux, W. 2001. Size matters: fisheries and social capital on the Turks and Caicos Islands. *Proc. Gulf Carib. Fish. Inst.*, 54.

Bennett, E. and Clerveaux, W. 2005. Social capital and fisheries management on small islands. *Aquatic Resource, Culture and Development*, 1(2): 109–118.

Bennett, E., Neiland, A., Anang, E., Bannerman, P., Atiq Rahman, A., Huq, S., Bhuiya, S., Day, M., Fulford-Gardiner, M. and Clerveaux, W. 2001. Towards a better understanding of conflict management in tropical fisheries: evidence from Ghana, Bangladesh and the Caribbean. *Marine Policy*, 25: 365–376.

Clerveaux, V. 2002. *The impact of tourism on the fishing industry of the Turks and Caicos Islands*. Department of Geography, University of the West Indies, Mona, Jamaica. (unpublished B.A. thesis)

Clerveaux, V. 2004. *Resource utilization and migration issues in the Turks and Caicos Islands*. Department of Geography, University of the West Indies, Mona, Jamaica. (unpublished M.Phil. thesis)

Holness, A.P. 1981. Turks and Caicos Islands report and recommendations to be considered for possible improvement to the fisheries. (unpublished report)

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Although research on the socio-economic characteristics of the fisheries industry has been limited, it is increasingly being recognized that this is an area in need of greater understanding, and it has been highlighted in the research plans of DECR's Fisheries Division. More recently, the department's staff members were trained in the Socio-Economic Monitoring (SocMon) Protocol in an effort to build capacity in this area.

Use of socio-economic and demographic indicators in the preparation of coastal area profiles and management/development plans

The environmental problems generated by rapid development, spatial concentration of human and commercial activities, and changes in production and consumption experienced in the islands (particularly in Providenciales) are generally not well documented. The lack of comprehensive analytical and descriptive information has been a major impediment to improved environmental analysis, selection of policy options, formulation of management strategies and implementation of action plans.

Even though socio-economic data is somewhat lacking, biophysical and socio-economic factors and factors influencing environmental deterioration and mismanagement have been considered in the development of various coastal area management/development plans, including the management plans for fisheries and several protected areas.

North West Point sustainable master plan. This is a development plan for the northwestern section of Providenciales. The area is virtually undeveloped and features several protected areas, including nature reserves and national parks. The plan was designed to ensure that there is minimum negative impact on the natural environment and will act as a catalyst for social development and conservation. Development of the plan involved extensive fact finding and personal contributions by many residents of Providenciales. Socio-economic and demographic information considered during preparation included the existing social dynamics: population size, growth rate, belonger:non-belonger ratio and employment/skill level. These data were obtained from the Department of Economic Planning and Statistics, based on various national surveys, and from a report on the standard of living in the TCI by Kairi Consultants Ltd.

Other pertinent information included an examination of existing infrastructure (communications, transportation, waste disposal, etc.) and land uses by DECR and the Planning Department and other secondary sources (reports) held within the Planning Department. Emerging market trends were considered in determining a development concept for the area, including data collected by the Tourist Board on tourist arrivals, tourist profiles, etc.

In general, development of the North West Point plan took a holistic approach, taking into account both the physical features of the area and the social, cultural, economic and political conditions of the Providenciales community. The resulting plan is envisioned as creating a balance between the natural beauty of the area and the built environment, while satisfying the needs of the local community.

Ramsar Nature Reserve Project. The North, Middle and East Caicos Nature Reserve (Ramsar site) is a wetland of international importance, containing a variety of habitat types representative of the region. The area possesses several archeological and historical sites, and a variety of plants within the area are used for traditional crafts and bush-medicine. Fishing and farming are of great importance to the local diet. Due to the diversity of this extensive area, a plan for biodiversity management and sustainable development was developed. It incorporated ecological and socio-economic aspects of the area and surrounding communities, taking into account the population density, growth rate, employment/skill level of residents, traditional uses of the area and the importance of these activities to local livelihoods.

Most of the socio-economic data used in formulating the plan were collated through public consultation (community meetings and one-on-one interviews with residents), some of which are presented in the appendix to the project report. Other socio-economic and demographic information was obtained from secondary sources, i.e. demographic statistics from the Department of Economic Planning and Statistics, fisheries data from the Fisheries Division and historical data from the National Trust.

A section of the plan has already been implemented and has proved successful. The creation of nature trails and the training of local tour guides have facilitated development of the capacity of local residents to establish small businesses based on ecotourism. This has provided an economic incentive to conserve the rich biodiversity of the coastal area.

Turks and Caicos Islands draft fisheries management plan. Apart from management/development plans for specific areas, socio-economic and demographic data have been incorporated into the management plans of specific natural resources, including the

fisheries resource. The draft fisheries management plan (DFMP) has integrated socio-economic data and concerns with fish-stock and biological data. It will protect the ecological integrity of fish stocks and the associated environment, while at the same time facilitating development and diversification of the fisheries sector and promoting economic prosperity. Historical data on the fisheries was examined, including the socio-economic background of fishers and how this has changed over time due to declining profits and resources.

Other socio-economic data considered were: population densities in the major fishing islands, demographic dynamics of the fishers, number of fishers and fishing vessels in the fishing industry, number and condition of fish vending facilities, average income of the various players, existing market value of fish products, and the fisheries' contribution to the country's GDP. Most of these data (mainly the fisheries statistics) are housed in the Fisheries Division; other data were obtained through public consultation or from published papers and 'grey literature'. Several interviews with local fishers were conducted, and public meetings were held to ascertain some of the information listed above. The population statistics and economic/financial data were acquired from the Department of Economic Planning and Statistics.

Although socio-economic and demographic data on the TCI is not well documented, and is to some extent fairly limited, the Government does incorporate social, cultural, political and economic factors, as far as possible, in designing plans for the development of the islands.

Preparation and implementation of special projects and activities – in the context of fisheries and coastal area management and conservation programmes – that aim to improve the socio-economic well-being of coastal fishers and their families

The Fisheries Division has undertaken several initiatives to protect fisheries resources while at the same time improving the standard of living of fishers. One of the major activities is this area was the establishment of a Fishermen's Day, which began in 2003 and will be held annually. In this way, the Government can publicly recognize and acknowledge fishers and their valuable contribution to the islands' economy and well-being. Fishers' input, and intellect, in the decision-making process for managing fisheries resources was also acknowledged. Fishermen's Day is a three-day celebration filled with enjoyable activities and workshops for fishers and their families. DECR takes advantage of the opportunity to promote conservation and best fishing practices. A few fishers were recognized for, among other things, their conservation efforts and knowledge-sharing.

South Caicos Fisheries Infrastructure Project. Another activity that DECR and the Government have been involved in is the improvement of existing docking/landing facilities in South Caicos. The fish landing area there was in a deplorable condition. Discarded conch shells and garbage lined the bank of the small bay. This created a fowl smell and polluted water. The project sought to improve conservation and the general well-being of individuals in the fishing industry here. In the first phase, it removed conch shell and other debris from the water and shoreline. Gabion baskets were then installed to stabilize the shoreline and reduce landward runoff. The improved docking facility served to facilitate boat safety and minimize congestion while products were being unloaded.

The second phase of the project involves creation of a children's park, currently under construction, adjacent to the docking facility. The park will provide a recreation area for fishers and their families.

The Government has amended policies and legislation to improve the general welfare of the fishing community. With the rapid development of the tourism industry, more and more young people are being employed in this or related sectors and fewer

youth are being recruited into the fishing industry. As a result, most of the fishers in the industry are above 45 years of age and have great difficulty free-diving to depths. To accommodate older fishers, the Government recently amended the Fisheries Protection Ordinance to allow non-nationals into the fisheries as assistants.

As the Government continues to explore ways to improve the socio-economic well-being of fishers and their families, it has committed itself to explore new markets to obtain better prices for TCI fisheries products. It also seeks to identify ways to utilize existing products better and minimize waste. These initiatives should increase overall incomes for all players in the fishing industry.

Fishers and their families are an important part of the Turks and Caicos Islands' social matrix and are the strength of the fishing industry. Thus special consideration is given to this group to sustain the long-term future of the industry and the life and welfare of the communities.

Use of socio-economic and demographic indicators in monitoring the impact of management regulations and measures on the socio-economic well-being of fishers, their families and others

At present there are no initiatives to monitor or assess the management effectiveness of various fisheries management strategies. However, one component of the DFMP involves regular evaluation (every 3–5 years) of the effectiveness of the plan. The DFMP proposes a research plan and incorporates socio-economic studies that, among other things, will assist in evaluating the impact of management. To address the need for information on key economic indicators, the DFMP foresees periodic user surveys in order to acquire information on fishers and on consumer expenditures, preferences and demand regarding commercial and sports fisheries, non-extractive uses and environmental qualities.

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