FINAL COUNTRY REPORT: GRENADA

December 2009

Grenada

Country Profile

Geographic coordinates	12° 07' N, 61° 40' W (This is the location of the centre of the Island)
Total area	344 sq km
Land area	344 sq km
Water area	0 sq km (Marine boundaries not yet delimited)
Length of Coastline	251 km
Shelf Area	629 sq km
Territorial Sea	4,504 sq km
Claimed EEZ	20.285 sq km
Highest point (m)	840 (Mount Saint Catherine)
Climate	tropical; tempered by northeast trade winds.
Natural hazards	lies on edge of hurricane belt; hurricane season lasts from June to November.
Population	90,739 (July 2009 est.)
Annual Population Growth Rate	0.468% (2009 est.)
Life Expectancy at birth	total population: 65.95 years
Languages	English (official), some vestigial French patois
Ethnic Mix	black 82%, mixed black and European 13%, European and East Indian 5%, and trace of Arawak/Carib Amerindian
Work force	42,250 (22,679 male; 19,571 female) - Agriculture 33%, Industry 17%, Other 50%
Unemployment	12.5% (2000)
GDP (PPP)	$1.161 billion (2008 est.)
GDP Growth rate	0.3% (2008 est.)
GDP per Capita (PPP)	$12,900 (2008 est.)
Currency Unit	Eastern Caribbean Dollars (EC$); 1US$ = EC$2.68
Area of Mangrove Forests	
Percent of Mangrove Forests Protected	
Per Capita Food Supply from Fish/Fishery Products (2000)	32 kg/person
Exports	$38 million (2006); bananas, cocoa, nutmeg, fruit and vegetables, clothing, mac

Sources: CIA World Factbook – Grenada (2009); EarthTrends Country Profiles – Grenada.

Abbreviations and Acronyms

CARICOM	Caribbean Community
CARIFIS	Caribbean Fisheries Information System
CFO	Chief Fisheries Officer
CFRAMP	CARICOM Fisheries Resource Assessment and Management Programme
CRFM	CARICOM Regional Fisheries Mechanism
EU	European Union
FAO	Food & Agriculture Organization of the United Nations
FAC	Fisheries Advisory Committee
FD	Fisheries Department
FMP	Fisheries Management Plan
GEF	Global Environmental Facility
GOG	Government of Grenada
IFAD	International Fund for Agriculture Development
IHHN	Hypodermal Hematopoietic Necrosis
JICA	Japan International Co-operation Agency
MAFF	Ministry of Agriculture, Forestry and Fisheries
MPA	Marine Protected Area
MT	Metric Ton
OECS	Organization of Eastern Caribbean States
TIP	Trip Interview Program
TSV	Taura Syndrome Virus
UNDP	United Nations Development Program
VIF	Venezuelan Investment Fund

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CHAPTER 1: INTRODUCTION

Grenada is an archipelagic sovereign state consisting of the island of Grenada and several of the southern Grenadines. Three islands are inhabited: Grenada, Carriacou and Petit Martinique. Grenada is located northwest of Trinidad and Tobago, northeast of Venezuela, and southwest of St. Vincent and the Grenadines. It is a member of the Caribbean Community (CARICOM) and the British Commonwealth of Nations.and member of OECS.

The contribution of fisheries to the national economy has been increasing at an annual average of EC$25.5 million from 2003 to 2009 which is equivalent to 2.8% of GDP. Although relatively small, the contribution of the industry to employment, food security, poverty alleviation and nutrition is very significant. The industry employs 3,000 persons which represent 10% of the work force. Additionally, the per caput supply of fresh fish is 16 kg. The industry experienced an average annual growth rate of 14.4% over the same period, except for 2004 when there was a decrease of 16.2%, mostly attributable to the passage of hurricane Ivan which struck the Island on 7th September of the same year.

Artisanal/Small-scale Fisheries Development: 1950-present

Prior to the 1950s most of the fishing in Grenada and the Grenadines was of a subsistence nature and targeted mainly the inshore coastal areas. Four major fisheries were noted in the early 1940s: the flyingfish and associated large pelagic fishery (caught using the *'ligne dormante'* or by trolling); the directed large pelagic fishery; the beach seine fishery for small coastal pelagics, and the hand-line fishery for demersal species; the latter operated mainly off the Grenadines. Already in the early 1940s 1980s, depletion of inshore stocks (reef fish) was noted, particularly in the Leeward Islands, and development of the pelagic offshore and deep water fisheries was

proposed. Indications are that the vessels during the 1940s were all powered either by wind (sail) or oars. A significant change occurred after World War II when inexpensive inboard gasoline engines were imported from Europe and fitted on double-enders or whalers and pirogue type boats.

During the late 1950s to the early 1960s the government provided loans of up to US$25,000 to encourage mechanization of the fleet This was done to increase efficiency and effectiveness of the fleet with respect to catch and income of fishers. In fact, Grenada was cited as the most advanced in vessel mechanization throughout the Windward Islands. In 1953, fish-pots were introduced and the Fisheries Department commenced experimentation with outriggers to catch large pelagics by trolling and gillnets to catch flyingfish. Prior to this time, dipnets were used to catch flyingfish. By the end of the 1950s, gillnets were adopted by the fleet. Beach seines, handlines and fish-pots were popular throughout the 1960s. The only exports were some 2.7 - 3.6 mt of crustaceans (i.e., lobsters) annually in the early 1960s.

Beach seining activity was concentrated on the west and north coasts of Grenada and some 15-20 landing areas were used. There was a distinct separation in the area of operation of different fleet types: small row-boats in the handline and pot fishery close inshore at 10-15 fathoms; 'whalers' because the design was similar to boats used to catch whales up to the 1960s in Grenada and also to those used in St. Vincent and the Grenadines. Using handlines and pots further offshore (10-15 miles) at 30-40 fathoms (they also utilized 'troll' lines when going to and from the fishing grounds); 'sloops' used both handlines and troll lines. These vessels concentrated on demersal species and fished further up the Grenadines. There were also directed lobster and conch fisheries off the south and north coasts of Grenada.

By 1969, another government loan scheme was implemented, which provided duty free loans on engines, gear and fishing equipment. This was done to reduce the input cost to fishing which allowed for development of the fleet and industry, and also to make fish more affordable to the population. The motorization of the fleet extended the fishing grounds and increased the fishing time, especially with the reduction in travel time to and from fishing grounds. Vessels were better equipped to withstand unfavorable sea conditions, which increased the number of possible fishing days. A change in species composition caught was also evident, as vessels previously targeting hind, grouper and various reef fish switched, once mechanized, to large pelagics. There was a distinct preference for motorized boats by younger fishers while older ones continued to target inshore demersal and reef resources.

During the 1970s, the industry was still characterized by small artisanal vessels and traditional fishing gear. Fish was sold at beaches, in markets or in villages by vendors; processing was limited. In the 1980s Grenada granted foreign fishing licenses to seven US longliners to fish for large pelagics in Grenada's ~~their~~ EEZ; five operated out of Grenada; an unspecified number of locally-based vessels were also licensed. By the end of the 1970s, semi-industrial longliners targeting tuna and swordfish were introduced; capable of ice storage, they made fishing trips of several days. Between 1986-1989 a major decrease in landings of large pelagic species was observed.

Fisheries development in the 1980s was a result of significant government investment and subsidy of the industry, which contributed to the 'dependency syndrome' of the industry. The highlight of this period was the investment of US$7.1 million dollars (loan and grant provided by IFAD and VIF) under the Artisanal Fisheries Development Project in 1982. This development provided for expansion and development of the longline fleet through a credit facility to fishermen on concessionary terms; improvement in shore-based infrastructure – construction and rehabilitation of fish market and fishermen locker rooms with facilities for cold storage, ice making, fish handling and retail; outlet for sale of fishing gears and equipment; and promotion of fish marketing and quality assurance. In 1991 JICA donated eight longliners (10.9

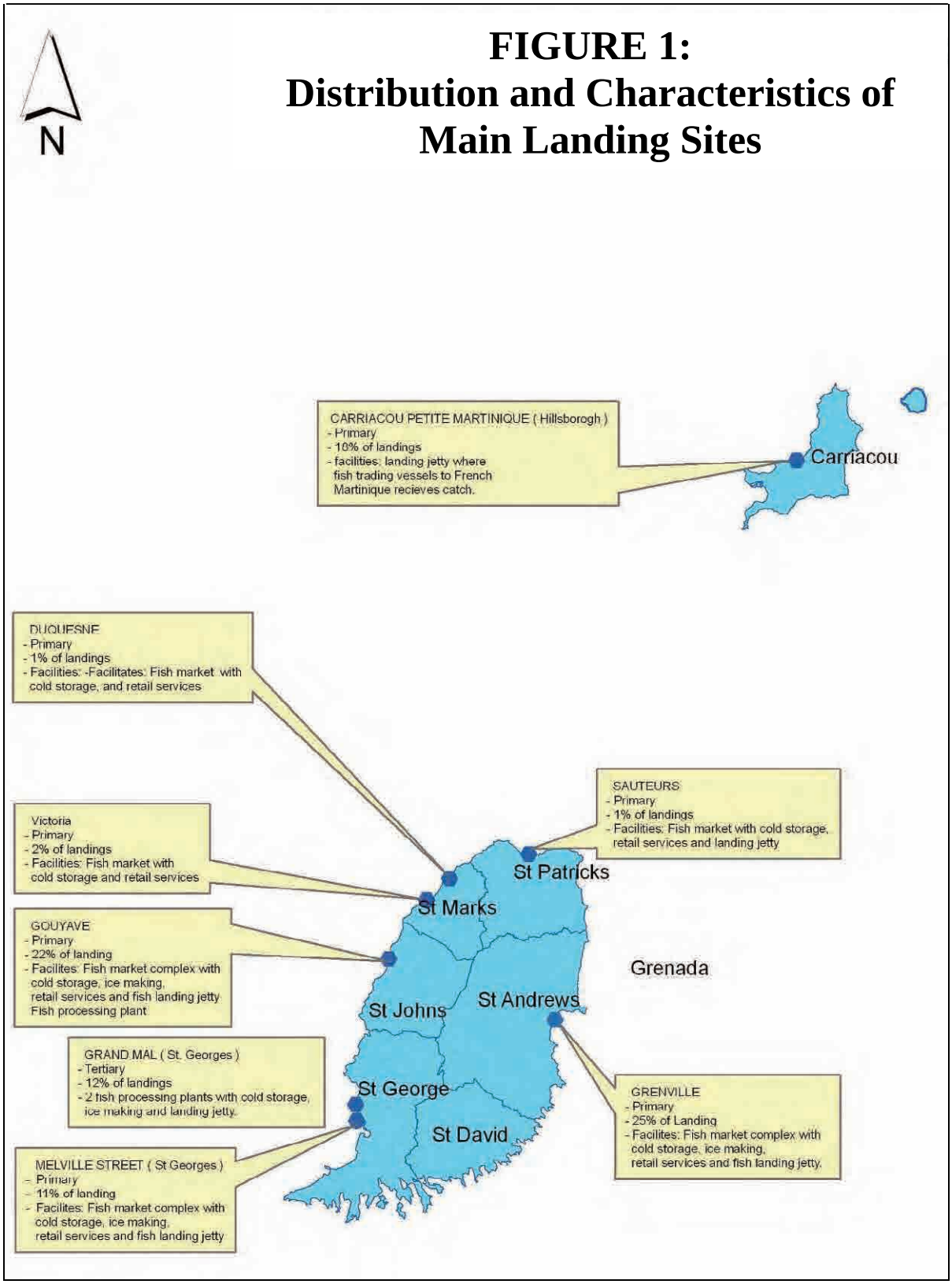
m long with 70Hp inboard diesel engine and cold storage of 2.4 cubic meters) to the Grenada government; fishing with them began in 1992. This initiative promoted and popularized the use of larger boats (36-50 feet) with inboard engines and the development of the tuna fishery. By the mid-1990s almost the entire west coast pirogue trolling fleet, without any modifications to vessel design or power, converted to longlining. Use of outboards resulted in high operating costs, which prompted the government to formulate in 1994 a "Fishing Vessel Modernization Plan" aimed at encouraging fishers to convert to more economical inboard engines. The fleet modernization plan, also placed emphasis on increasing vessel sizes to appropriate length and technology consistent to the development of capacity among fishermen. Moreover, the policy at that time was to focus on providing a high quality tuna for the niche ("high-end") export market. However, the low overall volume of production by Grenadian longline fleet as compared to the US fleet is the reason for the higher prices for Grenadian-caught tuna compared to that caught by the US fleet, comprised of larger vessels which stay at sea longer.

According to the FD there are forty-five (45) fish landing sites around the islands [about thirty-five (35) on mainland Grenada]. Five (5) [Grenville, Melville Street, Gouyave, Sauteurs and Hillsborough] are primary landing sites with fish market and port facilities; three (3) [Victoria, Waltham and Duquesne] also have fish markets, but no port facility; thirty-seven (36) are secondary landing sites (beaches/bays without infrastructure) and one (1) tertiary landing site at Grand Mal where two of the three fish processing plants are located. Primary landing sites are strategically located so as to provide a variety of functions – fish marketing, cold storage, ice making, berthing of vessels and also act as a focal point to facilitate fisheries management in gathering fisheries data and conducting surveys.

The main landing sites categorised by percentage of landings are Grenville (25%), Gouyave (22%), Carriacou and Petite Martinique (18%), Grand Mal (12%), Melville Street (11%), other secondary sites (8%), Victoria (2%), Duquesne and Sauteurs (1% each).

The figure below shows the distribution and characteristics of the main fish landing sites:

FIGURE 1:
Distribution and Characteristics of Main Landing Sites



The data included for vessels and fishers from the registration should not be sued for the reasons advanced in this section of the report.

More reliable data will be supplied as attachment to this report.

TABLE 1: BOATS REGISTERED BY HOME PORT BY ISLAND BY COAST GRENADA, 2000			
HOME PORT	**ISLAND**	**COAST**	**BOATS**
Grenada Yacht Club	*Grenada*	*St. George's Town*	27
Lagoon Road	*Grenada*	*St. George's Town*	50
Melville Street	*Grenada*	*St. George's Town*	63
Beausejour	*Grenada*	*West coast*	15
Carenage	*Grenada*	*West coast*	89
Cherry Hill	*Grenada*	*West coast*	13
Darvey	*Grenada*	*West coast*	3
Dragon Bay	*Grenada*	*West coast*	1
Duquesne	*Grenada*	*West coast*	28
Fontenoy	*Grenada*	*West coast*	14
Gouyave	*Grenada*	*West coast*	187
Grand Anse	*Grenada*	*West coast*	27
Grand Mal	*Grenada*	*West coast*	70
Grand Roy	*Grenada*	*West coast*	15
Halifax Harbour	*Grenada*	*West coast*	1
Happy Hill	*Grenada*	*West coast*	3
Harvey Vale	*Grenada*	*West coast*	23
Marigot	*Grenada*	*West coast*	5
Mollinerre	*Grenada*	*West coast*	1
Palmiste	*Grenada*	*West coast*	1
Victoria	*Grenada*	*West coast*	37
Waltham	*Grenada*	*West coast*	22
Woodford Bay	*Grenada*	*West coast*	1
Belmont	*Grenada*	*South coast*	23
Brizan	*Grenada*	*South coast*	2
Calivigny	*Grenada*	*South coast*	6
Calliste	*Grenada*	*South coast*	38
Fort Jeudy	*Grenada*	*South coast*	11
L'Anse Aux Epines	*Grenada*	*South coast*	9
Morne Rouge	*Grenada*	*South coast*	2
Point Salines	*Grenada*	*South coast*	1
Prickly Bay	*Grenada*	*South coast*	1
True Blue	*Grenada*	*South coast*	12
Westerhall	*Grenada*	*South coast*	16
Woburn	*Grenada*	*South coast*	26
Levera	*Grenada*	*North coast*	16
Sauteurs	*Grenada*	*North coast*	71
Conference Bay	*Grenada*	*East Coast*	1
Content	*Grenada*	*East Coast*	2
Corinth	*Grenada*	*East Coast*	4
Crochu Bay	*Grenada*	*East Coast*	2
Grenville	*Grenada*	*East Coast*	271
La Poterie	*Grenada*	*East Coast*	1
La Sagesse	*Grenada*	*East Coast*	3
LaTante	*Grenada*	*East Coast*	1
Mahot	*Grenada*	*East Coast*	2
Marquis	*Grenada*	*East Coast*	2
Petite Bacaye	*Grenada*	*East coast*	17
Requin	*Grenada*	*East coast*	8
Soubise	*Grenada*	*East coast*	7
	Grenada	*Unknown*	70

TABLE 1 (continued): BOATS REGISTERED BY HOME PORT BY ISLAND BY COAST GRENADA, 2000			
HOME PORT	**ISLAND**	**COAST**	**BOATS**
Bogles	*Carriacou*		9
Carriacou	*Carriacou*		1
Grand Bay	*Carriacou*		2
Hillsborough	*Carriacou*		31
Lauriston	*Carriacou*		1
L'Esterre	*Carriacou*		37
Windward	*Carriacou*		52
Mt. Pleasant	*Carriacou*		5
	Petite Martinique		74
	Isle de Rhonde		4

The 2000 Fishing Boat Registry data for Grenada was analyzed to observe the range of home ports from which the boats operate and to try to determine the approximate numbers of fishing boats operating in Grenada. There is a legal requirement for Grenadian fishers to register their boats; which is based on the Fisheries Act of 1986 and Fisheries Regulations of 1987. .

In all, 1,537 boats registered in 2000. These figures are widely divergent from the figures provided by the Fisheries Division to the Ministry of Agriculture, Forestry and Fisheries (MAFF) at their Strategic Planning Retreat in September 2008. Table 2 below shows that over the two decades between 1987 and 2007 the number of fishing boats in Grenada grew by 43% to 700. The data from the 2000 Fishing Boat Registry reveals very many more boats than the FD represented to the ministry. (Explanation on the fishing boat registry reported by the authors: The fishing vessel registry contains vessels which were registered for over a decade. Therefore since the registry was not updated during this period, this means that many vessels which exited the fishery due to physical or economic conditions and not reported would therefore remain in the registry in addition to new registrations added during the period. thereby inflating the actual number of vessels.

TABLE 2: Comparison of the Fisheries Sector, Grenada, 1987, 2007		
	1987	**2007**
Fishermen	1,200	1,500
Boats	490	700
Vendors	28	45
Employment	1,500	3,000
Fish Processing Establishments	1	3

Source: MAFF (2008)

The Grenada database of registered fishers was also analyzed to try to determine the approximate numbers of fishers operating in Grenada. Table 3 below presents the analysis. The Fisheries Legislation provides for the registration of fishers and vessels; and also for the licensing of vessels. Only 387 fishers registered, mostly from the St. George's area (the area geographically closest to the Fisheries Department). No fishers from Carriacou or Petite Martinique registered.

These figures are also widely divergent from the figures provided by the Fisheries Division at the 2008 MAFF Strategic Planning Retreat – but in the other direction: according to the FD, the

number of fishers increased over the twenty years between 1987 and 2007 by 25% to reach 1,500 – four times as many as those who registered with the FD.

The 2000 Fishing Boat Registry provides a way to estimate the number of fishers in Grenada in that year. One of the pieces of information boat-owners had to provide when registering their fishing boats was the number of persons in their crew. The 1,537 boats reported having 1,554 crew in 2000 – quite close to the 2007 estimate of number of fishers the FD represented to the ministry in 2008. Of course there could be duplications in the crew numbers; one person forming part of different boat crews on different days. (Again, as explained earlier, the fishing vessel and fishermen registry would not provide a reliable estimate of the actual number of vessels and fishers operating in the industry, for the reasons explained earlier. The information provide at the 2008 MAFF Strategic Planning Retreat was obtained from a Rapid Assessment Census conducted with Extension Officers.

TABLE 3:
FISHERS REGISTERED BY HOME PORT BY ISLAND BY COAST
GRENADA

HOME PORT	ISLAND	COAST	BOATS
Carenage	*Grenada*	*St. George's Town*	63
Grenada Yacht Club	*Grenada*	*St. George's Town*	17
Lagoon Road	*Grenada*	*St. George's Town*	34
Melville Street	*Grenada*	*St. George's Town*	64
St. George's	*Grenada*	*St. George's Town*	2
Beausejour	*Grenada*	West coast	12
Brizan	*Grenada*	West coast	2
Cherry Hill	*Grenada*	West coast	9
Dragon Bay	*Grenada*	West coast	1
Fontenoy	*Grenada*	West coast	7
Gouyave	*Grenada*	West coast	2
Grand Anse	*Grenada*	West coast	26
Grand Mal	*Grenada*	West coast	58
Mollinerre	*Grenada*	West coast	1
Calivigny	*Grenada*	South coast	3
Lance Aux Epine	*Grenada*	South coast	4
Belmont	*Grenada*	South coast	11
Calliste	*Grenada*	South coast	20
Clarkes Court Bay (Woburn)	*Grenada*	South coast	2
Island View Bay	*Grenada*	South coast	2
Morne Rouge	*Grenada*	South coast	1
Mt.Pandy (beach)	*Grenada*	South coast	1
Mt.Pandy (Belmont)	*Grenada*	South coast	2
Prickley Bay	*Grenada*	South coast	1
Southern Southern Coast	*Grenada*	South coast	1
True Blue	*Grenada*	South coast	7
Woburn	*Grenada*	South coast	16
Corinth	*Grenada*	East coast	1
Fort Jeudy	*Grenada*	East coast	10
Grenville	*Grenada*	East coast	1
Westerhall	*Grenada*	East coast	1
	Grenada	Unknown	5

When the data in Tables 1 and 3 are rearranged and presented by Grenadian island/coast, one can clearly see where the data gaps are. Grenadian law should require both boats and fishers to be registered and licensed, even just to be able to keep track spatially of the numbers of them active

in the fishery. Licensing and registration of fishers and fishing vessels is a standard and globally-used fisheries management tool, which has not been employed in Grenada.

Having accurate and up-to-date information on where fishers are spatially distributed in Grenada will guide those who would plan for the involvement of fishers, fisher organizations, fishing communities and other stakeholders in the management of fishery resources. The density of fishers in certain locations will guide where fishers' organizations should be encouraged to form.

In addition, it is only right for fishers to make an annual contribution towards the cost of management to produce healthy fish stocks from which they earn their livelihoods. (The above section starting with "when" is misconstrued since the fisheries Legislation provides for registration of fishers and vessels; and also licensing of vessels. However, the lack of adequqte financial and human resources is seriously impeding ongoing updating of both registries.

TABLE 4:
Number of Registered Fishers and Boats by Location in Grenada

LOCATION	BOATS	FISHERS
Carriacou	138	0
Petite Martinique	74	0
Isle de Rhonde	4	0
Grenada East Coast	321	13
Grenada North Coast	87	0
Grenada South Coast	147	71
Grenada West Coast	556	106
St. George's Town	140	180
TOTAL	**1467**	**370**

Stakeholder Organzsations/FFOs

There are nine (9) functional fishermen's organizations in Grenada: seven (7) on the mainland, one (1) on Carriacou, and one (1) on Petit Martinique; one of the mainland organizations is now defunct as it has been replaced by a co-operative:

TABLE 5:
FISHERS' ORGANIZATIONS, LOCATIONS AND MEMBERS

	Name of Organization	Location	Approx. Members
1	St. John's Fishermen Association (SJFA)	Gouyave	20
2	Southern Fishermen Association (SFA)	Grand Mal	25
3	Sauteurs Fishermen Cooperative (SFC1)	Sauteurs	15
4	Melville Street Fishermen Group (MSFG)	St. George's	22
5	Grenville Fishermen Association (GFA)[1]	Grenville	25
6	Soubies Fishermen Cooperative (SFC2)	Grenville	25
7	Calliste Fishermen Cooperative (CFC1)	Calliste	28
8	Carriacou Fishermen Cooperative (CFC2)	Carriacou	25
9	Petite Martinique Fishermen Cooperative	Petite Martinique	20
10	Waltham Fishermen Cooperative	St.Mark	27
		TOTAL MEMBERS	**232**

Source: Grenada Fisheries Division (personal communication)

[1] Now defunct.

One can see that the fishers' organizations are located in communities where there are relatively large numbers of fishers and boats; but one can also see that only a small fraction of the fishing community joins up.

The Contribution of Fisheries to the Grenada Economy

The Fisheries sector makes a significant contribution to the economy of Grenada. In 2005, it was estimated that fish production contributed US$9,144,444 to the economy of Grenada, which represented approximately 1.76% of the total 2006 GDP ($520,000,000) of the country. (Comment: don't quite understand why the value and % of fisheries contribution to GDP in 2005 is compared to 2006. Authors need to explain this concept.

THE ADMINISTRATION OF FISHERIES IN GRENADA

The Grenadian Fisheries Department, a unit of the Ministry of Agriculture, Forestry and Fisheries (MAFF), oversees the fishing sector. An organogram of the Department is attached.
The authority charged with management and development of fisheries in Grenada is the Fisheries Division which is headed by a Chief Fisheries Officer. This Division is within the Ministry of Agriculture, Forestry and Fisheries.

The Division has sixteen technical staff, namely the Chief Fisheries Officer, one Quality Control Officer, one Assistant Biologist, one Enforcement Officer, four District Extension Officers, one technologist responsible for coordination of the Marine Protected Areas Programme and technology, two Data Entry Clerks and two Refrigeration Technicians. Support staff includes one Secretary and two Clerical Officers.

There is severe staff shortage in critical areas such as fisheries biology and data management. There is also thirty-three staff members based at seven District Fishery Centres around the state.

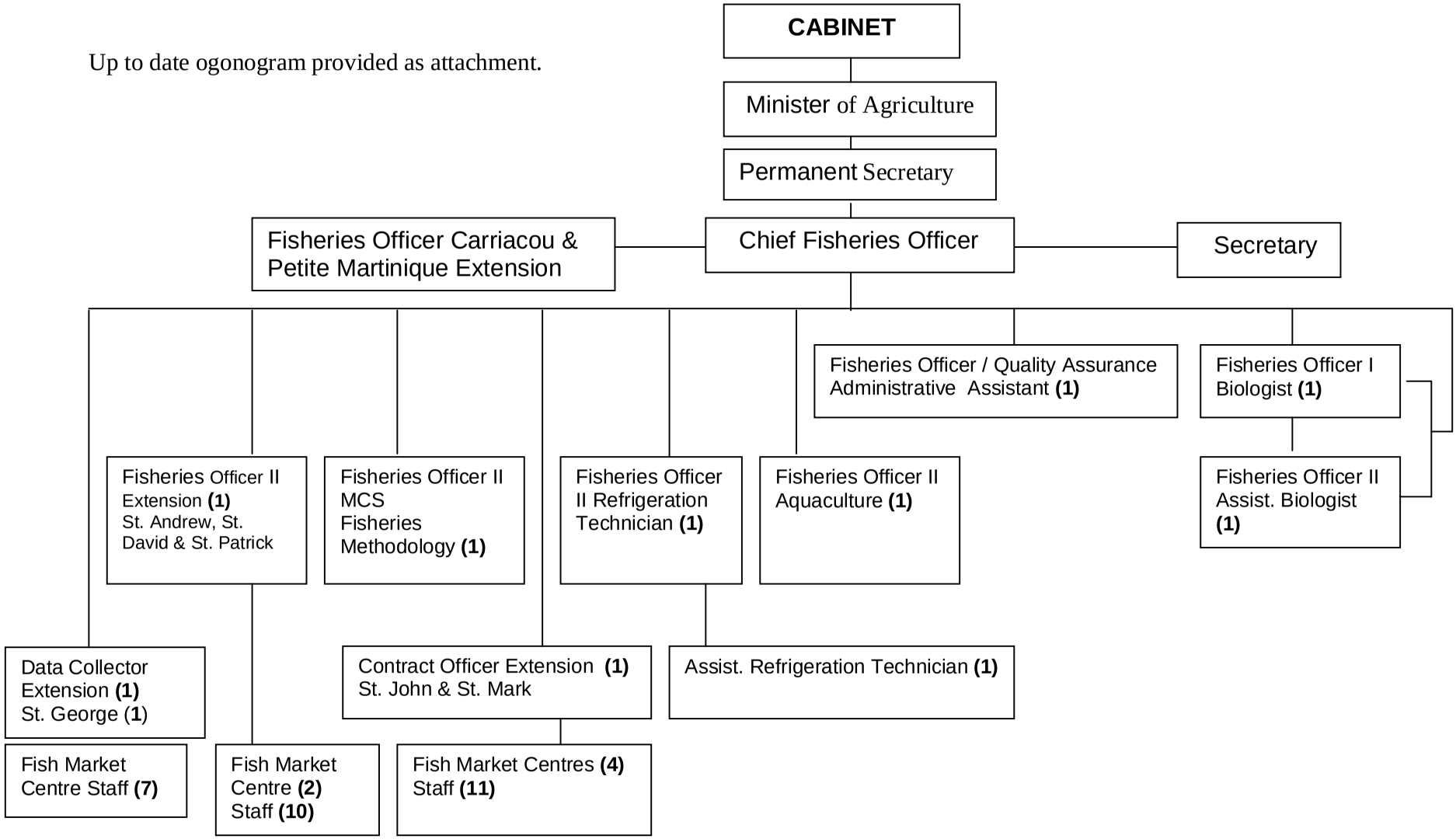
Governance agencies/major stakeholders include Grenada Coast Guard and district police, Customs Department, Physical Planning Unit/Land Development Control Authority, Grenada Board of Tourism, Environmental Health Division of the Ministry of Health, Ministry of Finance (Planning and Development), Ministry of Foreign Affairs, Grenada Ports Authority, Forestry Division, Grenada Bureau of Standards, and Produce Chemist Laboratory.

Non-governmental agencies include user group stakeholders such as Grenada Hotel and Tourism Association, Grenada Divers Association, Fishers Cooperatives and Associations, and Eco-tourism providers such as dive operators.

One of the most important international agreements influencing fisheries management is the United Nations Convention on the Law of the Sea (UNCLOS) of 1982 (and its protocols). The UNCLOS process generated two pieces of legislation in 1988: the Territorial Waters Act, and the Marine Boundaries Act, later consolidated and updated into the Grenada Territorial Sea and Marine boundaries Act #25 of 1989. Earlier in 1986, the parent legislation, the Grenada Fisheries Act #15 was passed and regulations SRO #9, 1987, became part of the Organization of Eastern Caribbean States (OECS) Harmonized Laws.

Organizational Chart of the Fisheries Division within the Ministry of Agriculture, Lands, Forestry, Fisheries, Energy and Public Utilities: Jan 2008

Up to date ogonogram provided as attachment.



CHAPTER 2: COMMUNITY-BASED FISHERIES MANAGEMENT COMPONENT

2.1 Coastal Community Characteristics

The archipelagic state of Grenada contains about a dozen islands of which four are inhabited (Grenada, Carriacou, Petite Martinique and Isle De Ronde). Most of the population of these islands live on or near the coast. The major coastal settlements in the state of Grenada with their populations as measured by the Grenada 2001 Population Census are:

TABLE 6:
POPULATIONS OF THE MAIN COASTAL SETTLEMENTS, GRENADA, 2001

ISLAND	PARISH	SETTLEMENT	MALE	FEMALE	TOTAL
Grenada	St. George	St. George's (town)	1,721	1,909	3,630
Grenada	St. George	Lance aux Epines	191	174	366
Grenada	St. George	Beausejour	75	91	166
Grenada	St. George	Calliste	194	202	396
Grenada	St. John	Gouyave	1,268	1,201	2,469
Grenada	St. Mark	Victoria	713	706	1,419
Grenada	St. Patrick	Sauteurs	339	368	707
Grenada	St. Andrew	Grenville	707	734	1,441
Carriacou		Hillsborough	183	173	356
Carriacou		Windward	252	216	468
Petite Martinique			376	380	756

Source: Grenada Department of Statistics, 2001 Population Census.

The male populations of some of these coastal settlements are quite small, and when one compares the population data with the number of fishing boats in Table 1 above[2], the importance of fishing to the local economy becomes apparent.

2.2 Policy, Legislation, and Supporting Institutional Arrangements

POLICY

The GOG has not chosen to prepare a **National Fisheries Policy** for Grenada. (The foregoing sentence is one of opinion rather than fact). In November 1996 the draft **Plan for Managing the Marine Fisheries of Grenada** received its latest revision (In fact the most up to date Strategic FMP was in 2002, which should be referenced by the authors. However, there was a draft FMP provided by CRFM based on the 2002 Plan which has not been concluded. This draft was reviewed by the Fisheries Division, following which it would go through the consultative process before forwarding to the fisheries Advisory Committee and Minister for approval) . The ten (10) **Objectives of Fisheries Management** outlined therein are:

1) Develop and increase the potential of marine living resources to meet human nutritional needs, as well as social, economic, and development goals, especially to contribute to foreign exchange earnings.

[2] Each boat may have as many as four or five crew members, may supply three or more fish vendors and each player in the industry may support two or three other family members.

2) Ensure that the fishing industry is integrated into the policy and decision-making process concerning fisheries and coastal zone management.
3) Take into account traditional knowledge and interests of local communities, small-scale artisanal fisheries and indigenous people in development and management programs.
4) Maintain or restore populations of marine species at levels that can produce the maximum sustainable yield as qualified by relevant environmental and economic factors, taking into consideration relationships among species
5) Promote the development and use of selective fishing gear and practises that minimize waste in the catch of target species and minimize by-catch of non-target species..
6) Ensure effective monitoring and enforcement with respect to fishing activities (especially foreign fishing).
7) Protect and restore endangered marine species.
8) Preserve 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.
9) Promote scientific research with respect to fisheries resources.
10) Cooperate with other nations in the management of shared or highly migratory stocks of commercial importance to Grenada.

The second policy objective states that it will "*ensure that the fishing industry is integrated into the policy and decision-making process*",while the third states that it will "*take into account*" traditional knowledge and interests of local communities, small-scale artisanal fisheries and indigenous people.

The following 14 general strategic objectives are outlined in the 2002 FMP

GENERAL STRATEGIC OBJECTIVES FOR FISHERIES MANAGEMENT AND DEVELOPMENT

1. Sustain and increase yields from fisheries resources for the purpose of satisfying and enhancing human food consumption and in general contributing to the socio-economic options available to the Grenada community.

2. Provide for recognition of the fishing industry as a key factor of production within an integrated national economy.

3. Highlight Traditional Fisheries-based Knowledge as a contributor to both fishing community and national development

4. Apply the concept of maximum sustainable yield in the management of specific stocks and habitat and use as reference point in conservation and management programmes.

5. Highlight and promote the approach of gear selectivity as a point of reference for managing the application of appropriate technology in targeting species and stocks within the fisheries.

6. Ensure that fisheries waters, fish stocks, habitat and sea space are protected from misuse by either local or foreign fishers.

7. Ensure that various fisheries sector services providers are controlled and facilitated for the socio-economic development of the Grenada community as a whole.

8. Ensure that all fish trade and fish production utilization activities are consistent with the UNFAO Code of Conduct for responsible fisheries and with international agreements such as CITES.

9. Promote the Eco-systems Approach to a management of stocks and habitat in the fishery waters of Grenada.

10. Apply the Co-management Approach to all the fisheries management and development programmes.

11. Establish and maintain a data and information system so as to facilitate management and development within the fisheries sector.

12. Promote an integrated, appropriately-scaled and cost effective physical fisheries infrastructure and also provide for human resource development within the sector.

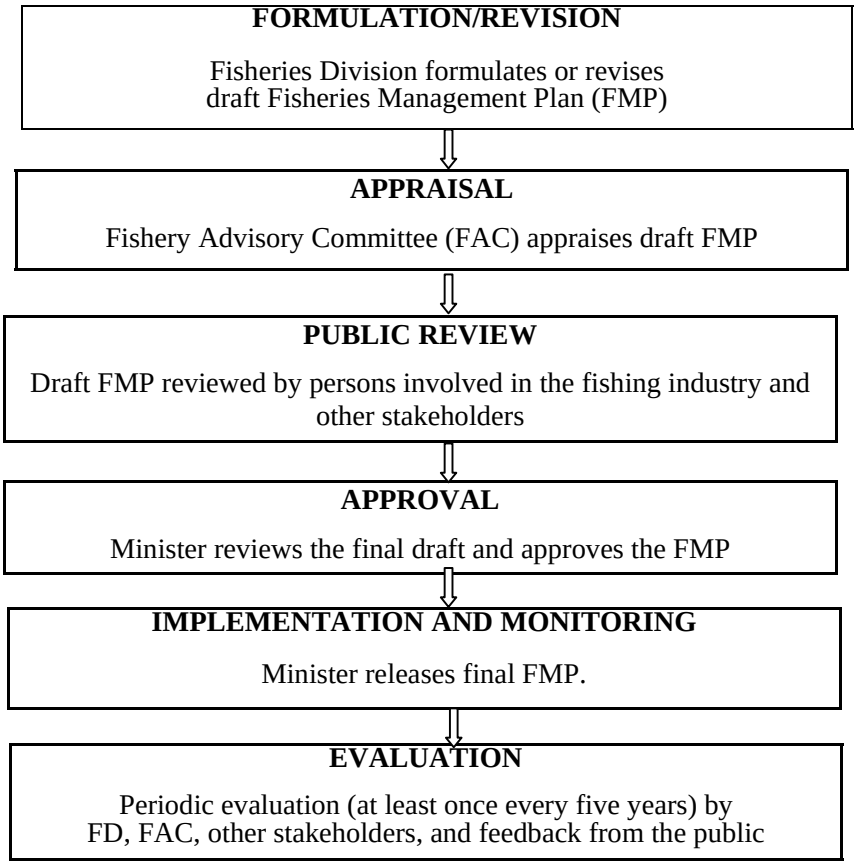
13. Ensure the security of the fishing fleet by facilitating Safety at Sea, ship to shore communications support and with demarcation of marine boundaries defining the fishing zone.

14. Establish and maintain human resource capabilities for conducting or facilitating needs-research with respect to fisheries management and development.

15. Cooperate with other nation states in the management of shared, straddling and highly migratory fish stocks.

The **Plan for Managing the Marine Fisheries of Grenada** is still a draft, and the document contains an outline of the process to be used to approve it. It is set out below:

Fisheries Management Planning Process



This draft report was last revised in November 1996, and according to the planning process diagram above it should be reviewed at least once every five years. Had it been approved, it would have missed at least two reviews already.

The planning process diagram indicates that there will be an opportunity for "*persons involved in the fishing industry and other stakeholders*" to review the draft FMP at the same time as other members of the public before it goes to the Minister for approval. The fishers may justifiably feel that because of their special position and involvement they should have their own opportunity to give their comments.

The 1996 draft FMP says very little about the involvement of the stakeholders in fisheries management planning. In the fishery-specific management plans "co-management arrangements" is almost always a management option, but then in the action plan following it, no concrete action is proposed. At the end of the section, the meaning of "co-management arrangements" is discussed thus:

FISHERIES MANAGEMENT OPTIONS			
	OPTIONS	**ADVANTAGES**	**DISADVANTAGES**
	**Co-Management Arrangements**	❒ By involving stakeholders directly in management encourages self-regulation and reduces government expenditures on enforcement.	❒ Difficult to set-up initially; requires multi-sectoral cooperation and agreement.

Source: Fisheries Division (1996)

The adoption of "co-management arrangements" is discussed as one option among many. The foreseen advantage is that it will be cost-saving, while the predicted disadvantage is that it will require difficult initial negotiations. There does not seem to be any commitment or enthusiasm to go down this road, and no staffing or training preparations are recommended.

In summary, the 1996 **Plan for Managing the Marine Fisheries of Grenada** does not pay sufficient attention to the involvement of fishers, fisher organizations, fishing communities and other stakeholders in the management of fishery resources. Hopefully the activities of this JICA-CRFM will see advances in this area.

LEGISLATION

The Grenada *Fisheries Act (1986)* and *Regulations (1987)*, which are based on the OECS harmonized legislation, govern the activities of the Grenada Fisheries Department.

With respect to community involvement in fisheries management, the 1986 Fisheries Act calls for:

Section 2: The Chief Fisheries Officer to prepare and keep under review a Fisheries Management and Development Plan

Section 3: The Chief Fisheries Officer shall consult with the local fishermen, local authorities, other persons affected by the fishery plan and with any Fishery Advisory Committee appointed under section 5.

Section 5: Minister may appoint a Fishery Advisory Committee to advise on the management and development of fisheries.

Section 11: Local fishing vessels must have a valid license.

Section 19: The Minister may designate an area as a local fisheries management area, and may designate any local authority, fishermen's co-operative of fishermen's association or appropriate body representing fishermen in the area as the Local Management Authority for that area. Where there is no appropriate body representing fishermen in the area, the Minister may promote the formation of such a body.

Section 20: The Local Management Authority shall make by-laws regulating the conduct of fishing operations in the designated area. They must be approved by the Minister.

Section 21: The Minister may declare a fishing priority area.

Section 23: The Minister may declare a marine reserve.

The Grenada *Fisheries Act (1986)* was passed a decade before the **Plan for Managing the Marine Fisheries of Grenada**, yet it contains more provisions for community participation in fisheries management than the FMP. The Act says that the CFO ***shall consult*** with the local

fishermen about the plan, not just ***take into account*** their traditional knowledge and interests. Section 19 takes it further and allows local fishers' organizations ***to actually manage*** a local fisheries management area, and Section 20 states that this local fishers' organization ***shall make by-laws*** regulating the conduct of fishing operations in the designated area. This gives local fishers' organizations real power, and not just the right to be consulted. These provisions are not being acted upon.

The Grenada Fisheries Regulations 1987 explain the procedure for appointment of a Fisheries Advisory Committee, and its composition:

FISHERIES REGULATIONS 1987.

PART II

FISHERIES ADVISORY COMMITTEE

2. Fisheries Advisory Committee. (1) There is hereby established a Fisheries Advisory Committee.

(2) Fisheries Advisory Committee shall be composed of the following persons:

(*a*) the Permanent Secretary, to the Ministry responsible for Fisheries who shall be the Chairman;

(*b*) the manager, Artisanal Fisheries or its successor of organization who shall be Deputy Chairman;

(*c*) the Chief Fisheries Officer, who shall be the Secretary;

(*d*) at least 3 persons who shall be appointed by the Minister from among professional fishermen to represent the views of professional fishermen;

(*e*) such other persons as the Minister may think fit to appoint.

The 1987 regulations specify that the manager of the Artisanal fisheries organization shall be the Deputy Chairman of the FAC, and that there should be ***at least*** three (3) professional fishers appointed to the FAC. If no other persons are appointed by the Minister under sub-section (e) **that would put fishers in the majority on the FAC**. (Not too sure what is the intention of this statement)

The 1987 regulations go on to describe the functions of the Fisheries Advisory Committee.

(5) The functions of the Fisheries Advisory Committee shall be:

(*a*) to advise the Minister on fisheries management and development;

(*b*) to consider and advise the Minister on the plan for the management and development of fisheries in the fishery waters and on each review of the plan;

(*c*) to consider and advise the Minister on any proposals for access agreements, joint venture investment in fisheries, or development projects in the fisheries sector;

(*e*) to consider and advise the Minister in any initiative for the regional harmonization of fisheries regimes, including any regional licensing scheme for foreign fishing vessels;

(*f*) to advise the Minister on the coordination of the policies and activities of Government departments and ministries with respect to any of the above matters;

(*g*) such other functions as the Minister may from time to time assign to the Fisheries Advisory Committee.

Should this FAC be in place it would put fishers in a strong position to participate in the management of the fisheries of Grenada.

The 1987 Regulations are clear (Section 8) that a ***local fishing license*** means a fishing vessel license and not a ***fisherman's license***. There is no mention in the 1986 Fisheries Act or the 1987 Fisheries Regulations of any requirement for fishers either to be registered or licensed. (This is not quite accurate since the Fisheries Act, 1986, Section 40 (2) (e) sets out the authority for the Minister to make regulations for registration and licensing of fishermen, fishing gear and other fishing appliances. However the Regulations of 1987 only provides for vessels to be licenced).

At present Grenada has three (3) Marine Protected Areas (MPAs) under the Fisheries Act:

- Sandy Island Oyster Bed (Carriacou)
- Moliniere/Beausejour
- Woburn/Clarke's Court Bay

Their management is empowered under the **Fisheries (Marine Protected Areas) Regulations 2001**, which provides for:

- A **Management Authority** to manage all MPAs in Grenada
- A **Management Committee** to advise the Management Authority

According to the **Fisheries (Marine Protected Areas) Regulations 2001** the management Committee consists of:

4. Management Committee: (1) The Management Committee for Marine Protected Areas consists of—

(a) a representative of the Ministry of Finance;
(b) a representative of the Ministry of Tourism;
(c) a representative of the Board of Tourism;
(d) a representative of the Ministry of Agriculture;
(e) a representative of the Science and Technology Council;
(f) a representative of the Grenada Coast Guard;
(g) a representative of the Grenada Ports Authority;
(h) a representative of the Marine and Yachting Association of Grenada;
(i) a representative of the Grenada Scuba Divers Association;
(j) a representative of any non-governmental organization which has a specialized interest in marine or environmental matters,

Nominated by the respective body and appointed by the Minister.

It is interesting that no fishers or fishers' organization is a member of this Management Committee. However, the regulations do say that:

(2) When making decisions about a particular area of water the Management Committee must invite a member of the local community in that area to attend the meeting.

The spirit of these 2001 Regulations are so different from the Grenada *Fisheries Act (1986)* and *Regulations (1987)* enacted a decade before.

Other fisheries-related legislation:

- *Grenada Territorial Waters and Marine Boundaries Act (1990)* - jurisdiction within the EEZ.
- *Fishing Vessel Safety Regulations (1990)* - safety-at-sea.
- *Beach Protection Act (1979)* - sand mining.
- *Land development control Act (1990)* - coastal development.
- *Town and Country Planning Act* - control of use of coastal zone.
- *Power Craft Ordinance (1987)* - controls operations of motorized vessels in nearshore zone.

SUPPORTING INSTITUTIONAL ARRANGEMENTS

While the concept of participation has been embraced by the Grenada Fisheries Act 1986 and Regulations 1987, its implementation lags far behind. The draft FMP does not reflect the approach of the legislation. The vast majority of Grenadian fishers are not members of an association, and there is no mechanism for them to participate in fisheries management. (Cabinet on the advice of the Minister appointed a Fisheries Advisory Committee in 2009) There is no staff member at the Fisheries Division trained in the formation and strengthening of fishers' organizations. Although the Act allows the Minister to create "local fisheries management areas", and to designate any fishermen's association as the Local Management Authority for that area, he has not chosen to do so. Where a Management Committee for MPAs has been appointed, fishers and fishers' organizations have been excluded.

In practice the FD has supported fishermen's groups that are functional, providing assistance so that they do not become defunct.

There is much room for improvement in the provision of institutional support for fishers, fisher organizations, fishing communities and other stakeholders to participate in the management of fishery resources.

All active fishing vessels in Grenada, Carriacou and Petite Martinique are required to be registered using the OECS/CFRAMP Licensing and Registration System. If a fisherman is to be registered, he has to be associated with a specific vessel. The license fee is minimal. A fishing license, which is legally required but is not enforced, is generally limited to those wishing to access government tax and duty concessions. Not all operating fishing vessels are licensed according to law.

2.3 National Programmes to promote the Involvement of Fishers, Fisher Organizations, Fishing Communities and other Stakeholders in the Management of Fishery Resources

The Fisheries Act (1986) and Regulations (1987) specify a requirement for a Fisheries Advisory Committee (FAC) to be appointed by the Minister. Despite the legal requirement and the recognized need for it by the Fisheries Division, there is no FAC in place at present. (Cabinet appointed a Fisheries Advisory Committee in 2009 on the advice of the Minister) A FAC operated successfully for some time during the late 1980s but did not survive because of differences the fisher's representatives had with government policy regarding foreign fishing.

In the early 1990s, the fishers' organizations in Grenada formed a **National Fishermen's Association** which was short-lived and is now defunct.

Communications with the fishing industry are now channelled through the individual cooperatives and fishermen to extension officers, the Chief Fisheries Officer, extension officers and the Ministry. This mechanism is going to put the FD out of touch with the vast majority of fishers, as only a small minority of fishers in Grenada are members of these organizations. (The preceding sentence is one of opinion and not fact. While is need to strengthen fisher's organisations at the local and national level, the vast majority of fishers are consulted regularly on issues of fisheries management and development. The Fisheries Division is currently spearheading a regional initiative to strengthen fisher's organisation at the local and national level) The FAC was appointed by Cabinet in 2009.

There does not appear to have been efforts to involve stakeholders other than direct resource-users. There has been little experimentation with other forms of participation in the management of fishery resources such as community enforcement and participatory monitoring. In many respects, fisheries management in Grenada is still "top-down". Although indirect resource-users are usually consulted on issues of fisheries management and development. With respect to community enforcement and participatory monitoring, the Division is also encouraging these approaches. However, this is largely dependent on the strength of fisher's organizations.

At present each of Grenada's three (3) MPAs has a steering committee made up of representatives of stakeholder groups, which is responsible for its management, namely:

- Fishers' organizations
- The Fisheries Division
- The Port Authority
- The Police
- The Sports Divers
- The board of Tourism

- Various NGOs

These steering committees meet monthly, and the stakeholder representatives take their responsibility seriously.

However, the **Fisheries (Marine Protected Areas) Regulations 2001** which govern the management of these MPAs, does not provide for co-management of MPAs, and these steering committees have no legal status. According to the 2001 Regulations only the Management Committee (one committee for all Grenada's MPAs) has the authority to manage.

The solution would seem to be for the Management Committee to enter into a management agreement with each steering committee. One possibility for a pilot project under this JICA-CRFM project is to prepare these management agreements, and to train the stakeholders to fulfill the obligations they would impose upon them. (The Management Committee appointed by Cabinet in 2008 recognized this shortcoming and has now signed the first co-management agreement between the MC and the Sandy Island/Oyster Bed MPA Management Board to manage this MPA. This is the model that the MC committee intends to adopt for other MPAs. Furthermore, the MC also recognizes the need to review and update the 2001 MPA Regulations).

2.4 Effectiveness of National- and Community-Level Participatory Approaches to Fisheries Management

Since national- and community-level participatory approaches to fisheries management are at a rudimentary stage, they have not yet had the opportunity to be effective. There is scope for deeper initiatives to be undertaken under the Master Plan being developed.

The FD has provided loans for the fishers to retool and to purchase equipment, but by-and-large the fishers are not paying back their loans. The artisanal fishery sector is heavily subsidized, and the FD has become a welfare organization. The future has to be to break down the dependency syndrome, and for the fishers to take control of their role in the fishing industry. However,Grenada fishery is largely artisanal and small scale and therefore requires support in infrastructure, technology, credit etc. However, the institutional arrangements for providing direct assistance to fishers such as credit need to be improved.

2.5 *Socio-Cultural and Attitudinal Issues related to Participatory Approaches to Fisheries Management and Introduction of Alternative Livelihoods*

Baseline workshops were held with government staff and the community. The results are presented in the Chapter 6 of this report.

CHAPTER 3: PELAGIC FISH RESOURCE MANAGEMENT AND DEVELOPMENT COMPONENT

3.1 Policy, Supporting Legislation, and Fishery Development and Management Plans

Fishery Management Plan (FMP)

The Fisheries Act requires the implementation of a Fisheries Management Plan (FMP) for Grenadian fisheries. Accordingly, a FMP was drafted and published in November 1996 under the title **Plan for Managing the Marine Fisheries of Grenada**. The 1996 FMP has several objectives, but in respect of management of pelagic fisheries we can distinguish six main ones:

(1) Develop and increase the potential of marine living resources to meet nutritional needs, as well as social, economic, and development goals, especially to contribute to foreign exchange earnings;
(2) Ensure that the fishing industry is integrated into the policy and decision-making process concerning fisheries and coastal zones management;
(3) Promote the development and use of selective fishing gears and practices that minimize waste in catch of target species and minimize by-catch of non-target species;
(4) Ensure effective monitoring and enforcement with respect to fishing activities (especially foreign fishing);
(5) Promote scientific research with respect to fisheries resources.
(6) Cooperate with other nations in the management of shared or highly migratory stocks of commercial importance to Grenada.

The Fisheries Division is the main agency that is legally responsible to implement fisheries development and management plans in Grenada. In 2008 the Fisheries Division published a "Corporate Plan" where it defined:

- **Its vision**: "*Attain sustainable utilization of the living resources of Grenada for the benefit of current and future generations*";
- **Its mission**: "*Promote effective management and development within the fisheries sectors;*"
- **Its scope of work**:
    - Monitor the range of fish stocks and habitats;
    - Regulate the operations of users;
    - Surveillance of activity of fishing units;
    - Initiate and facilitate the development of sector through the application of appropriate technologies, human resource development and improvement in fisheries infrastructure;
    - Collaborate with regional and international institutions on matters of fisheries management and development;
    - Promote co-management and community-based management of fisheries resources among stakeholders.
    - Provide technical support to enhance efficiency within the sector;

- **Current keys issues that need to be addressed**, such as:
    - Conservation and management of threatened species such as conch, lobsters and the inshore pelagic stocks which are harvested using inappropriate fishing gears and methods.
    - Access to affordable vessel insurance to provide for the replacement of the fleet after damage/losses following accidents at sea and natural disasters.
    - Increasing total fish production from the pelagic fishery by expansion of the pelagic fleet through the use of appropriate technology on the west as well as the east coast; in addition promoting the deployment and use of Fish Aggregating Devices (FADs).
    - Strengthening of fisherfolk organizations to increase benefits to fishers and enable their participation in co-management and community-based management initiatives;
    - Strengthening data management and basic research capacities to facilitate effective management.

Note that the Fisheries Division is currently revising the FMP, but this draft was not provided to us.

Legislation

The "*Grenada Fisheries Act 1986"* is the parent law that addresses the development and management of fisheries, and the regulation of fisheries and fishing related activities in Grenada. This Act is based on the OECS harmonized legislation, and thus provides for:

(1) Creating plan for the development and management of fisheries;
(2) Creating and enforcing fishing regulations;
(3) Licensing fishing activities;
(4) Regulating the processing of fishing products;
(5) Regulating the exportation of fishing products;
(6) Regulating scientific/research operations and institutions;
(7) Preserving marine resources by prohibiting the use of explosive, poison and other noxious substances to capture fishes; and by establishing marine protected areas;
(8) Appointing Fisheries Officers and creating a "Fisheries Advisory Committee;"
(9) Entering into arrangement/agreements with other countries.

This Act gives the Minister responsible for fisheries the authority to create new regulations to "*promote the management and development of fisheries, so as to ensure the optimum utilization of the fisheries resources in the fishery waters for the benefit of Grenada*." Under this framework, several regulations have been created:

- *Supplies (Control) (Prices) (Amendment) Regulations, 1987*: these regulations generally classify fish by species and regulate their prices on the retail and whole sale markets; Note that retailed fish prices had been deregulated since 1993 .
- *Fisheries (Fishing Vessel Safety) Regulations 1990*: these regulations make provisions for controlling fishing vessels and dealing with safety-at-sea issues.
- *Fisheries (Amendment Regulations)1996*;
- *Fisheries (Amendment) Act 1999*;
- *Fish and Fishery Product Regulations 1999*;
- *Fisheries (Amendment) Regulation 2001*;
- *Fisheries (Marine Protected Areas) Regulations 2001*: these regulations make provisions for operating marine reserves, marine sanctuaries, marine parks and marine historical parks in Grenadian waters.
- Another revision of the Fisheries Regulations was planned for 2008, and was supposed to address issues concerning marine protected areas, conservation, safety-at-sea and the operation of fishing vessels (commercial and recreational). This revision has not yet been implemented.

Enforcement of Regulations

Agencies

- The Fisheries Management Unit of the Fisheries Division: typically all fisheries officers employed by the division are considered as "enforcement officers" of fisheries regulations;
- The Marine Police Unit/Coastguard of the "Royal Grenada Police Force." Note that in Grenada the Coastguard belongs to the Marine Police Unit and enforces all fishing regulations at sea.

Level of enforcement

The level of enforcement is very poor in general. Problems are:

- Financial resource limitations: high cost of fuel is one of the most important constraints;
- Limited financial and human resources (motor vehicles, vessels and personnel) to control Illegal Unregulated and Unreported Fishing (IUUF) in Grenadian waters;
- Practically, there are no mechanisms to compel fishermen to get fishing licenses. However, withholding of services such as concessions and rebates are used as incentives.

Level of compliance

The level of compliance depends on the management measures being enforced; for example:

- Voluntary compliance is very good in terms of respecting the closed season imposed in the lobster fishery;
- Voluntary compliance is very poor, in terms of obtaining fishing licenses to exploit marine resources. Hence, illegal fishing is very problematic in Grenada waters.

Needs in training and funding

- Funds to improve collaboration between countries for enforcing fishing regulations and reducing illegal fishing;
- Funds to improve knowledge on IUUF level in Grenada waters.

Management Policy Strategy

Although not systematically implemented, some regulations are currently applied to:

- Small coastal pelagic fishery:
  - Control of mesh size of seines;
- Lobster fishery:
  - Closed season;
  - Minimum-size limits;
  - Restriction on fishing gears;
  - Restriction on taking berried or molting individuals;
  - Ban on landing dead lobsters.
- Conch fishery:
  - Size restrictions: minimum shell length and meat weight; harvesting only flared lip conchs permitted.

Currently there are no regulations controlling the exploitation of large pelagics, such as wahoo, dolphinfish, and king mackerel. However, it is expected that new draft FMP will address issues

concerning the regulations of these species where applicable. Further, the Fisheries Division is promoting the development of a regional FMP for those species.

3.2 Fishery Development Status regarding stated Policy Goals and Development and Management Objectives

Since the 1980's the government has made investments in developing and managing Grenada's pelagic fisheries. Today Grenada has one of the best pelagic fleets operating in the Caribbean, and has had much success in realizing its goals and objectives of developing fishing technology to increase the productivity and efficiency of its fleets, to meet the nutritional needs of its people. For example the increasing use of inboard engines has significantly decreased the cost of fishing operations.The introduction of artisanal longlines and semi-industrial longlines has led to significant increases in fishing productivity. However, whether these new fishing methods have significantly contributed to decrease by-catch of non-target species is not known, because to our knowledge, no studies have been conducted to assess this aspect of the pelagic fisheries. Also, by-catch information was not often reported in the catch data provided by the Fisheries Division.

However, Grenada seriously lags behind in realizing its management goals and objectives, particularly concerning the monitoring of the pelagic fisheries resources, the enforcement of fishing regulations, and the evaluation of pelagic stocks. Indeed, illegal local and foreign fishing activities are wide-spread, and most fishers do not carry a fishing license. Further, management measures recommended by the FMP are not really implemented in practice. Finally, research is not a priority of the government of Grenada; as a result the Fisheries Division does not comply with its regional agreements in terms of conducting stock assessments on some of its exploited fish populations. As Grenada possesses one of the best historical catch and effort data sets, issues concerning stock assessment research should be top priority in any future project concerned with the development of a sustainable coastal pelagic fisheries in CARICOM states.

3.3 Fishery and Market Characteristics

FISHERIES CHARACTERISTICS

Exploited Species

Table 7 summarizes the exploitation and the management status of coastal pelagic fisheries in Grenada. The pelagic fisheries resources of Grenada are predominantly exploited by artisanal/small-scale, open/partly-decked pirogue fishing vessels. fleets. On the southeastern coast of Grenada, Wahoo, Dolphinfish, and king mackerel are exploited by troll lines using artificial baits (squid like); whereas on the western coast there is a surface longline fishery that captures these species mainly as by-catch. These species occur in Grenada waters mainly from November to June, but their abundance peaks in February-March. These fish are species of choice on the market and thus are targeted by both the artisanal and small-scalefleets.

Blackfin tuna and flyingfish are mostly exploited by the artisanal fleet. Blackfin tuna are caught year-round in Grenada and historically the fishery has been oriented toward food production. In contrast, the type of production in the flying-fish fishery has changed over time. The flying-fish fishery started in Grenada as a food fishery, and then became mainly a bait fishery with the development of the longline fishery in the early 1980s and 1990s. Presently, the fishery is again mostly geared toward the production of food. As more countries compete in exploiting this regional fishery resource, Grenada is seeking to expand the capture of flyingfish so that its people can have an adequate share of the stock.

The scads (Jacks and Robins) have been historically fished by the artisanal fleet in Grenada. The fishery is relatively large and produces both food and bait. Scads are generally sold as a cheap fish product on the local market. However, their consumption is more popular than tuna in Grenada, as they provide low-cost but high-quality protein to average-income families.Other small pelagic fishes, such as sardines and herrings, are not targeted by any fleets in Grenada. However , their catches are usually sold cheaply or used as bait.

The spiny lobster fishery is believed to be fully developed in Grenada. The Fisheries Division is taking a precautionary approach in exploiting this species. A monitoring program has been set up at one of the most important lobster fishing grounds. This program generally monitors length, weight, sex ratio, and overall condition of mature and reproductive individuals.

A one year experiment was conducted on the exploitation of the diamond-back squid in Grenada in 2002-2003. Experimental fishing trials were very successful and showed potential to develop a fishery on the western side of the island. However, there are two major limitations in developing this fishery in Grenada:

- High cost of operation: because of the use of special lights and highly specialized jigging materials that are only available in Japan.
- A controversial fishery: because the species is a preferred prey of sperm whales. (I have no idea where this came from).
- A second major limitation is the lack of suitable niche markets to provide an attractive ex-vessel price that would make the fishery viable.

Table 7:
Status of Coastal Pelagic Fisheries in Grenada

	Stock Status		Fishery Status			
Species	**Type of exploitation**	**Over-exploitated**	**Developed**	**Sustainable**	**Monitored**	**Managed**
Wahoo (*Acanthocybium solandri*)	Commercial/Artisanal	Not			Not	Not
Dolphin fish (*Coryphaena hippurus*)	Commercial/Artisanal	Not				Not
Black fin tuna (*Thunnus atlanticus*)	Artisanal	?			Not	
King mackerel (*Scomberomus cavalla*)	Commercial/Artisanal	Not				
Jack Mackerel (*Trachurus spp.*)	N	?				
Flying fish (*Hirundicthys spp.*)	Artisanal/Bait	?	Potentially as food			
Sardines (*Sadinella aurita*)	Discard	Not				
Scaled Herring (*Harengula Jaguana*)	Discard	Not				
Atlantic thread herring (*Opisthonema oglinum*)	Discard	Not				
Jack (*Selar spp.*)	Artisanal/Bait	?			Yes	
Robin (*Decapterus spp.*)	Artisanal/Bait	?				
Diamond back squid (*Thysanoteuthis rhombus*)*	N	Not	Potentially			
Conch (*Eustrombus gigas*)*	N	Not		Endangered		Yes
Caribbean spiny lobster (*Panulirus argus)**	Scuba fishing	?		Uncertain	Not	Yes
Spotted spiny lobster (*Panulirus guttatus*)*	N	?				

Notes

**: These species are pelagic species but information is required on their status (This statement is not accurate)*

?: Sufficient data are available to evaluate the level of exploitation of these species in this fishery

N: Species are not exploited in the fishery or no catch records are available (conch is exploited)

Stock Status

The overall status of coastal pelagic stocks is uncertain because of their regional dynamics. It is generally believed that most stocks are not currently over-exploited (Table 7) and their local exploitation is usually assumed to be sustainable. However, more formal studies need to be conducted to better understand the dynamics of these populations and to assess their level of abundance.

Further, catch of large pelagic species in the Atlantic are commonly monitored by the International Commission for the Conservation of Atlantic Tunas (ICCAT 2008). Also, in 2004 the CRFM conducted an evaluation of the wahoo stock in the eastern Caribbean. This evaluation of the stock assumed wahoo catches to be sustainable in the region (CRFM, 2004).

MARKET CHARACTERISTICS

Since 1982 the government of Grenada has committed high levels of investments toward the development of the fishing industry, via several projects such as:

- the "Artisanal Fisheries Development Projects", a $ 7.1 million project financed by the Caribbean Development Bank, the International Fund for Agriculture Development, the Venezuelan Investment Fund (Finlay 1990 cited by Mohammed and Rennie 2003);

Among the major objectives of this development program were:

- The rehabilitation and expansion of shore-based facilities at fishing centers and markets;
- Provision of a credit facility;
- Provision of gears and equipment;
- The establishment of market infrastructure able to guarantee the sale of fishing products, even in period of high supply (Mohammed and Rennie 2003);

Fish centers are administered by the government and provided as a service to the community. They are usually equipped with cold storage and ice machines, and they are also used as fish markets where self-employed vendors retail fish products for local consumption (FAO 2007).

With the growth of the longline fleet in the 1980s and 1990s, several processing plants were also established (Table 11). These plants are equipped with cold storage and ice making facilities, and predominantly process fresh and iced fish products for export. Investment in fish processing and export has also been facilitated by the improvement of transportation between Grenada and the US. In a Mohammed & Rennie (2003) report, by 1998 ten plants were processing small pelagic fish in Grenada and four export packagers were processing tuna and swordfish.

Thus Grenada has become a major exporter of fish products. In 2005 the country was accredited to "*list one on the Hazard Analysis Critical Control Point (HACCP) register of exporting countries*" (FAO 2007). Major markets include the US, Martinique, and Caribbean countries.

Table 8 summarizes the production value of small and large pelagic fish surveyed in this study. Dolphinfish and blackfin tuna contribute the highest level of revenue to Grenada (This information should be reviewed since Yellowfin tuna is the largest contributor of revenue). However, dolphin and wahoo, and king mackerel, are the two most prized species on the local market, averaging nearly EC$6.00 per pound in 2008. Nevertheless scads are one of the most popular fish on the local market because of their low cost, which approximated EC$2.7-$3 per pound in 2008. The local market for coastal pelagic fish comprises households, restaurants, and hotels. Note that the export of these species is relatively marginal (Table 9), indicating that most of their production is consumed on the local market.

Table 8:
Annual value* (EC$) of some Pelagic Fish produced by Grenada, 1998-2008

	Year										
Species	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Wahoo	392,391	481,326	334,245	688,858	526,692	446,730	626,891	480,787	749,473	724,739	736,044
Dolphin fish	1,011,216	1,070,958	1,473,432	1,871,260	1,559,330	1,187,254	1,700,569	935,177	1,660,097	2,289,654	1,889,211
Black fin tuna	1,563,474	513,696	1,080,864	1,978,515	2,304,600	3,242,028	2,837,447	3,673,384	4,712,732	3,360,693	3,746,128
King mackerel	190,755	88,941	59,097	35,567	46,602	38,251	92,573	69,184	75,172	37,832	56,665
Flying fish	9,937	2,715	47,534	38,556	25,156	25,633	14,152	41,676	18,683	3,172	112,691
Atlantic thread herring				503							
Jack (*bigeye scad)*)	234,110	316,678	540,471	348,244	306,597	278,071	213,973	177,782	86,401	57,855	229,482
Robin (*round scad)*)	444,142	262,086	115,354	168,148	206,307	178,282	120,113	72,985	76,256	136,630	185,215
Conch *	421,528	102,473	3,245	17,203	277,471	326,872	289,231	209,393	27,710	299,000	36,015
Lobster	610,650	1,310,504	848,654	656,033	512,112	526,505	341,840	454,924	288,499	233,818	308,817

Source:* *Compiled from Fisheries Division records.

Nevertheless, Grenada remains a major importer of processed small pelagic fish products (Table 10). Sardines, flying-fish, mackerel and herring are the top four imported of these products, with minimum total imports ranging from EC$1,572,077 to $3,051,111 from 1999 to 2008.

Table 9:
Annual Exports (EC$) of some Pelagic Fish, Grenada 1998-2008

	Year										
Species	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Wahoo											
Dolphin fish	0	1,626	0	566	0	3,602	0	0	31,378	0	0
Black fin tuna	0	0	0	0	0	0	0	0	0	21,203	
King mackerel	0	0	136	0	0	0	0	0	0	0	0
Flying fish	0	0	0	0	0	0	0	0	0	0	0
Jack(*bigeye scad)*)	0	14,349	36,427	9,179	26,002	0	53,520	0	0	0	45,000
Robin (round scad)								23,990			
Conch *	14,005	33,638	11,883	6,812	0	25,856	23,236	0	0	0	0
Lobster	485,548	256,745	27,398	76,554	28,708	118,400	305,683	522,861	86,740	0	20,320

Source: ****Compiled from Fisheries Division records.***

Table 10:
Annual Value (EC$) of Imported Processed Pelagic Fish, Grenada, 1998-2006

		Year								
Processed Fish	Type	1998	1999	2000	2001	2002	2003	2004	2005	2006
Flying fish	Fresh, chilled, frozen fillet, other	37,631	44,319	42,049	81,946	59,863	202,218	86,724	61,731	67,186
Sardine	Fresh,chilled,frozen,	1,170,832	961,577	975,592	1,184,511	1,110,900	1,233,240	1,257,179	1,051,123	1,255,993
Herring	Fresh, chilled, frozen, smoke, other	296,217	359,621	176,418	215,748	219,494	246,004	343,014	337,898	538,602
Mackerel	Preserved in tin	448,466	447,833	380,318	623,851	704,881	816,138	1,113,410	1,015,680	1,189,330

Source: ****Compiled from Fisheries Division records.***

3.4 Current Levels of Catch and Effort by Species

There are about 45 landing sites around the islands making up the state of Grenada (FAO 2007**).** These landing sites serve also as sample points for fisheries and biological data**.**

Table 11:
Primary Landing Sites and their Location in Grenada

Landing site	Type	Location
Alex Swan Limited	Primary/Private	St George
Caribbean seafood Limited	Primary/Private	St George
Duquesne	Primary	St Marks
Grenada Commercial Fisheries Limited	Primary/Private	St George, St Johns
Gouyave	Primary	St Johns
Grenville	Primary	St Andrews
Merville Street Fish Market	Primary	St George
Nordom Seafood	Primary/Private	St Johns, Gouyave
Southern Fishermen Association	Primary/Co-operative	St Johns, Gouyave
Sauteurs	Primary	St Patrick
Victoria	Primary	St Mark

Correction to table 11: Alex Swan Limited is now Spiceisle Fish House Limited: Caribbean Seafoods Limited is no longer in operation; Grenada Commercial Fisheries Limited is now defunct; Southern Fishermen Association is located in St. George and it is an Association.

In the 1980s a data collection regime was implementd under the "Enhanced Program for Billfish Research" supported by ICCAT (Mohammed & Rennie 2003) at fish landing sites located at:

Gouyave, St. John's and the Melville Street Market (St. George's). In the 1990s the data collection system was expanded by CFRAMP to include landings at Hillsborough in Carriacou. Intense effort was made to record the catch at Grenville Market, Melville Street Market, Sauteurs, Duquesne, Petit Martinique, the Artisanal Fisheries Project in Carriacou, and 8 fish processors. Table 11 presents the main landing sites of small and large coastal pelagic fish.

Effort Data

Time series data on effort on pelagic species were provided by the Grenada Fisheries Division for the period of 1998-2002. These data contain information such as fishing location and landing site, gear and vessel type, number of trips and fishing days, landed weight and value by species. The quality of the data varies from year to year; and some of the most important information is not consistently reported. For example the number of trips and fishing days corresponding to catch, are often missing in the dataset. Hence, the data in Table 14 corresponds to minimum number of fishing days that were used to capture a given amount of fish.

Table 12:
Fishing Vessels, Gear Types used in Grenada Pelagic Fisheries in 1999*

Fishing location	Species Type	Vessel type	Gear	Engine	Number
Grenadines	Large pelagic	Double-enders	Troll		2
		Launch			1
		Pirogue		Inboard	2
				Outboard	18
				Unknown	7
		Sloop		Unmechanized	1
		Launch	Longline		8
		Pirogue		Inboard	6
				Outboard	6
				Unmechanized	1
		Double-enders			3
	Small pelagic	Pirogue		Inboard	1
				Outboard	1
Grenada	Large pelagic	Pirogue	Longline	Inboard	16
				Outboard	154
				Unmechanized	5
		Dory		Outboard	1
		Pirogue	Troll	unmechanized	4
				Inboard	7
				Outboard	171
		Launch		Inboard	1
				Outboard	1
		Dory		Outboard	1
				unmechanized	1
		Launch	Semi-industrial longliner	Inboard	7
		Longliner(nf)			18
		Longliner(nm)			3
		Sloop		Inboard	1
	Small pelagic	Seine Boat	Seine	Unmechanized	8
		Pirogue		Unmechanized	9
				Outboard	16
		Dory		Outboard	2
		Seine/gillnet Boat		Unmechanized	1
Total					484

Source: *Information compiled from Mohammed and Rennie (2003).

Another problem with these data is that trips or fishing days with zero catches are not explicitly reported. Further, information such as number of gears used during a trip/fishing day are never

recorded. Finally, the most recent and more important effort data, i.e. for 2003-2008, were not provided or available. Nevertheless, if adequately completed, these data could be filtered to study relative abundance of some of the coastal pelagic species caught within Grenada waters.

Fisheries resources are generally exploited by small-scale fleets in Grenada. However, fishing operations have gradually moved from subsistence activities (characterizing the 1970s) into predominantly commercial operations throughout the 1990s and 2000s (Fisheries Division 2008). Most fishing operations are located around the islands of Grenada, Carriacou and Petite Martinique, and the characteristics of their fishing vessels and gears are summarized in Table 12.

Catch Data

Grenada has a long historical catch data spanning from 1978 to 2008. Since the 1960s Grenada has been recognized to have one of the best collections of landing data in the Caribbean (Videus 1969 cited by Mohammed & Rennie 2003). The current data collection system was established in the late 1980s, under the ICCAT Endangered Program for Billfish (Andrew 1990 cited by Mohammed & Rennie 2003) Under this system, catch information is collected in fish landing centers (Gouyave, St John's, Melville Street, St George) and on foreign fishing vessels licensed by the government of Grenada. In the 1990s CFRAMP expanded the collection of data to include landings at Hillsborough in Carriacou, one of the Grenadine islands. Presently most coastal pelagic landings data are recorded in landing sites presented in Table 11.

Table 13:
Total Annual Catch* recorded in Grenada, 1998-2008

Species	Year										
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Wahoo	130,797	160,442	111,415	156,320	130,588	97,173	132,685	92,893	129,644	140,425	124,601
Dolphin fish	337,072	356,986	368,358	488,900	389,699	286,356	362,022	188,392	295,224	450,477	321,787
Blackfin tuna	521,158	171,232	360,288	489,922	561,352	737,942	609,763	675,306	818,704	642,313	640,008
King mackerel	63,585	29,647	19,699	8,348	10,202	8,144	19,380	13,670	13,741	7,262	9,360
Flyingfish	15,721	13,062	26,888	45,821	50,412	101,700	54,369	62,846	40,812	44,755	32,650
Atlantic thread herring				438							
Jack (bigeye scad)	117,055	158,339	301,958	213,284	147,518	121,618	80,108	87,283	36,893	31,140	76,241
Robin (round scad)	222,071	131,043	83,096	115,209	166,308	119,214	56,723	21,298	41,473	50,040	67,943
Conch *	52,691	12,745	403	4,443	70,049	78,155	64,943	35,980	4,618	55,000	6,003
Lobster *	67,850	159,082	103,028	70,302	52,879	57,199	42,985	50,390	32,532	22,090	23,175

Source: *Compiled from Fisheries Division records.

Table 13 shows landings data for some of the species surveyed in this study. The most important trends in these data can be summarized as followed:

- Blackfin tunas are predominant in the landings of coastal pelagic fishes in Grenada, with annual catches averaging 566,181 lbs and ranging from 171,232 pounds to 818,704 lbs.
- Dolphinfish are the second most captured fish, with annual catches averaging 349,570 lbs and ranging from 188,392 to 488,900 lbs.
- Landings of scads, the third most produced group of fishes, have drastically declined throughout the decade. In particular, landings of the big-eye scads decreased from 301,958 lbs in 2000 to 76,241 lbs in 2008; whereas catches of round scads declined from 222,071 lbs in 1998 to 67,943 lbs in 2008. Whether these declines correspond to natural variability of these small pelagic fishes or to the effect of fishing cannot be appreciated in this baseline survey, because effort data were not provided by the Fisheries Division for the most recent years (2003-2008).
- King mackerel landings have also significantly declined, passing from 63,585 lbs in 1998 to 9,360 lbs in 2008.

- Production of wahoo has remained relative stable over the decade, averageing 127,908 lbs, and ranging from 92,893 to 160,442 lbs.
- In most years, the catch of flying-fish has been generally low averaging 44,458 lbs and ranging from 13,062 to 101,700 lbs over the decade.
- Lobster catches have highly fluctuated throughout the decade, averaging 61,956 lbs and ranging from 22,090 lbs to 159,082 lbs.
- Landings of conch have also highly fluctuated, averaging 35,003 lbs and ranging from 403 lbs to 78,155 lbs.

Note that Mohammed & Rennie (2003) used statistical methods such as interpolation to reconstruct catch and effort data for the period 1942-1999 for various fisheries in Grenada. Based on the reconstructed data, they computed catch per unit area (CPUA, catch per km^2) and catch per unit effort (CPUE, catch per 1000 hp-days) for the inshore and offshore fisheries. Both CPUA and CPUE were aggregated estimates over several species and gears and could be used to understand the trends of fishing productivity in Grenada from 1942 to 1999. However, such estimates cannot inform on the relative abundance of individual species over the period of time considered.

Nevertheless, CPUA in the offshore fishery generally increased from 1942 to 2000, reflecting the development of this fishery, particularly from 1980-2000; whereas in the inshore fisheries CPUA shows two major peaks in 1965 and in 1987, and declined steadily from 1987-2000. These peaks in CPUA coincided mostly with major development periods in the inshore fishery, for example the introduction of vessel mechanization in the 1950s and the implementation of the Artisanal Fisheries Development Project, starting in 1982 (Mohammed & Rennie 2003).

In contrast CPUE has generally declined in both offshore and inshore fisheries from 1942-2000, although major peaks were observed throughout the 1960s in both the inshore and offshore fisheries, and in 1997 in the inshore fisheries (Mohammed & Rennie 2003).

Table 14:
Catch* (lbs) and Effort* (number of days fished) for Five Pelagic Species, Grenada, 1998-2002

Species	Year									
	1998		1999		2000		2001		2002	
	Catch	Days fished	Catch	Days fished	Catch	Days fished	Catch	Days fished	Catch	Days fished
Wahoo	16038.4	652	63490	318	45430	431	81746	1637	67439	1238
Dolphin fish	75577.3	1158	106010.2	598	198378	2076	271960	2843	255904	2985
King mackerel	24114	702	12840.2	309	20170.5	686	2324	125	4513	223
Jack (big-eye scad)	44979	151	20244	35	108782.5	154	75209	15	22123	21
Robin (round scad)	61252	204	71318	133	35946	79	77426	17	51460	92

Source: *Compiled from Fisheries Division Records

Technology Improvement & Extension Programs

A major objective of the Fisheries division is to "*initiate and facilitate development within the fisheries sector through the application of appropriate technologies, human resources development and improvement in the fisheries infrastructure*. Accordingly, the Grenada FD has defined the following priorities regarding technology and infrastructure development and extension programs:

(1) Infrastructure development

- Improve the coastal fisheries infrastructure, *i.e.* fish market and port facilities;
- Repair and maintenance of all fish market centers to improve fish handling and sanitation standards;
- Strengthen and expand collaboration among government institutions and fishing community for maintaining and enhancing quality control standards in compliance with local and international commitment.

(2) *Training of fishers in the following areas:*

- Fishing vessel captaincy;
- Use of VHF/SSB radio to enhance ship-to-shore communication;
- Global positioning system;
- Safety-at-sea and vessel safety device;
- Business and financial management.

(3) *Establishment of a "Fishery Communication Network"*

- Set up a 24-hour ship-to-shore communication network to provide for safety and security of life, property and fishery resources within Grenada waters;
- Training of staff for operating the 24-hour Fisheries Monitoring Station ;

(4) Fisheries Biology and regulations

- Determine the status of the conch and lobster stock and make recommendation for implementing a FMP for their sustainable exploitation;
- Formulation and implementation of a Monitoring, Control and Surveillance Plan collaborating with key stakeholders to deter, prevent and eliminate illegal foreign and local fishing activities;
- Make and implement recommendations concerning the regulation of the beach seine net fishery.

(5) Technical and scientific assistances in the following areas:

- Extension of methodology of fisheries;
- Fisheries data management, using new information technology methods and new computer hardware and software;
- Stock assessment of pelagic fishes;
- Industrial/commercial refrigeration methods;
- Fish inspection, quality control and auditing of fish quality control systems;
- Management and governance of pelagic fisheries;

CHAPTER 4: AQUACULTURE DEVELOPMENT COMPONENT

4.1 Policy, Supporting Legislation, and Development Plans

Policy and Supporting Legislation

There is no **National Fisheries Policy** for Grenada. There is a draft 1996 document **Plan for Managing the Marine Fisheries of Grenada**, which of course, makes no reference to aquaculture. There is no **Aquaculture Policy** for Grenada. The most recent Strategic FMP is 2002.

The Fisheries Division (FD) of the Ministry of Agriculture, Lands, Forestry and Fisheries (MALFF) is the government office responsible for aquaculture policy making, planning and co-ordination of all developmental efforts directed towards the sector.One of the specific objectives of the Fisheries Resource Unit is to develop an aquaculture and freshwater resources assessment programme. The objective here is to promote the development of aquaculture projects/operations.

Apart from legislation related to land tenure, use of inland waters, sanitary regulations, etc., the only specific reference to aquaculture is made in the Fisheries Act No. 15/1986 dealing with leasing of sea areas for mariculture activities (e.g. seamoss culture).

Institutional Support for Aquaculture in Grenada

Only two staff members of the Fisheries Resource Unit has some experience in aquaculture. One received two years training in aquaculture in Cuba, as well as having participated in three short training courses in seamoss culture in St. Lucia, and freshwater prawn culture in Taiwan and Jamaica. (Currently this officer is not attached to the Division)

4.2 Aquaculture Development Status regarding Stated Policy Goals and Development Objectives

One of the specific objectives of the Fisheries Resource Unit is to develop an aquaculture and freshwater resources assessment programme. However, although the above objective has been highlighted from 1992 in the Operational Plans of the Fisheries Division, no funding has been allocated to the program due to the limited funds available to the Fisheries Division.

The aquaculture sector is presently not receiving much attention nor emphasis compared to the capture fishery sector, although the Government is seeking and welcomes external support to establish aquaculture projects aimed at developing and promoting the sector as an option to the capture fishery and use of marginal agricultural land.

4.3 Aquaculture and Market Characteristics

Currently there exists local fish markets with cold storage facilities which support the marine catch. Given the small size of Grenada the same facilities could also be utilized for marketing and processing local aquaculture products. The seasonal nature of the wild catch and frequent staging of cultural events provides market opportunities for aquaculture products.

Detailed market analysis must accompany any future intervention.

4.4 Current Levels of Aquaculture Production by Species

Currently there are only two reports of aquaculture in Grenada, one being a small scale Gracillaria farm, and the other a small back yard tilapia facility.

Inland aquaculture.

In 1982 some *Oreochromis niloticus* were released in selected rivers and ponds in the northeast and western regions of the island, but this only resulted in subsistence activities.

In the late 80s, a pond culture project on the Asian giant freshwater prawn (*Macrobrachium rosenbergii*) was funded by the Organization of American States (OAS) and operated by the Grenada Science and Technology Council. Although encouraging results were obtained from the pilot project and some interest was stimulated among the private sector, there were practically no follow-up activities either from the Government or the private sector.

In 1992 a pilot project (funded by the Republic of China - Taiwan), was established to produce fresh water juvenile prawns (*M. rosenbergii*) to be supplied to farmers. It consisted of a hatchery and grow-out ponds, and five farmers were assisted by Government to construct ponds, while several more showed interest in its farming. Tilapia (*Oreochromis mossambicus*) was also cultured. However, when the technical assistance from Taiwan ceased in 2000/2001, operations at the project were severely affected due to lack of adequate funding, and Government has since commercialized operations at the facility on a lease basis, however, no operation occurred since then and the farm is now out of operation. .

Small populations of tilapia exist in a central crater lake which is reservoir for domestic water and further development would possible result in deteriorating conditions there.

Coastal aquaculture

Attempts in culturing seamoss (*Gracilaria* spp.) were carried out by the Artisanal Fisheries Development Project in the mid-80ss with financial support from the International Fund for Agriculture Development (IFAD). Although encouraging results were obtained, no commercial operations were established due to the selection of **unsuitable culture sites and theft of the culture rafts.**

More recently the algae is being cultured on ropes hung from bamboo rafts in the shallow, coastal areas of St. David, and most of the harvest is used locally to produce a drink. The drink – anecdotally said to be an aphrodisiac – is popular in the wider CARICOM Region and could have export potential.

The early eighties saw a Caribbean king crab (*Mithrax spinosissimus)* culture research project financed by a private investor, in the island of Carriacou. The project was eventually abandoned due to the financial difficulties of the investor.

4.5 Knowledge on Aquaculture Issues by Category

It would appear that there are unknown dynamics at play, as all prior attempts to transfer aquaculture technology in Grenada have failed. Prior to any other intervention a detailed analysis of the reasons for earlier failure must be conducted to avoid reoccurrences of the same failures and duplication of previous efforts. Issues of lack of sustainable technical and financial support, availability of low cost stocking material, high cost of feed, need for intensive culture are some of the issues affecting development of aquaculture.

4.6 Technical Aspects of Small-Scale Aquaculture Operations and Stock Enhancement

The aquaculture technology available in Grenada is limited to the culture of seamoss. Some experience in the culture of the freshwater prawn is also locally available. There is a limited number of persons with the requisite training to realize any meaningful development of Aquaculture. Very recently, two (2) persons from the Fisheries Division received training in China.

In order for the country to develop its limited potential for aquaculture, applied and adaptive research is needed to develop simple technologies suitable for the local environmental and socio-economic conditions.

4.7 Technical and Research Capabilities of Fisheries

Due to the shortage of staff (only one member dedicated to aquaculture), budget constraints and lack of any research/training facilities, the Fisheries Division has been unable to provide the necessary technical assistance to farmers who from time to time express an interest in aquaculture.

One academic institution (St. George's University) exists in Grenada where education and training in marine biology or related subjects such as aquaculture can be obtained. Formal education specific to aquaculture can also be obtained at the St. Augustine campus of the University of West Indies in Trinidad and Tobago.

The only facility in Grenada in which research could be conducted is the public facility provided by the Government of Taiwan, which produced mainly freshwater prawns (and tilapia to a lesser extent). However that facility is now totally vandalized.

If the DOF would like to pursue aquaculture development in Grenada, it would appear as though there is need for aquaculture policy review and development to provide the context for the legislative and institutional arrangements, including research, marketing, etc.

CHAPTER 5: REGIONAL FISHERIES DATABASE DEVELOPMENT COMPONENT

5.1 Policy and Data Management Documents

The Fisheries Division Corporate Plan (2008) does not specifically address explicitly the management of fisheries statistics and information, nor its importance and use in guiding decision-making in fisheries management. However, it cites the urgent need for a Data Manager since 2003 as one of the weaknesses in carrying out the functions of management of the fisheries in Grenada. This was also communicated during the interview process at the Fisheries Division.

The document also lists lack of human resource development through training programmes as one of the main problems with the development and implementation of a comprehensive Fisheries Information System.

There is no Data Management or Data Policy document that is used to guide the procedures, rigor, quality and standard of the Fisheries Information System.

5.2 Data Collection – Current Situation

On review of the "**Report of the First Annual CRFM Scientific Meeting-2004**", it was noted that a review of the situation in Grenada with respect to data on small coastal pelagics was conducted. The following were some of the findings from this report:

"1.3 MANAGEMENT ADVICE

i) Available data could not be used to conduct quantitative assessments of the three scad species, and hence it was not possible to develop specific fishery management recommendations for the associated fisheries at this time.

ii) Consequently and consistent with international law, a precautionary management approach is advised. This could entail a limitation of fishing effort to present levels or, if not practical at least controlled and cautious expansion of fishing effort, until the status of the resources could be evaluated with confidence.

iii) Additionally, the Fisheries Divisions should maintain accurate records of fishing licences issued for this fishery, as well as seek to improve statistical monitoring of the fishery as outlined in the subsequent sections of this report."

"1.4 STATISTICS AND RESEARCH RECOMMENDATIONS

1.4.1 Data quality

i) In the short-term, sampling methods should be reviewed to determine the extent of the problem of double-reporting of landings in … Grenada, and the possibility of eliminating this problem altogether.

ii) The overall sampling strategy for these fisheries needs to be improved to obtain more representative statistical coverage of fishing activities.

iii) The collection of effort data, as well as social, economic, and environmental data will improve future attempts to evaluate these fisheries.

iv) Data raising methods should be reviewed to determine their current level of accuracy, and improved to reflect more closely the full extent of fishing activities."

"1.6 SPECIAL COMMENTS

i) In view of the complex distribution, both in space and in time, of small coastal pelagic fishing operations…, as well as the often remote and not easily accessible landing sites, current statistical sampling coverage of the fisheries is very low and believed not to be representative of the full range of fishing activities."

The visit and interviews with the Fisheries Division in Grenada Sep 30-Oct 1, 2009 did not show any significant improvement in the data collection programme over what was reported five years ago. It was also conveyed and reiterated that the lack of a dedicated Data Manager is perhaps the primary reason for the current situation The CFO is responsible for coordination, planning and management of the Fisheries Division and therefore he does not have direct responsibility for data management.

In addition, there seems to be a sense of non-dependency on accurate and consistent data to guide management decisions for fisheries. Therefore, this may have led to less attention being paid to the data management programme to the point where the information that emanates from it is lacking in substance and application.

The mechanism used to collect data and convey the information to the Data Input Clerk in the Fisheries Division should be reviewed. Currently, there is a system where landing information for the primary sites are collected, summarized, and then sent to the Data Input Clerk at the end of each month. However, it is unclear as to the validity of the data entered into the system, as there is no system to validate this data in a structured manner. Census data is aimed for at these sites.

There is also some element of double-counting as vendors purchase fish from other landing sites and take it to the market for sale. It has also been reported that species mis-identification and grouping of species is also a significant concern that affects confidence in the data collected. There is no data collected from the secondary sites. Export data form the core of the tertiary site data.

The system contains data on large pelagics, small coastal pelagics, lobster, queen conch, sea turtle, sea urchins, diamondback squid, reef fisheries and deep slope fisheries. However, the data is not collected in a coordinated and dedicated manner, and thus, lacks parameters to conduct useful assessments and contains many gaps in time. Biological data as well as social, economic and recreational data are for the most part absent or significantly lacking.

The issue of lack of adequate staffing of the Data Management Unit has been stated as one of the main reasons affecting improvement in data collection and analysis. However, the current data system continues to provide reasonable time series data on the fishery.

The catch and effort data available is summarized below:

Data Type	Date Range
Catch and Effort	Electronic Copy: 1998-2002; hard copies: 1998-present
Summary sheets (catch and effort)	Electronic Copy: 1998-present; Hard Copy: 1978-present

5.3 Data Management – Current Situation

Data are entered by the Data Input Clerk on a monthly basis. CPUE data are entered into Microsoft Excel®. Socio-economic and recreational fisheries data are not collected.

The Statistical Unit, Fisheries Division, Ministry of Agriculture, Forestry and Fisheries is solely responsible for the management of the fisheries data.

All data is entered and stored on one (1) desktop computer and periodically backed-up on one (1) external hard drive. All hard copies and electronic copies are kept in the same area.

CARIFIS was introduced in Grenada in 2001, but was never implemented in its entirety. The limited use was then phased out over the years to leave sole dependency on Microsoft Excel®. The data officer cited problems with the software as the main limiting factor for the full implementation of CARIFIS. (The lack of adequately trained persons is affecting the full implementation of CARIFIS.

Each year, since 2004, the CRFM has held a Scientific Meeting where all participating countries take data collected and have analyses such as stock assessments done. This collaboration is important and has shown real progress over the years. It is also a useful way to share resources in a coordinated manner to allow member states with limited in-country capacity to analyse data. Grenada has participated in these meetings; however, the lack of quality and consistent data has resulted in the lack of proper treatments being applied to the data at these meetings.

Apart from Summary Statistics, no other treatments are conducted on the data in-house.

5.4 Information Dissemination

It is a requirement of the Ministry that the Fisheries Division annually produce the "Fisheries Digest". However, this is not done. It was not clear from the interviews the reason for this. The Digest is to be produced by the Statistical Unit. However, the current staff does not possess the requisite capacity to implement this activity.

As Grenada does not contribute adequate high quality data to the CRFM Annual Scientific Meetings, the annual reports of these meetings does not include any significant fisheries information for Grenada such as stock assessments.

It was also reported that there should be consultations with the Fishermen Cooperatives in order to report findings from the data, and to lead to a dynamic and participatory approach to the management of the fisheries.

5.5 Past Projects in Fisheries Data Management

The major project in Fisheries Information Systems was the introduction to CARIFIS in 2001. However, it is reasonable to say that this project was not successful as there is currently no use of CARFIS.

Possible areas of improvement which can be the subject of pilot projects for the Fisheries Information System were communicated by the interviewees:

1. **Project to facilitate data management, data security and decentralization**. This will allow faster processing of data, and also constitute a form of backup to prevent inadvertent loss of data at data units.
2. **Analyze and develop data to guide management decisions and incorporate biological data into the current database**. This will enable the data to be prepared in a manner that allows persons to utilize the data and make management decisions.
3. **Project to conduct surveys in secondary landing sites to elucidate take from fisheries**. We have no way of statistically determining the landed take from secondary landing sites and how much it adds to the landings from the primary sites."

For the most part, these suggested project areas would lead to significant improvement in the management of fisheries data in Grenada. However, the policy direction should first be defined and embraced by top management with respect to the value that fisheries statistics have to the management of fisheries in Grenada. This statement is one of opinion. There is no information to suggest that Fisheries Management in Grenada does not value the contribution of quality data and information to management, planning and decision making. There is need to enhance the current data collection and management system however, this could only be accomplished if the requisite human, material and financial resources are provided and available on a sustainable basis.

5.6 *Gaps in the Capacity for Management of Fisheries Information Systems*

1. Human Resources

The number of staff members in the Grenada Fisheries Department is significantly smaller than what is required to effectively collect and manage the national fisheries data. The geography of Grenada also adds another dimension to the difficulty in collecting data efficiently. The table below summaries the current situation, and recommends the optimal staff complement.

Position	Current Staff Complement	Recommended Staff Complement	Gap	Training Required**
Data Manager-Administrator	0	1	1	Yes
Data Collectors*	18	18	0	Yes
Data Input Clerks	1	2	1	Yes
Fisheries Statistician	0	1	1	Yes
Total	**19**	**21**	**2**	

** some of these data collectors can be based at selected field locations based on logistics and level of fishing at the sites to ensure efficiency.*
***Training is required also in CARIFIS and it is necessary for this training to be conducted in-house with real data after gaps in the computer infrastructure are dealt with (as outlined below).*

The 18 data collectors cited on the current staff do not have sole responsibility for data collection. The also perform other functions such as clerical, revenue collection etc. Greater attention should be given to data collection at secondary landing sites where additional data collectors are needed.

2. Equipment

There is a lack of equipment to effectively input, store and manage the fisheries data. Though some equipment is available for use, these are not dedicated to the Fisheries Information System, and this will have implications for safety of data as well as access to the data. The system requires at a minimum:

- One (1) dedicated Server for the Unit
- Two (2) Desktop Workstations for data input
- One (1) Desktop Workstation for validation of data, summary statistics, and data assimilation
- One (1) field-hardy laptop
- One (1) UPS dedicated for the FIS
- One (1) external hard drive (desktop)
- One (1) external hard drive (portable) that can be kept off-site

This section should be reviewed in association with the report by Paul Medley.

6. RESULT OF THE BASELINE WORKSHOP

6.1. Output from Workshop in the Fisheries Department

Overview of the Workshop

A participatory workshop was conducted in the Fisheries Division on 28th and 29th October 2009. As shown in Table 15, 18 officers of the Fisheries Department participated to discuss the issues and potential of sustainable fisheries development in Grenada.

Table 15: Overview of the workshop

Date	Place	Content	Participants
28 October 2009	Fisheries Department	- External Factor Analysis - Internal Factor Analysis	- Fisheries Officers: 18 persons - CRFM: 1 person - Study Team: 2 persons
29 October 2009	Fisheries Department	- Strategic Orientation - Problem Analysis	

Problem Analysis

Problem analysis via the PCM method was applied to identify the major issues of sustainable fisheries development in terms of the fishing operation of local fishers. The problem analysis concluded the following major issues for fisheries development in Grenada:

Lack of safety of fishing activities,
The amount of fish catch has no effect on the fishers' incomes,
Poor management of money and accounting,
Overfishing of some fish species,
Difficulty of reorganizing defunct fishermen's cooperatives,
Fishermen are not properly educated,
Poor quality of fish landed by fishers,
Lack of fisheries facilities for fishers, and
Pollution of coastal areas

ID/OS Analysis

The ID/OS method was applied to the workshop in the Fisheries Division. It analyzed external and internal factors (e.g., problems, conditions, potential) of the Fisheries Department, and determined proper strategic options in terms of sustainable fisheries development in Grenada. According to the basic question of sustainable fisheries management and development, analyses of external and internal factor concluded as follows.

Target Organization: Fisheries Department, Grenada
Basic Question: How can the Fisheries Department improve the sustainable management and development of the fisheries sector?

External Factors to Fisheries Department	
Opportunities	Threats
8 fisheries markets in primary landing sites More training opportunities for fishers Promotion of MPAs (Marine Protect Areas) Fisheries legislation in place Avoid fishing during spawning periods	Theft of fishermen's property Infrastructure development in mangrove areas Illegal fishing activities for local fishers No market for fish in high season Illegal fishing activities for foreign fishers
Internal Factors of Fisheries Department	
Strengths	Weaknesses
Training opportunities for workers Staff meetings and management team meetings New fishing methods for fishers Convenient meeting venues (office location) Salaries paid on time	Insufficient staff Low wages of staff More benefits (allowances, fringe) for market staff Not enough institutional programs for professional development of staff No computers at various fish markets

Note: The numbers indicate the rank of factors in each category based on the voting of the participants.

The strategic orientation discusses the practical impacts of the important strengths and weaknesses of the target organization to enhance opportunities and overcome threats, and evaluates the feasibility of selected strategic options in accordance with the basic question. The result of the strategic orientation in the workshop suggested that the Fisheries Department might take account of enhancing the opportunity "More training opportunities for local fishers", and overcoming the threat "Infrastructure development in mangrove areas" as effective strategic options for sustainable fisheries development.

6.2. Output from Workshop with Local Fishers

Overview of the Workshop

As shown in Table 16, mini-workshops with local fishers were conducted at four landing sites, St. George, Gouyave (west coast), Grenville (east coast), and Carriacou (Grenadines) from the 30th of October to the 4th of November 2009 .From 9 to 18 fishers attended the workshop to discuss their current fishing activities, and identify the major issues of their fishing operation.

Table 16: Overview of the workshop

Date	Place	Contents	Participants
30 October 2009 9:30 - 12:00	Gouyave (West coast)	Fishing Ground (Mapping) Fishing Activities Income and Expenditure of Fishing Operation Fishing Period (Seasonal Calendar) Problems / Issues of Fishing Activity and Operation	- Local Fishers: 18 persons - Fish Exporter: 3 persons - Fisheries Department: 3 persons - CRFM: 1 person - Study Team: 2 persons
2 November 2009 9:30 - 12:30	St. Georges (West coast)		- Local Fishers: 9 persons - Fish Exporter: 2 persons - Fisheries Department: 3 persons - Study Team: 2 persons
3 November 2009 9:30 - 12:30	Grenville (East coast)		- Local Fishers: 12 persons - Fisheries Department: 1 person - Study Team: 2 persons
4 November 2009 9:30 - 12:00	Carriacou (Grenadines)		- Local Fishers: 16 persons - Fisheries Department: 1 person - Study Team: 2 persons

Summary of Community

The basic features of four fish landing sites were identified in the workshops as shown in Table 17.

Table 17: Basic features of four fish landing sites

Site	Areas	Number of Fishers	Number of Fishing Boats	Fisheries Facilities
Gouyave	St. Johns St. Mark	Long-Line: The location map and general profile of Barbados were shown in Appendix 1. 400 - 500 Beach Seine: 180 Fish Pot: 6	Long-Line: 160 Beach Seine: 20 Fish Pot: 3	2 Fish Markets (Gouyave, Victoria) 1 Fish Exporter (Gouyave)
St. Georges	St. Georges	Long-Line: - Large Boat: 120 - Medium Boat: 21 - Small Boat: 63 Beach Seine: 66	Long-Line: - Large Boat: 30 - Medium Boat: 7 - Small Boat: 20 - 30 Beach Seine: 11	1 Fish Market in St. Georges 2 Fish Exporters (Grand Mal Bay)
Grenville	St. Andrew St. Patrick St. David	Long-Line (Small Boat): 250 Beach Seine: 60	Long-Line (Small Boat): 125 Beach Seine: 10	2 Fish Markets (Grenville, Sauteurs)
Carriacou	Grenadines	Large Boat (Long-Line): 120 Small Boat (Trolling, Diving): 120 - 240 Beach Seine: 24 – 36	Large Boat (Long-Line): 30 Small Boat (Trolling, Diving): 60 Beach Seine: 3	No special facilities for fisheries

Present Status of Local Fishery

Long-line fishing is the most popular fishing method in Grenada. In the western areas, such as Gouyave and St. Georges, large fishing boats with inboard engines are mainly used for long-line fishing to catch tuna for about three days in offshore and high sea areas. In the western areas in particular, three local fish processing factories export fresh tuna to the USA and Canada by air. Therefore, most fishing boats of the western areas target large tuna, because the demand for fresh tuna is higher than elsewhere in the island.

In eastern areas, such as Grenville, most fishing boats are smaller than those of the western areas. These smaller boats operate trolling, hand-line, or diving fishing on day trips to coastal and offshore areas. Most fishers target offshore pelagic fish, such as dolphin fish and kingfish, and demersal fish, such as snappers. However, tuna fishing is not popular in the eastern areas, because there are no large adult tuna on the Atlantic Ocean side.

In the Grenadines' areas, large long-line fishing boats operate in the high seas to catch tuna on trips lasting seven to ten days, and unload the captured tuna to the fish processing factories at Grand Mal Bay. Small fishing boats operate trolling, hand-line or diving fishing on day trips to catch offshore pelagic or demersal fish. Demersal fish are sometimes exported from Carriacou to St. Vincent, St. Lucia and Martinique via transport boats of exporters.

The high season for offshore pelagic fish, including tuna, skip jack, dolphin fish and kingfish, is from February or March to May or June. Coastal pelagic fish, including robin and jack, are mainly caught in beach seine nets in coastal areas of the island all year round. Diving fishing with scuba is also popular around the island; mainly to catch lobster and conch shellfish.

Needs of Local Fishers

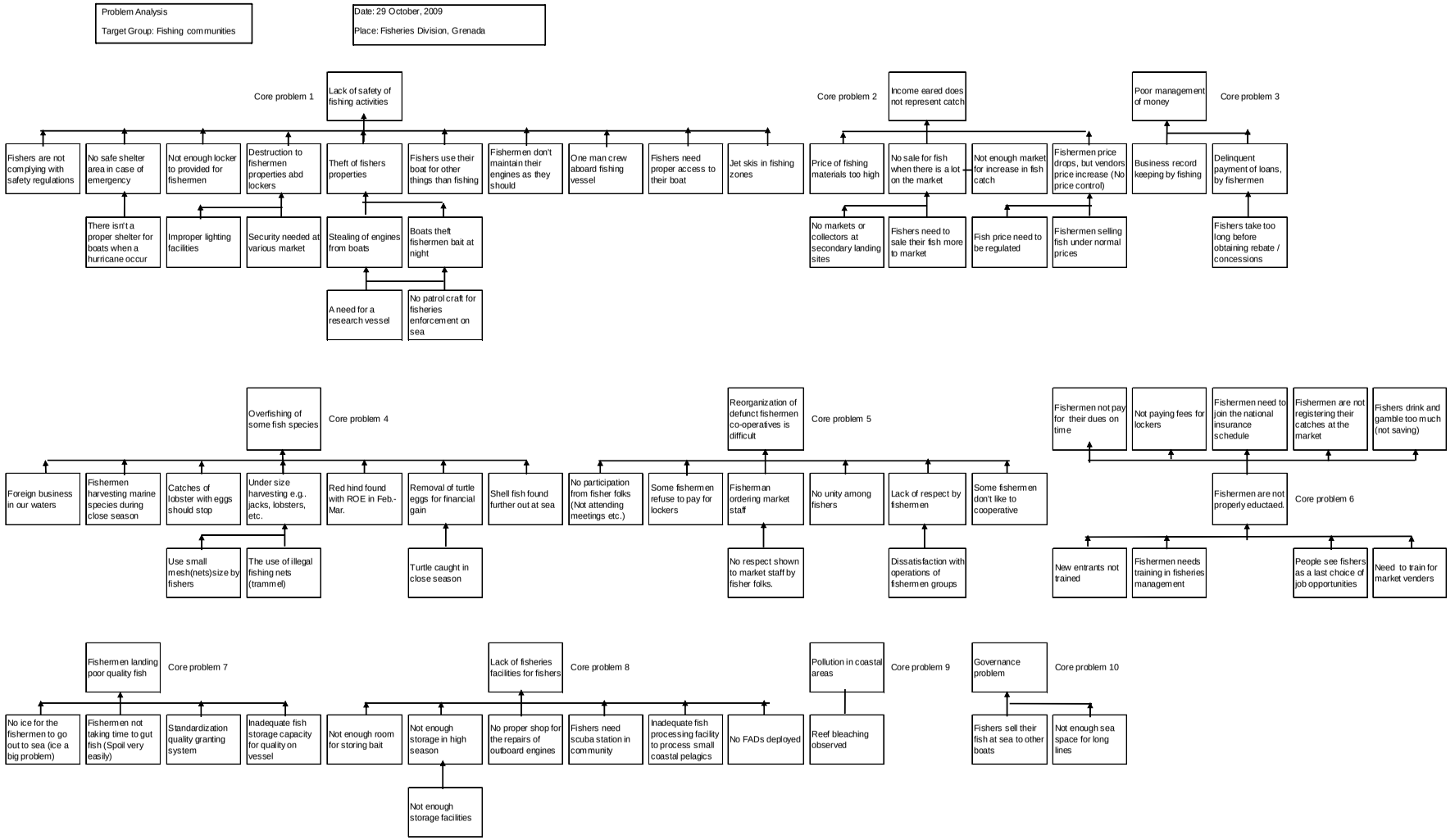
The following major issues of local fishing activities were identified in the workshops with local fishers:

Fish Sale and Market:
The local market for fish sales is too small.
It is difficult to sell fish caught by beach seines.
Fishing Facilities:
The jetty is not good for berthing fishing boats.
There is insufficient capacity for fish cold storage.
Unity and Cooperation among Local Fishers:
Fishers don't respect fellow fishers.
There is little cooperation among fishers.
Fish Market Management:
The fish market is not opened during night landings.
Proper sanitation practices, etc. must be observed.
Cost of Fishing Equipment:
The cost of fishing gear is very high.
There is no duty free concession for ordered parts of engines.

6.3. Key issues identified for the coastal resources management in the workshop

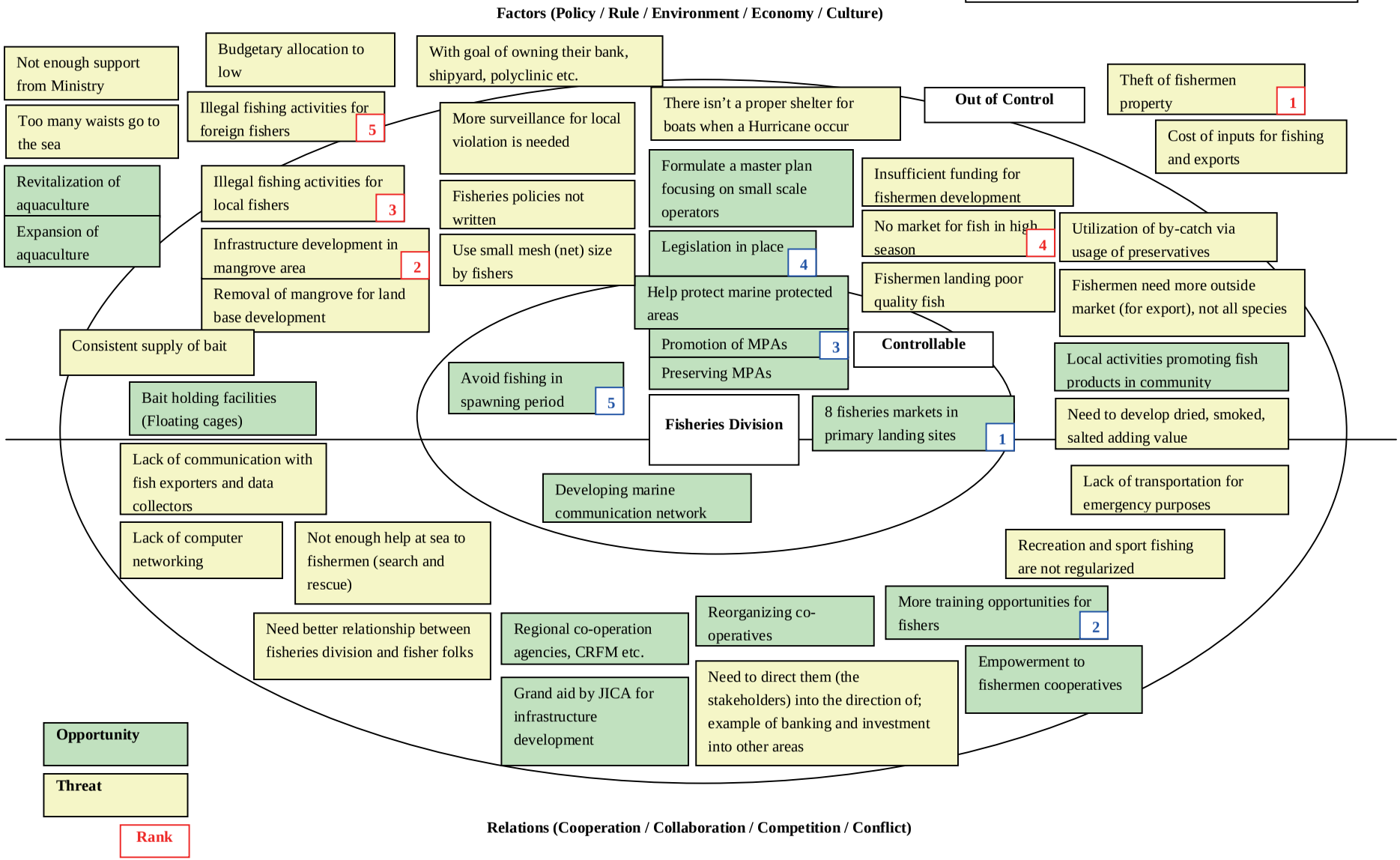
According to the results of the workshops in the Fisheries Department and with local fishers, four items were identified as key fishery-related issues namely, "Pelagic fisheries management and development by FAD deployment in coastal areas"; "Introduction of float cages to preserve live bait for long-line fishing to develop market system"; "Improvement of post-harvest condition to control fish quality"; and "Improvement in Fisheries Statistic Data Management".

RESULT OF THE PCM WORKSHOP

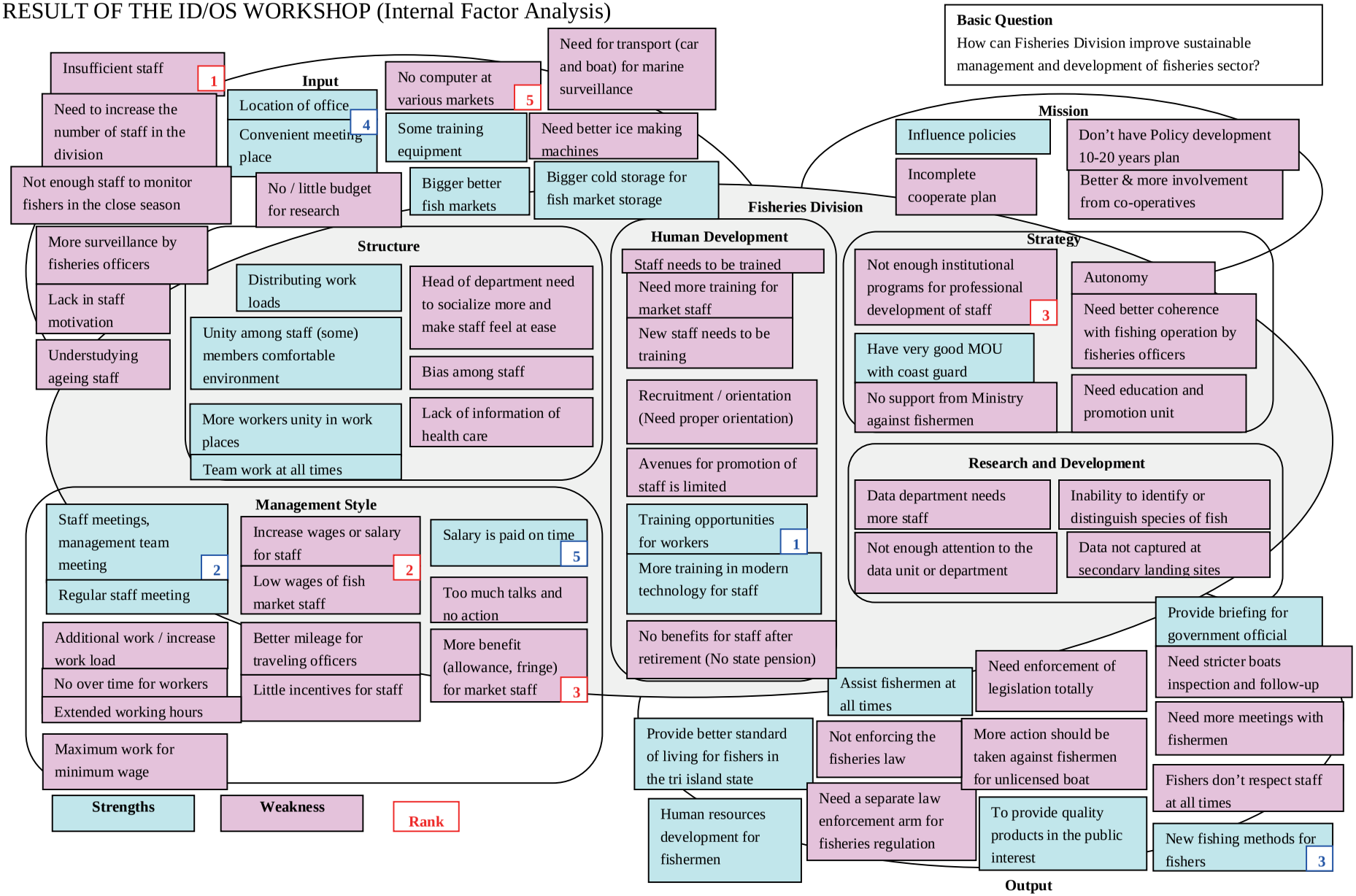


RESULT OF THE ID/OS WORKSHOP (External Factor Analysis)

Basic Question
How can Fisheries Division improve sustainable management and development of fisheries sector?



RESULT OF THE ID/OS WORKSHOP (Internal Factor Analysis)



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FINAL COUNTRY REPORT: GUYANA

October 2009

Guyana

Country Profile

Geographic coordinates	5° 00' N, 59° 00' W
Total area	214,969 sq km
Land area	196,849 sq km
Water area	18,120 sq km
Length of Coastline	1,154 km
Shelf Area	48,762 sq km
Territorial Sea	10,939 sq km
Claimed EEZ	122,017 sq km
Highest point (m)	2,835 m (Mount Roraima)
Climate	tropical; hot, humid, moderated by northeast trade winds; two rainy seasons (May to August, November to January)
Natural hazards	flash floods are a constant threat during rainy season; outside the hurricane zone.
Population	772,298 (2009 est.)
Annual Population Growth Rate	0.181% (2009 est.)
Life Expectancy at birth	total population: 66.68 years
Languages	English, Amerindian dialects, Creole, Caribbean Hindustani (a dialect of Hindi), Urdu
Ethnic Mix	East Indian 43.5%, black (African) 30.2%, mixed 16.7%, Amerindian 9.1%, other 0.5% (2002 census)
Work force	333,900 (2007 est.)
Unemployment	11% (2007)
GDP (PPP)	US$2.966 billion (2008 est.)
GDP Growth rate	3% (2008 est.)
GDP per Capita (PPP)	US$3,800 (2008 est.)
Currency Unit	Guyanese dollars (GYD); US$1 = GY$203.86 (2008 est.)
Area of Mangrove Forests	1,592 sq km
Percent of Mangrove Forests Protected	0%
Per Capita Food Supply from Fish/Fishery Products (2000)	57 kg/person
Exports	$800 million (2008 est.); sugar, gold, bauxite, alumina, rice, shrimp, molasses, rum, timber

Sources: CIA World Factbook – Guyana (2009); EarthTrends Country Profiles – Guyana.

Abbreviations and Acronyms

CARICOM	Caribbean Community
CARIFIS	Caribbean Fisheries Information System
CARNUFO	Caribbean Regional Network of National Fisherfolk Organizations
CFO	Chief Fisheries Officer
CFRAMP	CARICOM Fisheries Resource Assessment and Management Programme
CIDA	Canadian International Development Agency
CPUE	Catch per unit effort
CRFM	CARICOM Regional Fisheries Mechanism
DOF	Department of Fisheries
EU	European Union
FAO	Food & Agriculture Organization of the United Nations
FAC	Fisheries Advisory Committee
FD	Fisheries Department
FIS	Fisheries Information System
FMP	Fisheries Management Plan
GATOSP	Guyana Association of Trawler Owners and Seafood Processors
GEF	Global Environmental Facility
GGFCSL	Greater Georgetown Fishermen's Cooperative Society Limited
GOG	Government of Guyana
IHHN	Hypodermal Hematopoietic Necrosis
JICA	Japan International Co-operation Agency
MCS	Monitoring, control and surveillance
MPA	Marine Protected Area
mt	Metric Ton
NAAG	National Aquaculture Association of Guyana
TIP	Trip Interview Program
TSV	Taura Syndrome Virus
UG	University of Guyana
UNDP	United Nations Development Program

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CHAPTER 1: INTRODUCTION

Guyana is situated on the northeast coast of South America, along the Atlantic Ocean; it shares a 600-kilometer (373-mile) border with Suriname to the east, a 743-kilometer (462-mile) border with Venezuela to the northwest, and a 1,119-kilometer (695-mile) border with Brazil to the south and southwest. It is the third-smallest country in South America (after Suriname and Uruguay), and the only English-speaking country on that continent. It is a member of the Caribbean Community (CARICOM) and the British Commonwealth of Nations.

The coastal regions of Guyana are low-lying, and would flood at high tide if an extensive coastal defences were not in place. The Ministry of Public Works is responsible for the maintenance of a concrete wall built along the foreshore with the Atlantic Ocean, mostly in Demerara. Guyana's marine environment lies within the area bounded by the Orinoco and Amazon rivers, and during the rainy season is greatly influenced by the heavy sediment load and great discharge of fresh water from these huge rivers, and its own large rivers of Essequibo, Demerara and Berbice. The fresh water affects the salinity, while the sediments (and nutrients) create a series of shifting sand bars and mud flats that cover the shelf out to about the 40-m contour. Sand gradually becomes dominant beyond this depth and is replaced by coral at about 100 m depth. The mud supports a rich invertebrate fauna that nourishes a variety of demersal species.

Description of the Fisheries

Guyana's marine fishing activities are directed at exploiting its shrimp resources using shrimp trawlers and Chinese seine vessels, and demersal finfish resources using wooden vessels and a

variety of gear by artisanal fishermen. There is limited exploitation of pelagic resources over the continental shelf and towards the continental slope.

The Guyana fisheries sector[1] is made up of three primary components, with further subdivisions as follows:

1. **The Marine Fishery**
   - The Offshore Industrial Trawl Fishery
   - The Inshore Artisanal Fishery
2. **The Inland Fishery**
   - The Subsistence Fishery (for food)
   - The Ornamental Fish Fishery
3. **Aquaculture**
   - Brackish-water Culture
   - Fresh-water Culture

The **Offshore Industrial Fishery** consists of 146 trawlers, seven (7) fish/shrimp processing plants and numerous wharves and dry docking facilities. Forty-one (41) trawlers are licensed to catch large penaeid shrimp and the remaining 105 are licensed to catch seabob (*Xiphopenaeus kroyeri*), a small short-lived shrimp. The iced and freezing facilities servicing this fishery are owned and operated by participants within and outside of the fishery sub-sector. These trawlers measure about 21 m in length and use double rigger shrimp trawl nets and operate in waters 14-91 m in depth over the seabed of mud, gravel or sand.

The **Inshore Artisanal Fishery** consists of about 1,129 vessels ranging in size from 6-18 m long propelled by sails, outboard or inboard engines, and using gear that include Chinese seines (fyke nets), pin seines (beach seines), cadell lines and handlines, drift seines and circle seines (modified gill nets). The larger vessels have ice-boxes and go on fishing trips that last as long as eighteen (18) days, while smaller vessels may or may not have ice boxes and their operations are either tidal or diurnal. Except for the large handliners and drift seiners, which may or may not be decked, most artisanal vessels are of the flat-bottomed dory type with little draft that affords great maneuverability over shallow muddy and sandy bottoms.

There are about 4,600 small-scale fishermen. Of these about 1,000 are boat owners, with sixty to seventy percent (60-70%) of the boat owners being members of one of eight (8) Fishermen's Cooperatives which acquire and sell fishing requisites to their members (only four are now active). With assistance from CIDA and the EU, onshore infrastructure (wharves, ramps, workshops, fuel depots, requisite shops, ice machines and ice storage bins, and fish storage bins) were constructed at eight sites (8) along the coast for this Fishery.

The **Inland Subsistence Fishery** involves the catching of fish in rivers, lakes, canals, flood plains, etc. by subsistence or part time fishermen for their own consumption or for sale. The activity tends to be influenced by the season and in some areas by the down periods in agricultural and other activities. For example, in the sugar estate areas the intensity of subsistence fishing activity varies with the cycle of the sowing and harvesting of sugar cane. Small flat bottomed long type vessels and cast nets, seine or handlines are used in the exploitation of inland freshwater fish.

[1] *The following is adapted from the **Draft Fisheries Management Plan, Guyana 2007-2011**.*

There is a small but active **inland fishery for ornamental fish**. Live fish are caught in the upper reaches of the rivers by collectors and brought and sold on the coast to six (6) exporters of ornamental fish. The fish are exported mainly to the U.S.A.

Brackish water culture involves the legal or illegal opening of the sea defences, and taking advantage of inflows at high tide during which juveniles, larvae, eggs, etc. are trapped in the coastal wetlands and in some cases, specially constructed impoundments near the foreshore, where they are allowed to mature to marketable size. Some of the targeted species are swamp shrimp (*Mesopenaeus tropicales*), snook (*Centropomus undecimales*), cuffum (*Megalops atlanticus*) and mullet (*Mugil spp*.). These brackish water farms operate as extensive polyculture systems.

Brackish water culture occurs mainly in the brackish water swamps along the Atlantic Coast in Corentyne and Berbice. Towards the end of 1980, there were sixty-four farms, which included two registered fish culture cooperatives, utilizing approximately 670 ha of coastal lowlands. The average size of a farm was 11 ha. In 1987, it was estimated that 91 mt of fish and shrimp were harvested from 400 ha of these swamps.

Freshwater aquaculture was first started in the late 1940's, with the introduction of Mozambique Tilapia. It was thought that fish culture could be undertaken in association with

agricultural practices, such as fish in irrigated rice fields, or flooded sugar cane fields. Also, the hundreds of miles of irrigation canals offered a ready possibility for undertaking freshwater aquaculture. However, none of these ideas were carried out at the time, primarily because Government placed emphasis on the development of the potential of the marine capture fisheries.

Landing Sites

Because much of Guyana's coastline is below the high-water mark, there is a long sea-wall fronting the Atlantic Ocean, and a set-back of several dozen yards inland for all buildings. There are no beaches or beach-front structures on the ocean, although there are several on the riverbanks.

There are over 100 artisanal fish landing sites in Guyana; by region the major ones are:

- Region 2: 15; Potaro-Siparuni
- Region 3: 12; Essequibo Islands-West Demerara
- Region 4: 12; Demerara-Mahaica
- Region 5: 4; Mahaica-Berbice
- Region 6: 6. East Berbice-Corentyne

There are seven (7) industrial fish-processing facilities, all in Georgetown.

TABLE 1:
Landing Sites By Region For 2002

Region # 2	**Region # 3**	**Region # 4**	**Region # 5**	**Region # 6**
Richmond	Zeeburg	Houston	Rosignol	# 43
Danielstown	Windsor Forest	Betterhope	De Edward	# 66
Dartmouth	Parika	Lancaster	C. Mahaicony	Albion
Cullen	Leonara	Annandale		Sheet Anchor
Better Success	Philadelphia	Hope		New Amsterdam
Sparta	Ruby Koker	Mon Repos		Crabwood Creek
Lima	Vreed-en-Hoop	Mahaica		
Zorg	Meeten-Meer-Zorg	Stabroek		
Cotton Field	Vergenogen	GreenField		
Bush Lot		Ogle		
Little Alliance		Liliendaal		
Golden Fleece		GFL		
		GQS		
		GSTCL		
		BME		
		Floss		
		W&R		
		PSI		

Source: Fisheries Department Annual Report 2002

Stakeholder Organizations

Stakeholder organizations in the fisheries sector include the Guyana Association of Trawler Owners and Seafood Processors (GATOSP) and (at one time) thirteen (13) fishermen's cooperative societies. The sector does not have a unified organization. GATOSP does not

include ten small seafood processing plants, nor the smaller cottage industry processors and the storage facilities. The claim is that 80% of boat owners are in the artisanal co-operative societies, but only four (4) co-ops are active, and those that are active report a small membership. Table 2 below lists the active fishing co-operatives in Guyana and their current membership:

TABLE 2:
FUNCTIONING FISHERS' ORGANIZATIONS, LOCATIONS AND MEMBERS

	Name of Organization	Location	Approx. Members
1	Upper Corentyne Fishermen's Cooperative Society	Berbice	78
2	Rosignol Fishermen's Cooperative Society	Rosignol	35
3	Greater Georgetown Fishermen's Coop Society	Georgetown	83
4	Essequibo Islands/West Demerara Fishermen's Coop. Federation	Parika	22
	TOTAL MEMBERS		**218**

Of the 4,600 small-scale fishers, less than 250 are members of an active association. The following fishers' associations are no longer functioning:

TABLE 3:
NON-FUNCTIONING FISHERS' ORGANIZATIONS, LOCATIONS

	Name of Organization	Location
1	Essequibo/Pomeroon Fishermen's Coop. Society	
2	Charity Fishermen's Cooperative Society	
3	Morawhanna Fishermen's Cooperative Society	Morawhanna
4	Albion Fisherman Cooperative Society	
5	Lima\Sparta Fisherman Friendly Society	Lima
6	Fishermen's Cooperative Society of Essequibo	
7	The Almoorings Fishing Cooperative Society	

Artisanal Fisheries Infrastructure Project (AFIP) ran from 1984-1993 with assistance from CIDA and the EEC. The EEC and the Government of Guyana funded the establishment of the inshore fishport complex at Meadowbank in Georgetown in 1987, while CIDA and the Government funded inshore fishport complexes at #66 and #43 on the Corentyne, and at Rosignol, Parika, Lima, Charity and Morawhanna. Of the eight (8) complexes constructed, six (6) have been leased to Fishermen's Cooperative Societies for management and operations, of which by far the largest is the Greater Georgetown Fishermen's Cooperative Society Limited (GGFCSL).

The objectives of the AFI Project were to:

a) Reduce post-harvest losses and thereby increase the supply of fish to the local market and for export.
b) Increase the productivity and incomes of artisanal fishermen.
c) Move the existing Fishermen's Cooperatives toward the role of being local organisations of producers and marketers.

These Cooperative-run complexes have to varying extents made progress toward achieving objectives a) and b), but none of them have made any headway toward objective c).

The Societies have remained uninvolved in the marketing of their members' catch. Their main roles are to supply their members with ice and equipment at cost. They also suffer from insufficient skilled and experienced management personnel and lack of working capital. The GGFCSL is somewhat of an exception to these statements. A main limitation for their involvement in marketing is that the complexes do not have cold storage and freezing facilities.

This is a major hindrance and, among other things, results in lower prices for fish in the outlying coastal areas because of the difficulty of storing the fish and transporting it to Georgetown.

The Contribution of Fisheries to the Guyana Economy

The fisheries sector is a major contributor to the economy of Guyana. In 2004, it was estimated that fish production contributed G$157 million to the economy of the country, which represented 7.94% of the 2004 agriculture GDP (G$1,977 millions, FAO 2007), and 3.65% of the total 2005 GDP (G$5,419 million, FMP 2007).

THE ADMINISTRATION OF FISHERIES IN GUYANA

The Department of Fisheries (DOF) has as its mandate the management, regulation and promotion of the exploitation and development of Guyana's fisheries resources. The department's authority was originally contained in the Fisheries Act of 1957, and has been redefined by the Fisheries Act, 2002. It reports to the Minister of Agriculture through the Permanent Secretary, and is organized under four sub-programmes:

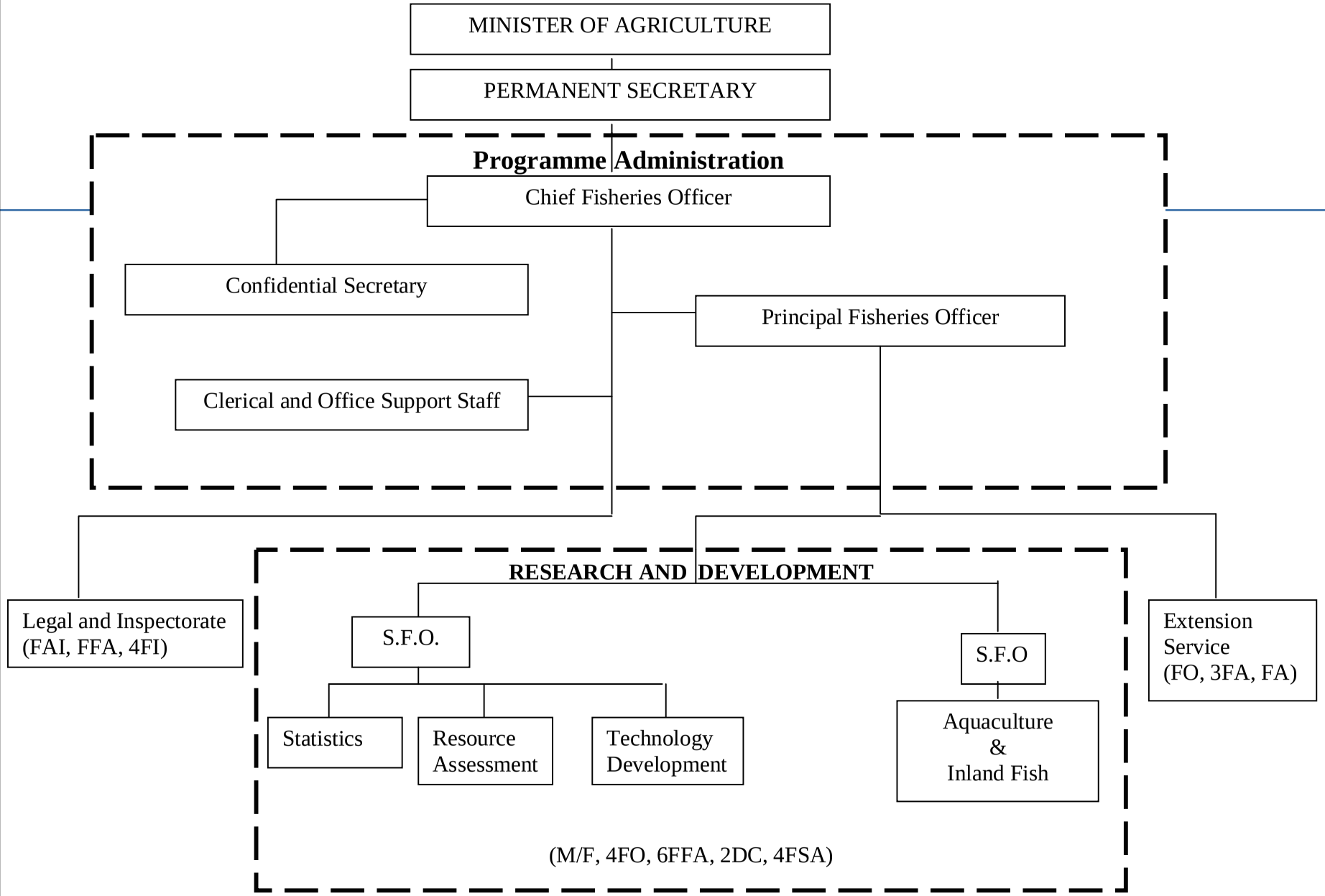
- Programme Administration;
- Legal and Inspectorate;
- Research and Development; and
- Extension.

A ten-year analysis of DOF staffing shows a high percentage of vacancies. The full staff complement would be about 50 employees, but on average over half the posts have remained unfilled. At the end of 2003, the three most senior administrative positions were vacant. The acting Chief Fisheries Officer also served as Chief Administrator, Head of Operations and Budget Coordinator. Only half of the senior technical positions were staffed.

The DOF is in dire need of additional human resources to accomplish its mandate. It urgently requires scientific, operational and enforcement personnel. Reasons cited for the problem of finding staff included difficulties in finding suitably qualified candidates, and the government's inability to offer attractive remuneration packages to the few potential qualified candidates. It raises doubts about the department's capability to undertake its regular functions and services, especially in the areas of licensing and the collection and inputting of data. The paucity of resources hampers its ability to monitor and enforce regulations.

Following is an organogram describing the structure of the Guyana Department of Fisheries.

STRUCTURE OF THE GUYANA DEPARTMENT OF FISHERIES



CHAPTER 2: COMMUNITY-BASED FISHERIES MANAGEMENT COMPONENT

2.1 Coastal Community Characteristics

More than ninety percent (90%) of Guyana's population lives along the coast, on a strip constituting only five percent (5%) of the country's total land area. More than seventy percent (70%) of Guyana's coastal population is rural, living on plantations or in villages strung along the coastal road. The villages range in size from several hundred to several thousand inhabitants. The layout of the villages is dictated by the drainage and irrigation systems of the sugar plantations, both active and abandoned. The villages are most heavily concentrated along the estuary of the Demerara River and the eastern environs of Georgetown, near the mouth of the Berbice River close to New Amsterdam, and along the extreme east coast near the Courantyne River.

Some of the major coastal settlements in Guyana with their populations as measured by the Guyana 2002 Population Census are:

TABLE 4:
Populations of the Main Coastal Settlements, Guyana, 2002

SETTLEMENT	TOTAL
Georgetown	33,366
Charity	1,295
Parika	4,081
Rose Hall	3,583
Rosignol	3,071
New Amsterdam	17,033
Corriverton	11,494

Source: Guyana Department of Statistics, 2002 Population Census.

2.2 Policy, Legislation, and Supporting Institutional Arrangements

POLICY

The GOG has not chosen to prepare a **National Fisheries Policy** for Guyana. A draft **Fisheries Management Plan for Guyana 2007-2011** has been prepared, but has not yet received official approval; it might serve the same function as a policy. This document is an update of the Draft FMP which was produced in 1992, and reflects to a large extent the recommendations coming out of the national fisheries consultations on marine fisheries management and aquaculture development held in 2000 and 2002, as well as the November 2005 and 2006 National Consultations on the Draft FMP for the Fisheries of Guyana.

Early policies for the fisheries sub-sector were first outlined in the Fisheries Act of 1957 and were intended to expand the fishing industry. Administrative and other arrangements made modifications that further stimulated the development process, e.g., **in the early 1960s** duty-free fuel for the industry to promote growth; **in the 1970s** obligatory landing of by-catch to prevent waste of valuable finfish resources and increase the protein supply to the population, and a ban

on importation of fish and fish products to promote growth of the industry and develop self-sufficiency; and **in the 1980s** significant fisheries cooperative development associated with infrastructure development.

The eight (8) major goals for fisheries management contained in the 2007-2011 draft FMP are:

- To optimise the development of the fishery sector through effective management in order to create employment and stable sources of income for the fishers and the communities involved in fisheries and related activities.
- To optimise the amount of fish protein available for domestic consumption and export consistent with sound resource management practices.
- To optimise on the value of the limited fisheries resources through cost effective harvesting, value added processing and diversification of markets.
- To promote sustainable development of aquaculture, for poverty alleviation, income diversification and increase in export earnings.
- To promote sustainable development of inland fisheries, including ornamental and sports fisheries, and diversification of economic activities in the hinterland and coastal communities into these areas.
- To promote the image of fishing as an occupation that is socially desirable and financially rewarding.
- To maintain or restore populations of marine species at levels that can produce the optimum sustainable yield as qualified by relevant environmental and economic factors, taking into consideration relationships among species.
- To preserve rare or fragile ecosystems, as well as habitats and other ecologically sensitive areas, especially estuaries, mangroves, seagrass beds, and other spawning and nursery areas.

None of these policy objectives address the participation of fishers, fishers' associations or fishing communities in fisheries management. The first objective above is "*to create employment and stable sources of income for the fishers and the communities involved in fisheries and related activities*", and so the draft FMP has fisherfolk in mind as beneficiaries, but not as participants in the management itself.

The draft FMP goes on to say: "In pursuance of the policy and goal, it has been determined that the fisheries managers and resource users would be guided by the following twenty (20) principles:

1. Ensuring sustainable development of the living aquatic resources.
2. Promoting the maintenance of the quality, diversity and availability of fishery resources in sufficient quantities for present and future generations in the context of food security, poverty alleviation and sustainable development.
3. Ensuring the conservation of target species but also of species belonging to the same ecosystem or associated with or dependent upon the target species.
4. Ensuring that fishing effort is commensurate with the productive capacity of the fishery resources and their sustainable utilization.
5. Ensuring that conservation and management decisions for fisheries are based on the best scientific evidence available, also taking into account traditional knowledge of the resources and their habitat, as well as relevant environmental, economic and social factors.
6. Encouraging bilateral and multilateral cooperation in research, as appropriate, in recognition of the transboundary nature of many aquatic ecosystems.
7. Applying a precautionary approach widely to conservation, management and exploitation of living aquatic resources in order to protect them and preserve the aquatic environment, taking account of the best scientific evidence available.

8. Encouraging the use of selective and environmentally safe fishing gear and practices to the extent practicable, in order to maintain biodiversity and to conserve the population structure and aquatic ecosystems and protect fish quality.
9. Promoting the harvesting, handling, processing and distribution of fish and fishery products in a manner which will maintain the nutritional value, quality and safety of the products, reduce waste and minimize negative impacts on the environment.
10. Protecting and rehabilitating, as far as possible and where necessary, critical fisheries habitats in marine and fresh water ecosystems, such as wetlands, mangroves, reefs, lagoons, nursery and spawning areas.
11. Ensuring that fisheries interests, including the need for conservation of the resources, are taken into account in the multiple uses of the coastal zone and are integrated into coastal area management, planning and development.
12. Ensuring compliance with and enforcement of conservation and management measures and establishing effective mechanisms, as appropriate, to monitor and control the activities of fishing vessels and fishing support vessels, within its competence and in accordance with international law.
13. Cooperating at sub-regional, regional and global levels through fisheries management organizations, other international agreements or other arrangements to promote conservation and management, ensure responsible fishing and ensure effective conservation and protection of living aquatic resources throughout their range of distribution, taking into account the need for compatible measures in areas within and beyond national jurisdiction, within the country's competence and in accordance with international law.
14. Ensuring that decision making processes are transparent and achieve timely solutions to urgent matters.
15. Ensuring that the international trade in fish and fishery products would be conducted in accordance with the principles, rights and obligations established in the World Trade Organization (WTO) Agreement and other relevant international agreements.
16. Ensuring that disputes relating to fishing activities and practices would be resolved in a timely, peaceful and cooperative manner, in accordance with applicable international agreements or as may otherwise be agreed between the parties.
17. Promoting the awareness of responsible fisheries through education and training.
18. Ensuring that fishing facilities and equipment as well as all fisheries activities allow for safe, healthy and fair working and living conditions and meet internationally agreed standards adopted by relevant international organizations.
19. Protecting the rights of fishers and fishworkers, particularly those engaged in subsistence, small-scale and artisanal fisheries, to a secure and just livelihood, as well as preferential access, where appropriate, to traditional fishing grounds and resources in the waters under their national jurisdiction.
20. Promoting aquaculture, including culture-based fisheries, as a means of income diversification, poverty alleviation, increased export earnings and reducing pressure on marine resources.

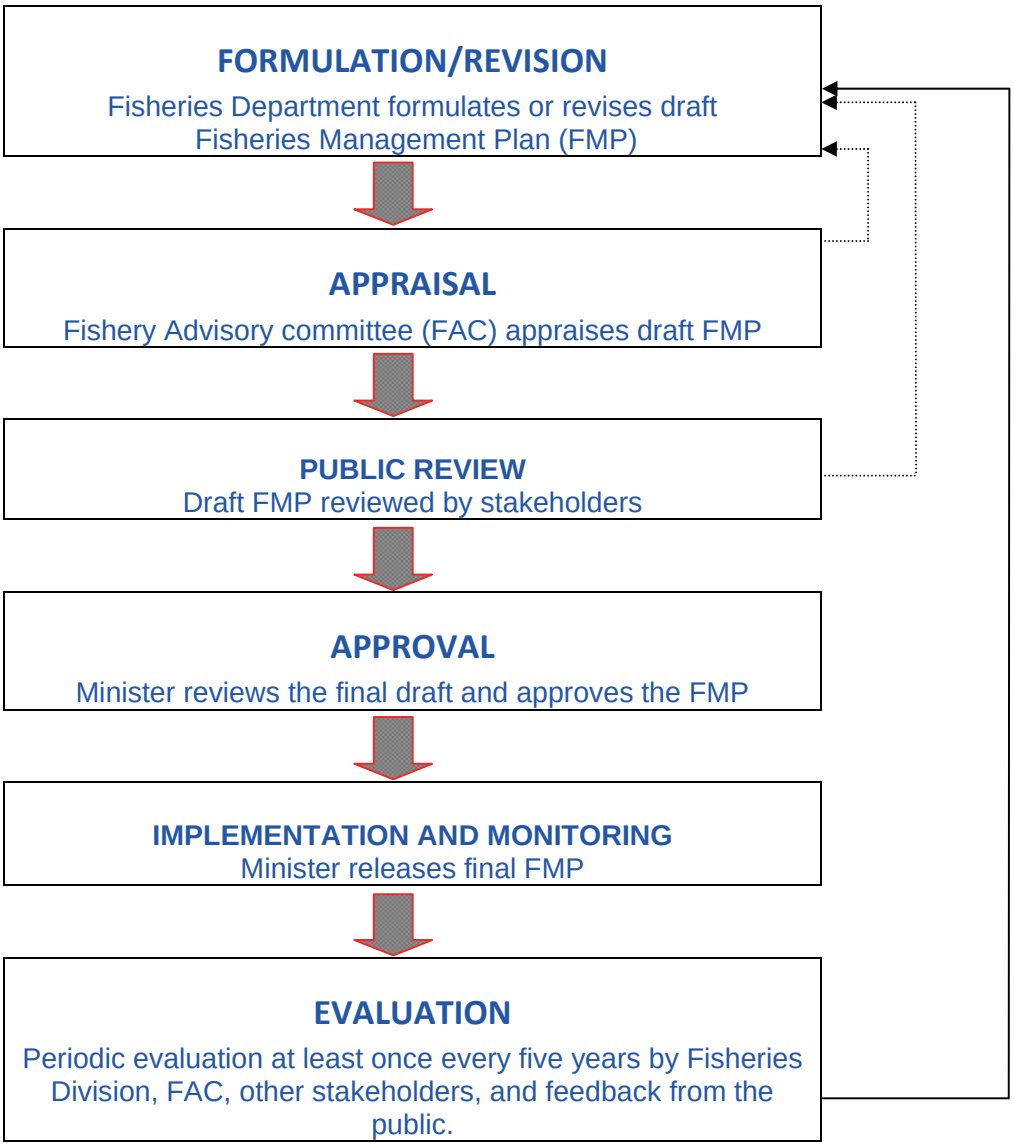
Some of these principles relate to the welfare of the fishers community, but none encourage the participation of fishers, fishers' associations or fishing communities in fisheries management.

- No. 5 seeks to ensure that traditional knowledge is taken into account, as well as relevant environmental, economic and social factors;
- No 11 seeks to ensure that fisheries interests, including the need for conservation of the resources, are taken into account in the multiple uses of the coastal zone and are integrated into coastal area management, planning and development;
- No. 17 seeks to promote the awareness of responsible fisheries through education and training
- No. 19 seeks to protect the rights of fishers, particularly those engaged in subsistence, small-scale and artisanal fisheries, to a secure and just livelihood, as well as preferential access

It would seem that the draft **Fisheries Management Plan for Guyana 2007-2011** could be improved by adding in provisions to encourage the participation of fishers, fishers' associations or fishing communities in fisheries management.

The 2007-2011 FMP is still a draft, and the document contains an outline of the process to be used to approve it. It is set out below:

Figure 2: Fisheries Management Planning Process



The planning process diagram indicates that there will be an opportunity for stakeholders in the fishing industry to review the draft FMP, which would lead to a new formulation by the FD should their concerns be taken on board. This certainly qualifies as participation in fisheries management, in a reactive sort of way. A better approach would be for the stakeholders through their representatives to be involved in the actual formulation and re-formulation of the draft FMP.

The 1996 draft FMP says very little about the involvement of the stakeholders in fisheries management itself. In the fishery-specific management plans there are only three (3) references to stakeholders:

"*Improve collaboration among the stakeholders (DOF, Coast Guard, GPP, Fishers Organisations and Private Trawlers Association) in conducting MCS*" which refers to monitoring, control and surveillance to deal with illegal fishing and poaching.

"*Provide training and technical assistance, including infrastructure improvement, to fishers, fisher organisations, processors, etc. in order to improve on the quality assurance and safety mechanisms in the post harvest/cold chain*".

These first two references to stakeholders are operational rather than management-related; in the first, the idea is for the fishers to provide information to the authorities to act upon, and in the second, they are to be provided with training so that they will produce a better quality product.

The third reference to stakeholders is in the "Action Plan for the Inshore Artisanal Fishery"; the excerpt is reproduced verbatim below:

Action Plan for the Inshore Artisanal Fishery

Issues	Action	Implementation Strategy	Resources Required
▪ Inadequate institutional capability within fishers organisations to sustain their economic activities and represent their members at various fora in the area of fisheries management and development.	▪ Determine the institutional capability of the fishers organisations to sustain their economic activities as well as to play their role in advocacy.	▪ Conduct a study to determine the institutional capability of the fishers organisations to sustain their economic activities as well as to play their role in advocacy. ▪ Based on the recommendations of the study, develop and implement a plan aimed at strengthening fishers organisations.	1. Agencies involved: Ministry of Agriculture and Fisheries Department, FAC, Ministry of Labour and Cooperatives 2. Funds required: See Budget at Appendix II. 3. Technical Support/Assistance: CRFM and FAO/WECAFC 4. Links: CTA/CRFM – Project: Development of Caribbean Network of Fisher Folk Organisations (2006 – 2008)

The issue is the lack of capacity within fishers' organizations to "*represent their members at various fora in the area of fisheries management and development*", the first reference in the document to fishers participating in this activity. In the "*Implementation Strategy*" column, their role is referred to as "*advocacy*", and so maybe the role envisaged for fishers is really to participate in various "*fora*".

In the 2007-2011 FMP the phrase "co-management" is not used, nor any synonym.

Interestingly, there is a section in the draft FMP entitled "*Institutional Strengthening of the Fisheries Authority*". There is need to increase the internal capacity of the FD, as they are short-staffed; but rather than sharing management responsibility with the stakeholders, the FMP seeks to concentrate more power in the hands of the FD, making it an "*Authority*". This will require even more staff.

In summary, the **Fisheries Management Plan for Guyana 2007-2011** does not pay sufficient attention to the involvement of fishers, fisher organizations, fishing communities and other stakeholders in the management of fishery resources. Hopefully the activities of this JICA-CRFM will see advances in this area.

LEGISLATION

The primary legislation governing the fisheries sector in Guyana is the **Fisheries Act 2002** which replaced the 1959 Fisheries Act and portions of the 1977 Marine Boundaries Act. The 2002 Fisheries Act, which was drafted with FAO assistance in 1983 and 1999, was passed in the Guyana Parliament in December 2002 and signed into effect by the Minister of Fisheries, Crops and Livestock on July 25, 2003. It includes a number of new provisions, such as:

- Authorizing the Minister to promote the development and management of fisheries to ensure the optimum utililization of fisheries resources.
- Mandating the Chief Fisheries Officer to prepare and keep under review a plan for the management and development of fisheries, including mandatory consultations with local fishermen, and other persons affected by the fisheries plan (stakeholders).
- Creation of a Fisheries Advisory Committee.
- Procedures for licensing fish processing establishments; dispute settlement in fisheries and for foreign and local licensing.
- Create Marine Reserves (no fishing allowed) and Fishing Priority Areas (reserved for fishing).

The Guyana **Fisheries Act 2002** was passed half-a-decade before the **Fisheries Management Plan for Guyana 2007-2011** was prepared, yet it contains more provisions for community participation in fisheries management than the FMP. Section 5(3) of the Act says that the CFO ***shall consult*** with the local fishermen about the plan, not just ***take into account*** their traditional knowledge and interests as the FMP says.

The Guyana **Fisheries Act 2002** explains the procedure for appointment of a Fisheries Advisory Committee (FAC), and its composition:

> 6. (1) The Minister may appoint a Fisheries Advisory Committee to advise on the management and development of fisheries, with the objective of ensuring the optimum utilization of the fisheries resources of the fisheries waters of Guyana for the benefit of the people of Guyana.
>
> (2) Any Committee appointed under this section shall include the Chief Fisheries Officer and such other persons as the Minister may consider capable of advising him on the management and development of fisheries.
>
> (3) The names of the members of the Committee as first constituted and every change in the membership of the Committee shall be published in the Gazette.
>
> (4) The Minister may prescribe the procedure of the Committee, including the frequency of meetings, and the quorum for its meetings.
>
> (5) Subject to any regulations made under subsection (4), the Committee may determine its own procedure.
>
> 7. The functions of the Committee shall be to advise the Minister on -
>
> (a) fisheries management and development;
>
> (b) any aspect of a fisheries plan;
>
> (c) any proposals under this Act for subregional or regional co-operation with respect to fisheries, fisheries agreements, joint ventures, or development projects in the fisheries sector;
>
> (d) such other matters as may be referred to it by the Minister.
>
> 8. There shall be paid to the members of the Committee such remuneration or allowances, if any, as may be determined by the Minister.

Fisheries Acts in other CARICOM countries specify the level of representation that artisanal fishers shall enjoy on the FAB. The Guyana **Fisheries Act 2002** leaves the composition of the FAB up to the minister, and does not require that any fishers be represented.

Neither the Guyana **Fisheries Act 2002** nor any subsequent regulations require fishers to be registered or licensed before they are permitted to fish. Only fishing vessels are required to be licensed.

No Marine Reserves or Fishing Priority Areas have been created under the Guyana Fisheries Act 2002.

Other Fisheries Acts in the Caribbean take it further and allow a local fishers' organization ***to actually manage*** a local fisheries management area, and state that this local fishers' organization ***shall make by-laws*** regulating the conduct of fishing operations in the designated area. This gives local fishers' organizations real power, and not just the right to be consulted. These provisions are not included in the Guyana Fisheries Act 2002.

SUPPORTING INSTITUTIONAL ARRANGEMENTS

The concept of "stakeholder participation in fisheries management" has not been embraced either by the Guyana **Fisheries Act 2002** or by the **Fisheries Management Plan for Guyana 2007-2011**.

The present administration has taken steps to include fishers in the process of fisheries management decisionmaking, which is commendable; but since these are underpinned neither by policy nor legislation, a future administration could easily reverse all this. There is room for improvement in the provision of institutional support for fishers, fisher organizations, fishing communities and other stakeholders to participate in the management of fishery resources.

2.3 National Programmes to promote the Involvement of Fishers, Fisher Organizations, Fishing Communities and other Stakeholders in the Management of Fishery Resources

The Artisanal Fisheries Advisory Committee (AFAC) began initially in 1984 as a project steering committee to advise on and monitor the construction of the Artisanal Fisheries Complexes and the allocation of fishing equipment to the Cooperatives under the Fishing Equipment Facilities Project [both funded by the Canadian International Development Agency (CIDA)]. After project funding ended in 1992, the AFAC gradually evolved into a body which serves as a mechanism to assist the DOF to deal with artisanal fisheries issues and to coordinate activities among the cooperative societies. It has no legal status.

The FAC was established in 1986 and was active until 1988. It was resuscitated in 1994 under the chairmanship of the Permanent Secretary in the Ministry responsible for fisheries. Also on the Committee were representatives from the Fisheries Department, the industrial and artisanal marine fisheries sub-sectors, the Guyana Coast Guard and aquaculture sub-sector. This body once more became dormant.

The FAC was revived in 2009. Organisations/persons represented on it are:

1. CEO, Guyana Lands & Surveys Commission
2. Permanent Secretary, Ministry of Agriculture
3. Chairman, Guyana Association of Trawler Owners & Seafood Processors
4. Chairman, Upper Corentyne Fishermen Coop Society
5. Chairman, Grater Georgetown Fishermen Coop Society
6. Chairman, Rosignol Fishermen Coop Society
7. Chairman, Essequibo Islands/West Demerara Fishermen Coop Society
8. Executive Director, North Rupununi District Development Board

9. Chief Fisheries Officer, Ministry of Agriculture
10. Head, Project Cycle Management Unit, Ministry of Agriculture
11. Chairman, National Aquaculture Association of Guyana
12. State Counsellor, Ministry of Legal Affairs & Attorney General's Chambers
13. Director, Frontiers Department, Ministry of Foreign Affairs
14. Dean, Faculty of Agriculture, University of Guyana
15. Guyana Police Force
16. Project Coordinator, Guyana Rice Project Management Unit
17. Manager, Policy & Donor Relations, Conservation International
18. Director, Financial Intelligence Unit, Ministry of Finance
19. Commander, Guyana Coast Guard
20. Board Member, Guyana Fisheries Limited

There has been little experimentation with other forms of participation in the management of fishery resources such as community enforcement or participatory monitoring. In most respects, fisheries management in Guyana is still "top-down".

One possibility for a pilot project under this JICA-CRFM project is the preparation of a plan to involve fishers, fisher organizations, fishing communities and other stakeholders in the management of fishery resources, including providing the training the stakeholders will need to fulfill the obligations which would be imposed upon them.

2.4 Effectiveness of National- and Community-Level Participatory Approaches to Fisheries Management

Since national- and community-level participatory approaches to fisheries management have not yet been included in any national fisheries policy or plan, the issue of their effectiveness does not arise.

There is scope for initiatives in this area to be undertaken under the Master Plan being developed.

2.5 *Socio-Cultural and Attitudinal Issues related to Participatory Approaches to Fisheries Management and Introduction of Alternative Livelihoods*

Baseline workshops were held with government staff and the community. The results are presented in the Chapter 6 of this report.

CHAPTER 3: PELAGIC FISH RESOURCE MANAGEMENT AND DEVELOPMENT COMPONENT

3.1 Policy, Supporting Legislation, and Fishery Development and Management Plans

Fishery Management Plan (FMP)

There is no **National Fisheries Policy** for Guyana. A draft **Fisheries Management Plan for Guyana 2007-2011** has been prepared, which might perform the same function.

The Fisheries Act 2002 requires that "*The Chief Fisheries Officer shall progressively prepare and keep under review plans for the management and development of significant exploitable fisheries in the fisheries waters*" of Guyana. Accordingly, the Fisheries Division has prepared a draft management plan that aims to cover the management of Guyanese fisheries for the period 2007-2011. This draft is an update of the 1996 FMP, including recommendation from "*National Fisheries Consultations*" on marine fisheries and aquaculture development held from 2000 to 2006. The draft FMP defines several goals, but in respect to pelagic fisheries we can distinguish three main ones:

(1) To optimise the development of the fishery sector through effective management in order to create employment and stable sources of income for the fishers and the communities involved in fisheries and related activities.
(2) To optimise the amount of fish protein available for domestic consumption and export consistent with sound resource management practices.
(3) To optimise on the value of the limited fisheries resources through cost effective harvesting, value added processing and diversification of markets.

As there are no directed fisheries for coastal pelagic fishes in Guyana, the FMP specifically seeks to achieve the following objectives in the near future:

- To develop the capacity for optimizing catches of coastal pelagic fishes migrating through the EEZ of Guyana;
- To develop a fishery aimed at optimal utilisation of the underutilised small pelagic resources;
- To maintain and improve the net income per operator at a level above the national minimum desired income;
- To include as many participants in the fishery as is possible given the biological, ecological and economic objectives listed above.

Legislation

The *"Fisheries Act of 2002"* is the major law that addresses the development and management of fisheries, and the regulation of fisheries and fishing related activities in Guyana. This Act replaces the Fisheries Act of 1956 and its 1983 Amendment. The Fisheries Act of 2002 gives the Minister or the Chief Fisheries Officer the authority to create regulations for the purpose of promoting the "*management and sustainable development of fisheries so as to ensure the optimum utilization of fisheries resources in the fisheries waters for the benefit of Guyana, and in so doing shall promote precautionary approaches to fisheries management, as well as the need to conserve fisheries resources for future generations.*"

The Act generally provides for:

(1) Preparing and implementing fisheries management plans;
(2) Creating and enforcing fishing regulations, and designating enforcement officers;
(3) Licensing fishing activities;
(4) Registering and licensing local and foreign fishing vessels; Regulating the exportation of fishing products;
(5) Regulating fisheries related research or survey operations;
(6) Creating marine reserves and fisheries priority areas;
(7) Entering into arrangement/agreements with foreign fishing vessels for the testing of fishing operations.
(8) Appointing a Chief Fisheries Officer and Fisheries Officers and creating a "Fisheries Advisory Committee;"

Under this Framework the "*Fisheries Product Regulations 7 of 2003*" were created.

Further the Fisheries Act of 2002 gives the Chief Fisheries Officer authority to "*prepare and keep under review plans for the management and development of significant exploitable fisheries in the fisheries waters*."

Enforcement of Regulations

The government agencies with the responsibility for enforcement of the Guyanese fisheries legislation are:

- The Guyana Defense Force;
- The Police Force of Guyana;
- Customs and Trade Administration of the Revenue Authority.

Note that the Fisheries Act 2002 recommends that all members of these three agencies be designated as Fisheries Officers.

Level of enforcement

Several problems limit the enforcement of fisheries regulations:

- The agencies do not have adequate surveillance capacity;
- Illegal foreign fishing and over-the-side sale and piracy are widespread in Guyana waters, but are yet to be controlled because of lack of resources, operational problems within the agencies, and unresolved maritime boundary delimitation with neighboring countries (FMP 2007).

Level of compliance

The level of compliance with fisheries regulations is generally fair; in particular, lack of monitoring of the finfish fisheries is a major issue in Guyana.

Management Policy Strategy

Currently there are no specific regulations governing the exploitation of the coastal pelagic fisheries of Guyana. However, the draft FMP of 2007 has the following provisions:

- For large coastal pelagics:
  - Registration/licensing of local gillnet boats that take coastal pelagic as by-catch.
  - Establishment of target and limit reference points for their fishery.
  - Determining the most appropriate fishing gear and set effort limits.

- For small coastal pelagics:
  - Lack of data precludes the development of management measures, but the Fisheries Division intends to develop regulatory measures as more data become available with the development of a coastal pelagic fishery;
  - Investigating the best means of optimally utilizing the small pelagic resources, including the feasibility of operating a cannery and/or fish meal plant.

3.2 Fishery Development Status regarding stated Policy Goals and Development and Management Objectives

As defined in the 2007 draft FMP, the stated policy goals, and development and management objectives *re* pelagic fisheries in Guyana are yet to be promulgated. Thus, no evaluation can be made on their level of implementation. However, as the pelagic resources seem to be largely under-exploited, they constitute an area that should receive substantial funds for pilot studies, such as conducting:

- preliminary fisheries surveys to assess the dynamics and abundance of pelagic populations;
- Experimental fishing to assess the feasibility of developing a fishery on these populations;
- Tests on the methods that are likely to be most appropriate to exploit these populations.

3.3 Fishery and Market Characteristics

FISHERY CHARACTERISTICS

Exploited Species

Table 5 summarizes the exploitation and the management status of coastal pelagic fisheries in Guyana. Large coastal pelagics such as wahoo and blackfin tuna, are usually taken as by-catch in the artisanal demersal gillnet fishery. Small coastal pelagics such as jacks and sardines are mostly exploited by the artisanal fishery using Chinese seines and pin seines. The level of exploitation of these fish populations is not well known, as there are no good records on the catch history of these species (FMP 1996).

Table 5:
Status of the Coastal Pelagic Fisheries in Guyana

	Stock Status		Fishery Status			
Species	Type of exploitation	Over-exploitated	Developed	Sustainable	Monitored	Managed
Wahoo (*Acanthocybium solandri*)	Gillnet by-catch	Not			Not	To be
Dolphin fish (*Coryphaena hippurus*)	N	Not			Not	To be
Black fin tuna (*Thunnus atlanticus*)	Gillnet by-catch	Not			Not	To be
King mackerel (*Scomberomus cavalla*)	N					
Jack Mackerel (*Trachurus spp.*)	N					
Flying fish (*Hirundicthys spp.*)	N					
Sardines (*Sadinella aurita*)	Artisanal/Seine	Not			Not	To be
Scaled Herring (*Harengula Jaguana*)	N	?				
Atlantic thread herring (*Opisthonema oglinum*)	N	?				
Jack (*Selar spp.*)	Artisanal/Seine	Not			Not	To be
Robin (*Decapterus spp.*)	Artisanal/Seine	Not			Not	To be
Diamond back squid (*Thysanoteuthis rhombus*)*	N	?				
Conch (*Eustrombus gigas*)*	N	?				
Caribbean spiny lobster (*Panulirus argus)**	N	?				
Spotted spiny lobster (*Panulirus guttatus*)*	N	?				

Notes

*: These species are pelagic species but information is required on their status

?: No data are available to evaluate the level of exploitation of these species in this fishery

N: Species are not exploited in the fishery or no catch records are available

Stock Status

The actual status of Guyana coastal pelagic stocks is not known. However, a survey conducted in 1988 by the R/V Dr. Fridtjof Nansen (FMP 1996) estimated the fishable biomass of large pelagics and small pelagics to be respectively 70,000 mt and 15,000 mt in Guyana waters. As these stocks have not been heavily exploited, these levels of biomass might have been maintained over the years; although considerable natural fluctuations should be expected. Nevertheless, new fisheries surveys and stock assessment research need to be conducted to understand current dynamics of these populations and to assess their level of abundance.

MARKET CHARACTERISTICS

The supply of fishery products to the local and international market is dominated by demersal finfish and shellfish, amounting to G$26,653,395,393 in 2004 (FAO 2005). The contribution of coastal pelagic fish to this total is minor, because there are no directed fisheries for these species.

Nevertheless, fish landed by artisanal fishermen are marketed by various means, which include:

- Vendors buy fish directly from boats for sale from cart or bicycle to a given community;
- Vendors buy fish from boats for sale in municipal markets or through roadside markets, especially on pay-days at sugar estates;
- Middlemen buy large quantities of fish from boats and sell them to processing plants or to supermarkets in Georgetown;
- Processing plants purchase fish directly from boats;
- Sale of salted, smoked and dried cottage industry products by vendors in markets, at outlets and supermarkets, and by middlemen in hinterland areas (FAO 2005).

In 1996 Guyana had four (4) industrial processing plants with a total capacity of 20,000 mt/year (FMP 1996):

- Georgetown Seafoods & Trading Company,
- Marine Food Products,
- BEV Enterprises, and
- Noble House Seafood.

The country also has four major cottage industry processors (and several small-scale processors):

- E. Lord Fish & Fish Products Ent,
- K.P. Preserve Seafood Plant,
- Carleton Hall Seafood,
- Jasshiri & Sons Ent..

The development of infrastructure facilities such as wharves, ramps, workshop, fuel depots, chandleries, ice machines, and fish storage bins at these landing sites were financed by the government of Guyana with support from CIDA and the EU. These complexes were then leased to the local fishermen's cooperative and to joint-venture arrangements with private companies.

Table 6:
Estimated annual exports of fish from Guyana

Year	2000	2001	2002	2003	2004	2005
Fish (MT)	11,628	18,689	19,322	21,901	21,757	19,319

Source: FMP 2007.

Guyana is a major exporter of fish, with an annual average of 18,769.33 mt of processed fish products from 2000 to 2005 (Table 6). In 2004, the total value of finfish exports was estimated

to be $12,600,000 (FMP 2007). There are six major licensed processors in Guyana, along with cottage industries and individuals (~20). Nevertheless, Guyana remains an importer of processed fish products, particularly of canned salmon, tunas, sardines and mackerels (Table 7).

Table 7:
Estimated Annual Imports of Canned Salmon, Tuna, Sardines and Mackerel, Guyana, 2000-2005

Year	2000	2001	2002	2003	2004	2005
Fish (MT)		428	1,145	12	985	252

Source: FMP 2007.

3.4 Catch and Effort

Landing Sites

Pelagic catches are landed in about 100 landing sites in Guyana. However, there are seven (7) primary industrial landing sites. The government of Guyana has financed the development of fisheries infrastructure complexes on these sites such as: wharves, ramps, workshops, fuel depots, requisite shops, ice machines and fish storage bins. Eight of these fish complexes are currently rented to fishermen's cooperatives (4) or to private joint-ventures (4), which are responsible for their management and operation (FAO 2005).

Effort Data

The marine fishery sector of Guyana can be divided in three main categories (CRFM 2008):

- The **offshore industrial** (trawl) fishery, consisting of 147 shrimp trawlers;
- The **inshore artisanal** fishery, consisting of 1,200 vessels (6-18m) propelled by sails, outboard or inboard engines. About 5,000 fishers are involved in this fishery (CRFM 2008), using gears such as: Chinese net (fyke net), pin seine (beach seine), cadell lines and hand lines, drift seine, gillnets and circle seine (FAO 2005).
- And the **semi-industrial** fishery, consisting of 42 vessels in 2004, one third of which was foreign (FAO 2005). Presently the fishermen used mostly traps to capture snappers.

Note that the polyethylene gillnet (6-8 inch mesh size) opportunistically caught large coastal pelagics during the period June-July when these fish are abundant in coastal waters. For a normal fishing trip a polyethylene gillnet vessel may spend 7-15 days at sea**.**

Approximately 4,000-6,000 small-scale fishermen operate in Guyana waters, but only 1,000 of them are boat owners. Sixty percent (60%) of the boat owners are members of fishermen's cooperatives where they can buy fishing gear and equipment.

Catch Data

The marine fishery of Guyana uses mostly gear toward the exploitation of demersal species such as shrimp and seabob. Thus, pelagic species are not a big component of fish landings in Guyana. Nevertheless, wahoo and blackfin tuna are taken in the demersal gillnet fishery as by-catch, whereas small coastal pelagics such as jacks and sardines are captured by Chinese seines and pin seines (Table 8). However, the level of annual landings of both large and small pelagics is not well known, because historically, catches have not been recorded.

Table 8:
Estimated Total Landings* (mt) for Three Groups of Coastal Pelagic Fish, Guyana, 1997-2005.

	Year								
Species	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
Kingfish (Wahoo & King mackerel)	270	440	398	214	239	267	391	311	245
Sardines				0.30		4.00	34.00	24.00	21.00
Jacks and Scads				42.00	48.00	5.00	12.00	10.00	9.00

Source: FMP 2007

Technology Improvement & Extension Programs

Two major objectives of the Guyana FMP are:

- To develop the capacity for optimizing catches of coastal pelagic fish migrating through the EEZ of Guyana;
- To develop a fishery aimed at optimal utilisation of the underutilised small pelagic resources.

Accordingly, the Fisheries Division of Guyana will need technical and financial assistance towards building a coastal pelagic fisheries development and management programme. In the short term this program should aim to conduct:

- Surveys to collect biological and fishery data;
- Statistical sampling of catches from existing fisheries;
- Stock assessment for:
  - Understanding of population dynamics of coastal pelagic fishes;
  - Evaluating total and fishable biomasses of pelagic fishes in Guyana waters;
  - Determining biological and fishing reference points for the management of pelagic stocks.
- Experimental trials for the determination of the most appropriate fishing gears and methods to sustainably exploit the pelagic stocks.

Technical and Research Capabilities

Several problems limit the technical and research capabilities of the fisheries department:

- Guyana generally lacks professional fisheries scientists, management and data collection staff;
- In general, fisheries management has not been based on sound scientific evidence;
- It appears that limitations in human and financial resources prevent:
  - Adequate monitoring of finfish fisheries;
  - Developing alternative technologies to replace the most destructive methods that, in the past, have caused the collapse of fisheries;
  - Appropriate evaluation of underexploited pelagic stocks;

Needs in funding

- Funds to develop and implement a coastal pelagic fisheries development and management programme.
- Establish scholarship funds to support undergraduate training of the Fisheries Division staff;
- Funds to conduct a study on cost of fishing production;
- Funds to conduct socio-economic surveys.

CHAPTER 4: AQUACULTURE DEVELOPMENT COMPONENT

4.1 Policy, Supporting Legislation, Development Plans

Policy

There is no **National Fisheries Policy** for Guyana. A draft **Fisheries Management Plan for Guyana 2007-2011** has been prepared, which makes reference to aquaculture. There is no separate **Aquaculture Policy** for Guyana.

Aquaculture is designated as a subsector of the Overall Fisheries Sector and is divided into two, namely:

- Brackish-water Culture
- Fresh-water Culture

Policy for aquaculture in Guyana is at a draft stage. However the main objective of the policy is:

> *To ensure that aquaculture is developed in a timely, sustainable and controlled manner with economic and environmental benefits optimised*

The objectives of the Aquaculture Programme would be:

- to develop aquaculture as an important facet of agriculture diversification.
- to maximise the development of aquaculture as an alternative approach to capture fisheries consistent with sound environmental management.
- to increase household incomes, generate employment and improve nutrition and living standards in coastal and inland communities, as well as among commercial investors.
- To reduce poverty in coastal and inland areas and make communities increasingly independent of government support

It is fair to say that social sustainability is a very important pillar supporting the draft policy.

Legislation

At present, there is no specific legislation in force to regulate aquaculture development. There is a Draft Aquaculture Bill, which on approval will become part of the new Fisheries Act, which was approved in 2003.

The Draft Aquaculture Bill envisages the Department of Fisheries being the main regulatory body as well as the enforcing institution of the aquaculture sector. This includes licensing of farms, specification of rearing areas, specification of inputs to be used in the rearing process, waste disposal, movement of aquatic species within Guyana, etc.

Other important aspects, such as importation of exotic species and aquaculture as it relates to the natural environment, fall under the jurisdiction of the Environmental Protection Agency.

Currently Aquaculture falls under the Jurisdiction of the Fisheries Act 2002 by virtue of the fact that under the Act *"aquaculture products"* means all fishery products born and raised in controlled conditions until placed on the market as a foodstuff. However, seawater or fresh water fish or crustaceans caught in their natural environment when juvenile and kept until they have reached the desired commercial size for human consumption are also considered to be aquaculture products. Fish and crustaceans of commercial size caught in their natural environment and kept alive to be sold at a later date are not considered to be aquaculture products if they are merely kept alive without any attempt being made to increase their weight or size.

"The Minister or the Chief Fisheries Officer, as the case may be, may take such measures as he thinks fit to promote the management and sustainable development of fisheries so as to ensure the optimum utilisation of fisheries resources in the fisheries waters for the benefit of Guyana, and in so doing shall promote precautionary approaches to fisheries management, as well as the need to conserve fisheries resources for future generations. The Chief Fisheries Officer shall progressively prepare and keep under review plans for the management and development of significant exploitable fisheries in the fisheries waters."

The following outlines the key responsibilities of the Fisheries Division through its Aquaculture Unit:

- Identify species to be cultured based on scientific information.
- Collect and obtain disease-free specimens for culturing.
- Establish culture systems to determine food requirements, growth rates, environmental tolerance, and rates of reproduction.
- Implement an aquaculture programme in schools.
- Maintain and operate the Anna Regina Fish Culture Station, with the intention of establishing other stations to provide seed stock to farmers and to serve as centers of technical excellence.
- Co-ordinate the development of the aquaculture industry at the national/regional level.
- Identify incentives that will facilitate growth of the aquaculture industry.
- Collaborate with other agencies regarding the use of the shore zone.
- Promote the formation of a National Aquaculture association

4.2 Aquaculture Development Status regarding Stated Policy Goals and Development Objectives

It is worthy of mention that appointment of a CFO was only recent, and that the National Aquaculture Policy and the aquaculture legislation currently exist as draft documents. These draft documents are due for immediate review in keeping with Fisheries Act 2003 and given issues associated with climate change and the low carbon economic developmental approach adopted by the Guyana government.

Notwithstanding, the list of achievements below indicates that key objectives are being realized in keeping with the development objectives laid out in the Fisheries Management Plan.

ACHIEVEMENTS

- Two persons obtained a 'Certificate in Fisheries' from the Guyana School of Agriculture. These officers would assist in the effective management of the Arapaima and support efforts of the Executive Fisheries Committee and Toushaos of the North Rupununi villages.
- Five additional fishermen were trained during the Fifth Arapaima Count Survey held in the Rupununi.
- Approximately 25 persons benefitted from 40 acres of semi-intensive freshwater aquaculture.
- Three training courses were successfully conducted during 2008, whereby a total of 32 persons were trained. The training courses were conducted at the Satyadeow Sawh Aquaculture Station; two were in collaboration with CRSP and GRPMU Rice Fish Project.
- The Tilapia Hatchery was commissioned on the 7th August 2008.
- A total of 20,000 fingerlings of Red Tilapia were produced since the commissioning of the Tilapia Hatchery in August 2008

- Forty-five farmers received advice from the technical personnel present on field visits that were conducted in support of aquaculture development.
- There is a large scale aquaculture development initiated by rice farming companies.
- At least two aquaculture projects were implemented by the FAO: one in relation to the Mon Repos Aquaculture station and the other as a joint Guyana/Suriname Rice/Fish Culture project.
- There are some large size farms being developed in Guyana; e.g at Onverwagt there is a farm of over 100 acres being developed.

4.3 Aquaculture and Market Characteristics

Low population, large and easy access of natural catch mean, limited demand for aquaculture products, in addition to the seasonal nature of inland and coastal catch, means depressed prices for aquaculture products.

Local markets associated with small-scale aquaculture can at best be described as limited and restricted to subsistence farming. However the large land holdings of the general population coupled with established market channels, and the processing sector associated with the capture fishery, presents opportunities for small scale commercial aquaculture.

Successful test shipments of aquaculture products have been made in recent years; however current production volumes and plant throughput currently hinder export marketing efforts.

Cooperative farming efforts supported by central processors would spread risk and contribute to gainful economic enterprise for poorer Guyanese nationals.

This approach/development model fits neatly within the current strategy for the development of a low carbon economy.

Most fish and shrimp sold in the local market are as “whole cleaned”, whilst the supermarket shelves will have “fillets”, “headless shell on” and other higher value-added products.

In some areas like Onverwagt, Blairmont, etc., farmed fish are marketed as soon as they are produced. Large-scale farmers are looking at markets in the tourist sector (restaurants, hotels) and for export.

4.4 Current Levels of Aquaculture Production by Species

Brackish Water Culture

The first reliable accounts of attempts at aquaculture in Guyana can be traced back to the early East Indian inhabitants of the Corentyne Coast near the Berbice River estuary. These persons and their present day descendants, practice a system of fishery enhancement similar to aquaculture, but which does not contain all the activities to be properly defined as aquaculture.

This practice involves the legal or illegal opening of the sea defences, and taking advantage of tidal inflows of high tides during which juveniles, larvae, eggs, etc. are trapped in the coastal empoldered swamps and in some cases, specially constructed impoundments near the foreshore, where they are allowed to mature to marketable size. Many species are contained in the seawater, with some of the targeted ones being swamp shrimp (*Mesopenaeus tropicales*), snook (*Centropomus undecimales*), cuffum (*Megalops atlanticus*) and mullet (*Mugil spps*.). These brackish water farms operate as extensive polyculture systems.

During 1958 to 1981, this basic type of aquaculture benefited from a brackish water fish culture station, the Onverwagt Brackish Water Fish Culture Station.

Brackish water culture occurs mainly in the brackish water swamps along the Atlantic Coast in Corentyne and Berbice. Towards the end of 1980, there were sixty-four (64) farms, which included two registered fish culture cooperatives utilizing approximately 670 ha of coastal lowlands. The average size of a farm was 11 ha. In 1987, it was estimated that 91 mt of fish and shrimp were harvested from 400 ha of these swamps.

Freshwater Culture

Freshwater aquaculture was first started in the late 1940's, with the introduction of Mozambique Tilapia. It was thought that fish culture could be undertaken in association with agricultural practices such as fish in irrigated rice fields or flooded sugar cane fields. Also, the hundreds of miles of irrigation canals offered a ready possibility for undertaking freshwater aquaculture.

None of these ideas were carried out at the time, primarily because Government placed emphasis on the development of the potential of the marine capture fisheries.

Renewed interest in freshwater aquaculture occurred in Guyana in the 1970's with the establishment of three stations by the Department of Fisheries and a joint IDRC/GUYSUCO venture. The Nile Tilapia (*O. niloticus*) was introduced, and attempts were made at the culture of alternate indigenous species such as the armoured catfish or hassar (*Hoplosternum littorale*). The government stations supplied tilapia for close to 500 private ponds in the country in the 1980s. After decentralization of the government into 10 Administrative Regions, these facilities were handed over to the regional authorities. Without the management capabilities or human resources required to continue operations, the installations both in the government and private sector fell into disrepair and were eventually abandoned. This type of culture produced an estimated 34 mt of fish in 1987 from about 115 ha of ponds.

In its efforts to revive and stimulate aquaculture development, the GOG with the assistance of the FAO and CIDA, designed and constructed the Mon Repos Freshwater Aquaculture Demonstration Farm. This was commissioned on July 13, 2001. The main purpose of the Centre is to stimulate and promote the development of aquaculture through the training and provision of technical assistance, including start-up fingerlings, to farmers, and to conduct adaptive and applied research. Work is presently being carried out on Jamaican Red Tilapia, Nile Tilapia (*Oreochromis nilotica*), Hassar (*Hoplosternum littorale*), Giant Malaysian Freshwater Prawn (*Macrobrachium rosenbergii*) and Freshwater Pacu (*Colossoma macropomum*).

The GOG with assistance of the FAO also implemented FAO Project TCP/RLA/3003: "The introduction of aquaculture and other integrated production management practices to rice farmers," (2003 to 2005) and the Guyana Rice Producers Association Project "Improve standard of living in rice farming communities" (2005 to 2006). These projects were aimed at farmers operating in sugar and rice cultivation and who were interested in diversifying their operations and dedicating portions to the culture of freshwater fish and shrimp for sale in the local markets and for export.

The National Aquaculture Association of Guyana (NAAG) was formed in early 2006 to contribute to the sustainable development of the aquaculture sector. Members include private farmers, lending agencies, public sector agencies, feed producers and fish processors. The Association seeks to identify the constraints to aquaculture development and initiate actions to remove them.

Government's policy is to facilitate the development of the aquaculture industry by the private sector. According to the Private Sector Commission of Guyana, US$1.2 million was invested in aquaculture in 2002. However, with the start-up of two commercial aquaculture facilities in

2004 and 2005, this investment was surpassed in both years. In 2003, 1,197 mt of shrimp and finfish were produced by the combined fresh and brackish water aquaculture operations.

At present, it is estimated that about 100 persons are involved in aquaculture as a part time activity. Their other activities include rice and cattle farming, chicken farming and cash crop farming. Most of these persons are involved in brackish water culture. Freshwater aquaculture is practiced mainly, but not entirely, in Regions 2-5.

Table 9:
Aquaculture Production, Guyana, 2000-2008

Species	Production Tonnes(mt) Price (US$)	2000	2001	2002	2003	2004	2005	2006	2007	2008
Oreochromis (=Tilapia) spp	mt									215
	US$									437,246
Penaeus	mt									77
	US$									652,340
Hoplosternum litorale	mt									
	US$									
Macrobrachium	mt									
	US$									
combined fish and shrimp	mt									292
	US$									1,089,586

4.5 Knowledge on Aquaculture Issues by Category

Among the issues and constraints in the aquaculture industry are:

- Lack of an indigenous knowledge base within the private sector and the Fisheries Department to stimulate aquaculture development.
- Land tenure/land ownership.
- Absence of affordable credits to encourage investment in aquaculture.
- Lack of tax and investment incentives to encourage aquaculture development.
- Partial flooding
- Very poor quality of local fish food.

Table 10 below gives some general costs as obtains within Guyana; please note that the values derived are based on averages as obtained from personal interviews and store prices.

Table 10: COST STRUCTURES	
	US$
Electricity (Kwh)	0.2
Gas (Liters)	0.93
Diesel (lLiters)	0.99
Wild caught fish (/Kg)	2.50
Wild caught shrimp (/Kg)	5
Farmed fish (/Kg) Tilapia	1.50-2
Farmed shrimp (/Kg)	3-4.50
Fish Food (/Kg)	0.49
Beef (/Kg)	1.5
Chicken (/Kg)	1.5
Pork (/Kg)	2-2.50
Rice (/Kg)	0.5
Pond construction/Ha	3000
Land costs Lease/Ha	?
Labor/week unskilled	70

Comments on Cost Structure

- Prices of farm reared products compare well if are not cheaper that wild-caught products.
- Labour cheap from a regional perspective
- Feed costs are of no essence, as quality of feed is poor. This is unfortunate, as an abundance of raw material is available from by-catch, processing waste, rice and cane by-products.
- Pond construction costs appear to be favourable
- No information on costs or mechanisms for land acquisition and land tenure were obtained.

4.6 Technical Aspects of Small-Scale Aquaculture Operations and Stock Enhancement

A. STOCK ENHANCEMENT

A review of the data suggests that the basic practices are sound and there is evidence of appropriate use of technology.

The site selection, pond construction and production technologies in place are, for the most part, properly designed given the local conditions.

Extensive and semi-intensive production systems are currently in existence.

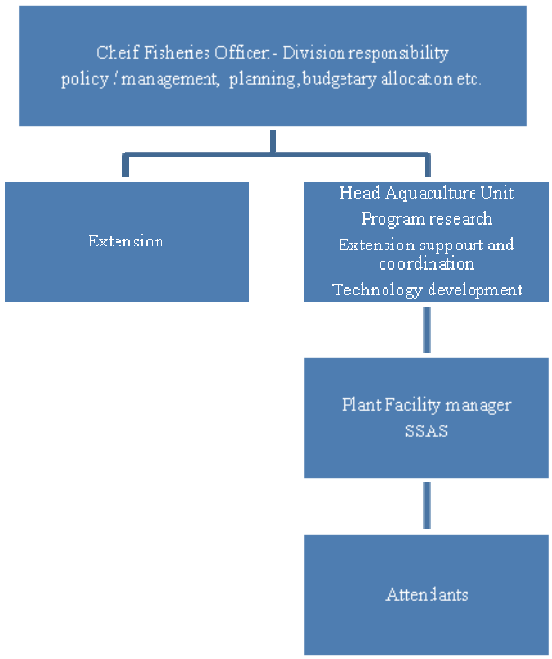
Current efforts are underway to determine the optimal/appropriate production model. This seems critical as the Mega/Intensive farm approach practiced elsewhere has proven to be inflexible, and poses too high a risk for the Guyanese investor; and to compound the matter, there are little to no sustained benefits to the country nationals as is evidenced in Belize.

Considered interventions should seek to shift the scale of production from a subsistence level to one that displays economic returns; this can only be achieved through increased efficiencies associated with innovative technological approaches within the following key areas:

- Water Quality management
- Feed Formulation
- Feed Management
- Health Management
- Extension Services

4.7. Technical and Research Capabilities of Fisheries

At present, technical and research capability is resident in the Fisheries Division and other Government departments. The Organogram below shows personnel placement and technical responsibilities.



The staff complement (6 in total) needs to be increased simply because of the size of the country and the geographic location of farms. Academic training for the staff members was average, but noticeably, extension and support staff could benefit from farm-level training on proper husbandry techniques.

The department currently has limited capacity to conduct the critical research needed to drive the sector; however effective partnerships and collaborative efforts with regional and international institutes and universities could fill this void.

At present the University of Guyana (UG) and the Agricultural Farmer Training Center offer training in aquaculture. The UG program is limited to the Bachelors level, and courses offered are just part of a general Fisheries Program. Specialization will have to be sought outside of the region and efforts to this end are being pursued and/or could fall within the frame of this project.

SUMMARY

It would appear as though there is need to finalise the aquaculture policy and have it approved in order to provide the context for the legislative and institutional arrangements, and an aquaculture development plan that would cover research, technology transfer, training, fiscal incentives, environmental protection, marketing, etc.

CHAPTER 5: REGIONAL FISHERIES DATABASE DEVELOPMENT COMPONENT

5.1 Policy and Data Management Documents

Generally, the policy and management objectives for the fisheries sector in Guyana aim to promote the sustainable use of fisheries as well as equitable benefit sharing. Though not listed as an explicit objective, it is apparent that the objectives for the management of the fisheries require effective and consistent fisheries information systems.

In 2008, a review of the Fisheries Information System in Guyana was conducted by Paul Medley (Appendix 1). The Fisheries Management Objectives in Guyana and the fisheries data required for the effective monitoring of these objectives are tabulated below: (excerpt from Medley, 2008):

Overall Objective	Data Required for Monitoring
To optimise the development of the fishery sector through effective management in order to create employment and stable sources of income for the fishers and the communities involved in fisheries and related activities.	Catch and prices by commercial category Fishing effort and vessel crew
To optimise the amount of fish protein available for domestic consumption and export consistent with sound resource management practices.	Consumption survey Production and Exports
To optimise on the value of the limited fisheries resources through cost effective harvesting, value added processing and diversification of markets.	Catch and prices by commercial category Fishing effort Vessel registration data Costs of vessel, gear, fuel, bait etc. Exports by market category
To promote the image of fishing as an occupation that is socially desirable and financially rewarding.	Catch and prices by commercial category Fishing effort and vessel crew Number of employed in processing and marketing sectors Interviews with fishers and general public
To maintain or restore populations of marine species at levels that can produce the optimum sustainable yield as qualified by relevant environmental and economic factors, taking into consideration relationships among species.	Research for harvest control rule development and monitoring. Catch and prices by commercial category Fishing effort Vessel registration data Costs of vessel, gear, fuel, bait etc.
To preserve rare or fragile ecosystems, as well as habitats and other ecologically sensitive areas, especially estuaries, mangroves, seagrass beds, and other spawning and nursery areas.	Habitat mapping and basic ecosystem modelling. Research on ecology may be required.

The data parameters listed above are consistent with the objectives, and form a good basis for the development of the required FIS. This is an adequate framework within which to manage fisheries information.

There are some protocols to be observed, though not documented. These are outlined below:

- All commercial companies must submit their monthly report on the 7th day of every month for the preceding month.
- Catch and effort and Biological data are collected from landing sites by staff of Department of Fisheries (DOF).
- Staff from the DOF collects retail prices (Market survey) from municipal markets.
- Data collection activities take precedence over all other activities within the Department
- Data collected by the DOF are confidential
- All processing plants are required by law to maintain production log books
- Socio data is collected by the DOF via the licensing form

In 1998, Robin Mahon prepared a "Review of Catch, Effort and Biological Data Collection Systems of the Inshore Artisanal and Offshore Industrial Fisheries of Guyana" for CFRAMP. This document outlines all the components for the FIS for Guyana. It addresses all the components quite effectively, and over the years, has become the Working Document for the FIS. There have been some changes (such as the sampling sites), but overall, the document is still applicable. The data collection forms are still being used by the DOF.

There is no written policy for data access, but some protocols are practiced, such as limiting the persons that can enter the system, as well as ensuring that sensitive data (such as commercial seabob production) are treated accordingly.

5.2 Data Collection – Current Situation

The Department of Fisheries started to collect data since in the 1980's; however because of constant office relocation, floods and limited computers, the data are either missing or destroyed.

1. CPUE Data: from 1996-2007, 2008-2009
2. Market Survey data: from 1986-2006, 2008-2009. Again the data for the majority of years are either lost or destroyed. There is an electronic copy for the period 2008-2009.
3. Registration & Licensing 1986-2009
4. Exports 1986-2009; Electronic 2000-2009

The types of fisheries targeted for data collection are:

- **The Marine Fishery [**Seabob, Finfish (pelagic, and demersal), Red Snapper]
- **Aquaculture** (in its infancy).

The types of data collected are:

- Catch & Effort (landing sites)
- Biological (length and weight from landing sites)
- Social (licensing forms)
- Export (export form)
- Economic (export form)
- Price (market survey and data collection form)
- Production by Species (processed weight from plants)

The mechanism to collect data is outlined below:

Market Survey

- The DOF collect data twice per week

Data Collection

- The DOF collect data at least five times per week
- The contracted employee provide data twice per week
- The Co-operative societies (#66 Fish Port Complex and Rosignol Fish Port Complex) will submit forms on ice sale on a monthly basis

Export Data

- The DOF collect export data monthly from processors, individual exporters and the Guyana Revenue Authority

Licensing

- Licensing is done by the DOF, registration by the Maritime Administration

There are nine (9) staff members collecting data, and one (1) one contracted employee. Two volunteers from the Fish Port complex collect sale of ice data for the Department of Fisheries.

5.3 Data Management – Current Situation

The entity solely responsible for the management of the FIS is the Department of Fisheries.

- There is need to rebuild the database software and obtain a specific computer for data entry (Market Survey, Export, Production etc).
- Realistically the duplicates of the database should be stored at the Bureau of Statistics, Planning Division, and at the Ministry of Agriculture; but this is not done.
- The number of staff members responsible for data management is one (1).

Data are stored in Microsoft Excel® because staff members are comfortable with that software. The DOF is unable to enter data into CARIFIS, although staff received training; the registration data for the vessels are not accurately and consistently recorded.

The data present in electronic form are outlined below:

Market Survey:	2000-2009 Electronic data
Data Collection:	2001-2005 EXCEL
Registration & Licensing:	2007-2009
Exports:	2003-2009

There are currently no Information Technology personnel in the DOF, and there is severe lack of computer hardware.

The data is superficially validated upon entry and again while in the system prior to assimilation.

Currently the information is stored on one (1) workstation. This machine is not dedicated to the FIS. The data are stored on the hard drive on this computer. There is no effective back-up system in place for the safety of the data. There are no external hard drives. CDs, floppy discs and thumb drives are used as storage devices. Much of the data is stored in paper files, some of which have been damaged in the past.

Each year, since 2004, the CRFM has held a Scientific Meeting where all participating countries take data collected and have analyses (such as stock assessments) done. This collaboration is important and has shown real progress over the years. It is also a useful way to share resources

in a coordinated manner to allow member states with limited in-country capacity to analyze their data. Guyana has participated in these meetings.

Apart from Summary Statistics, other treatments of the data include:

- Stock assessment was done on *Xiphopenaeus kroyeri* (seabob) - 1997, 1999, 2000, 2003, 2006, 2007, 2008 & 2009
- Stock assessment was done on *Penaeus subtilis, Penaeus brasiliensis and Penaeus notialis* (prawns) - 1998
- Stock assessment on fish was done on the following species:

  Macrodon ancylodon (Bangamary) – 1996, 1997, 1998, 2000
  Nebris microps (Butterfish) – 2000
  Cynoscion virescens (Sea Trout) – 2007
  *Lutajanus pupureus (*Red Snapper) – 2003

5.4 Information Dissemination

Information emanating from the CRFM Annual Scientific Meetings also contains Country Reports with the data from Guyana, and this report is widely circulated and available.

Annual Reports of the DOF are generated and are widely circulated and readily available. Agencies such as the Bureau of Statistics, Ministry of Finance, Planning Division, Ministry of Agriculture, Bank of Guyana and Commercial Banks, Institute of Private Enterprise Development, University of Guyana and Guyana Office for Investment (Go- Invest) request and are provided with information from the data gathered, and the information shared is limited to Summary Statistics. This information is enclosed in the Annual Fisheries Report.

The information generated from the FIS is used to:

- Update of Fisheries Management Plan
- Change regulations (gears, mesh size, size of hooks etc) - Regulation mandatory for example all trawlers must be equipped with a Turtle Exclusive Device (TED)
- Update price schedule for export
- Assess the value of the fishery (species)/year
- For addendum to Fisheries legislation

Stakeholder involvement in Fisheries Management is wide. The main stakeholders include:

- *The Fishermen Co-operative societies
- *Fishers from artisanal landing sites
- *Guyana Trawlers Operators and Seafood Processors Association
- *National Aquaculture Association of Guyana
- Ministry of Amerindian Affairs
- Middlemen/Hucksters
- Ministry of Health
- Guyana Coast Guard
- Marine Police
- Environment Protection Agency
- Maritime Administration
- University of Guyana
- Guyana National Bureau of Standards
- Hydro-meteorological Service
- Boat Builders
- Sea Defence Board

* Only four (4) of the above have regular scheduled meetings with the DOF where information from the FIS is discussed. The level of involvement should be improved.

5.5 *Gaps in the Capacity for Management of Fisheries Information Systems*

1. Human Resources

The number of staff members in the Guyana Fisheries Department is significantly smaller than what is required to effectively collect and manage the national fisheries data. The geography of Guyana also adds another dimension to the difficulty in collecting data efficiently. The table below summaries the current situation, and recommends the optimal staff complement.

Position	Current Staff Complement	Recommended Staff Complement	Gap	Training Required**
Data Manager-Administrator	1	1	0	Yes
Data Collectors*	9	12	3	Yes
Data Input Clerks	1	2	1	Yes
Fisheries Statistician	0	2	2	Yes
Total	**11**	**17**	**6**	

** some of these data collectors can be based at selected field locations based on logistics and level of fishing at the sites to ensure efficiency.*
***Training is required also in CARIFIS and it is necessary for this training to be conducted in-house with real data after gaps in the computer infrastructure are dealt with (as outlined below).*

2. Equipment

There is a lack of equipment to effectively input, store and manage the fisheries data. Though some equipment is available for use, these are not dedicated to the Fisheries Information System, and this will have implications for safety of data as well as access to the data. The system requires at a minimum:

- One (1) dedicated Server for the Unit
- Two (2) Desktop Workstations for data input
- One (1) Desktop Workstation for validation of data, summary statistics, and data assimilation
- One (1) field-hardy laptop
- One (1) UPS dedicated for the FIS
- One (1) external hard drive (desktop)
- One (1) external hard drive (portable) that can be kept off-site

6. RESULT OF THE BASELINE WORKSHOP

6.1. Output from Workshop with Staff of the Fishery Division

Brief Overview of the Workshop

A PCM workshop was held at Red House in Georgetown on the25th of August 2009 and an ID/OS workshop the following day at the same venue. A PCM workshop was held separately for marine fisheries and aquaculture. In addition to the officers from the headquarters, those from a regional branch attended these workshops.

Problem Analysis

During the problem analysis session, the main focus is on issues related to data management. Even though data management is vital for resource management, the collection of data has been suspended since 2007. Officers attending discussed and disseminated issues to identify the root cause of less developed data management.

The aquaculture session focused on issues related to the inadequate feed supply, since these make aquaculture less economically feasible and limit the quality and quantity of the harvest. Other input-related issues are also addressed such as land, water, and finance for start up and operation. The less developed market is another issue, because tilapia has not yet become popular in Guyana.

ID/OS Analysis

The result of the external analysis session revealed many negative aspects or threats, related to law enforcement and resource management activities with other government stakeholders. Many officers seem to consider the fisheries sector as a lower priority, despite its contribution to GDP. The less cooperative community is also considered a threat by officers.

There were many weaknesses and a few strengths addressed in the internal analysis session. In particular, the strategy and structure of the organization had many weaknesses. The result also reveals that most officers seem dissatisfied with the current situation.

6.2. Output from the Workshop and Interview with Local Fishers

Brief Overview of the Workshop

An interview survey was conducted to collect information on the community instead of a workshop. The study team visited the fishing communities of Upper Corentyne, Lima and Better hope and aquaculture communities of Trafargar, Mahaicony and Rockstone.

Summary of the Community

As Guyana has large fish stocks, many fishers are fishing in a more commercially-oriented rather than community–based way. Accordingly, not many communities formulate organizations like cooperatives and few such activities are observed. However, some cooperatives such as that in Upper Corentyne have organized market activity. Conversely, fishers in Better Hope are engaging in fishing individually, which implies the current fisheries community situation in Guyana varies in accordance with each site.

Regarding aquaculture, some has been conducted on a small-scale basis. Although there are some individual farmers, their objectives are not to establish a livelihood but to invest. However, one enterprise in Trafalgar is union-managed by a women's group and is a good model of a community development program through the use of aquaculture.

Present Status of Local Fishery

As is often the case in the region, declining resources have been identified by every fisher in Guyana. In addition, the local fisher's situation is further threatened by the decrease in fish prices due to the global recession as well as fuel price increases. Compounding matters, the fisheries division cannot evaluate stock or take appropriate measures because there has been no data collection since 2007.

Although there are many locations of commercial tilapia culture, community-based small-scale culture remains underdeveloped. Trafargar has major potential as a base for community-based aquacultural development. Since the aquaculture project has been managed by a women's group in an area of limited local job opportunities, it may serve as a model for community and women empowerment, job creation, and food security in rural areas of Guyana.

Needs of Local Fishers

In three sites, fishers expressed a need t to improve fishing facilities and equipment such as landing sites, ice plants, and gear storage. Alternative sources of income are required by inland fishers in the Rockstone area. Data collection and its feedback are also addressed as one of the fishers' needs.

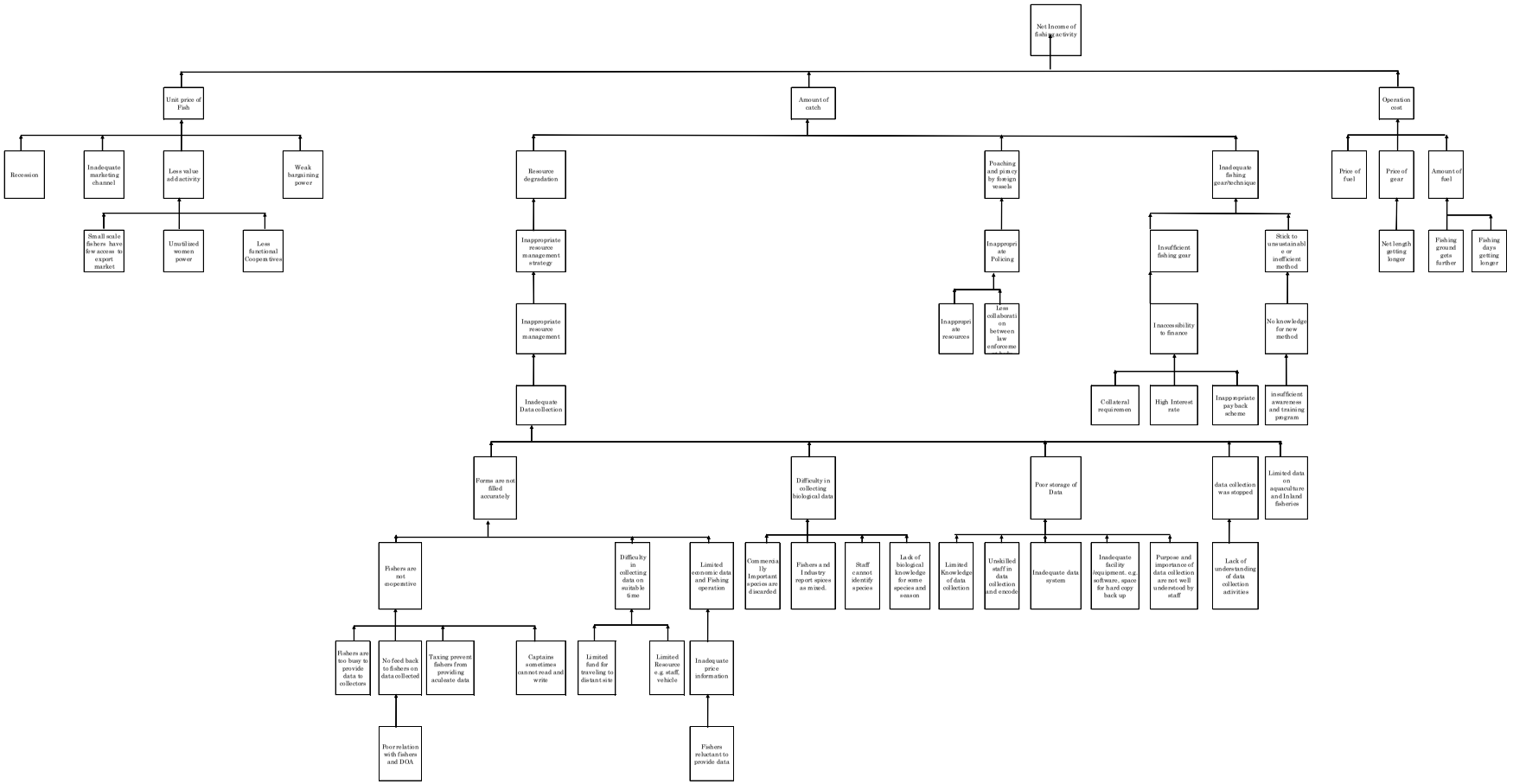
Individual farmers' needs are mainly in market development, given the insufficient domestic market for tilapia. The community-based aquaculture project in Trafargar and Rockstone both require technical and financial support, especially with pond creation and water management.

6.3. Key issues identified for the coastal resources management in the workshops

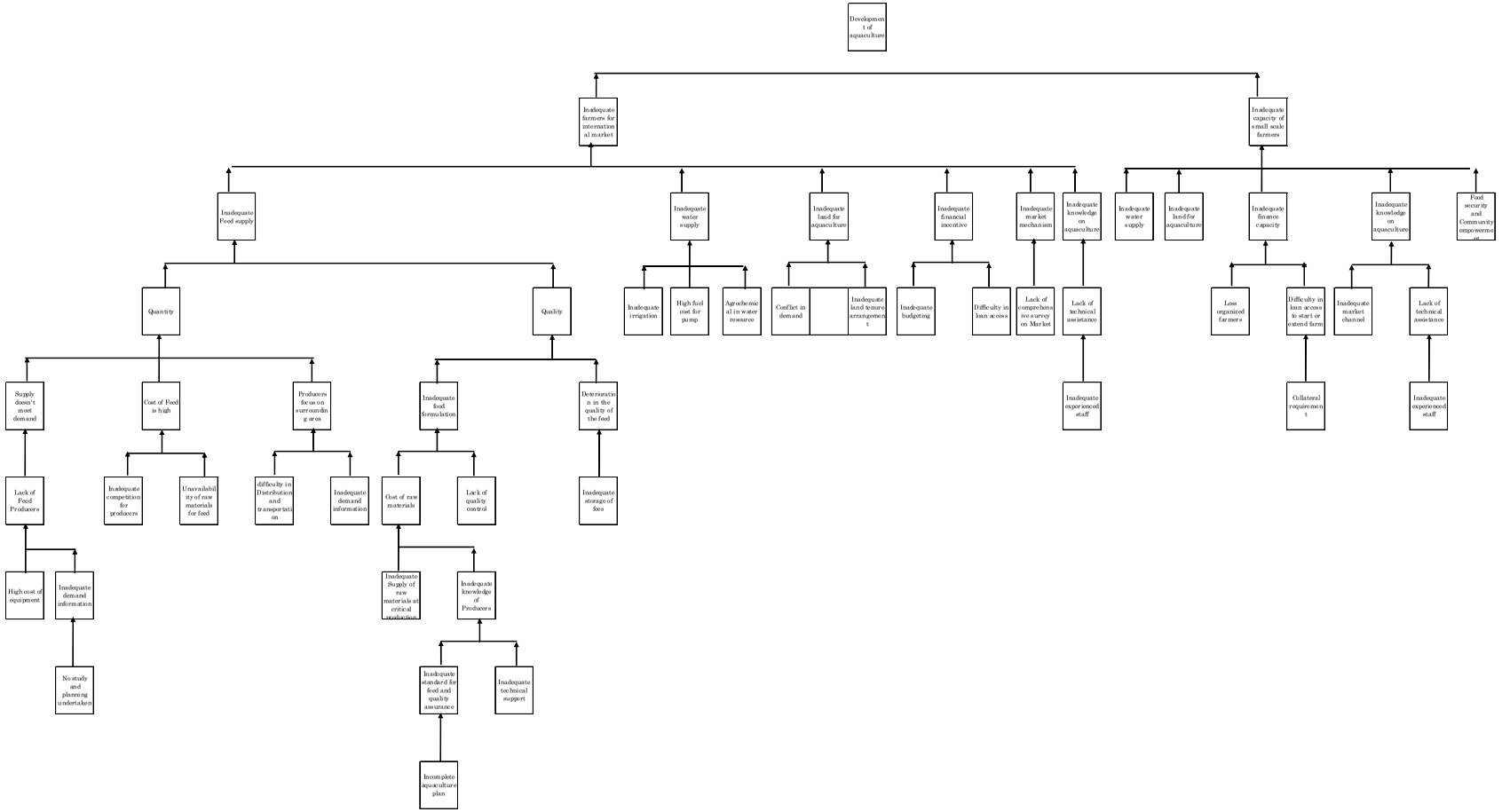
Both workshops and interview surveys revealed that key fishery-related issues involve data management for resource management. Without data, proper resource assessment and strategy making is impossible. Therefore, a pilot project aiming to improve data collection and management was proposed in the workshop. It includes restructuring data collection, a management system, and training for officers who will operate such a system.

Another proposed project for the aquaculture sector aims to establish good practice in community-based aquaculture, consisting of technical support and facility provisions such as water pumps.

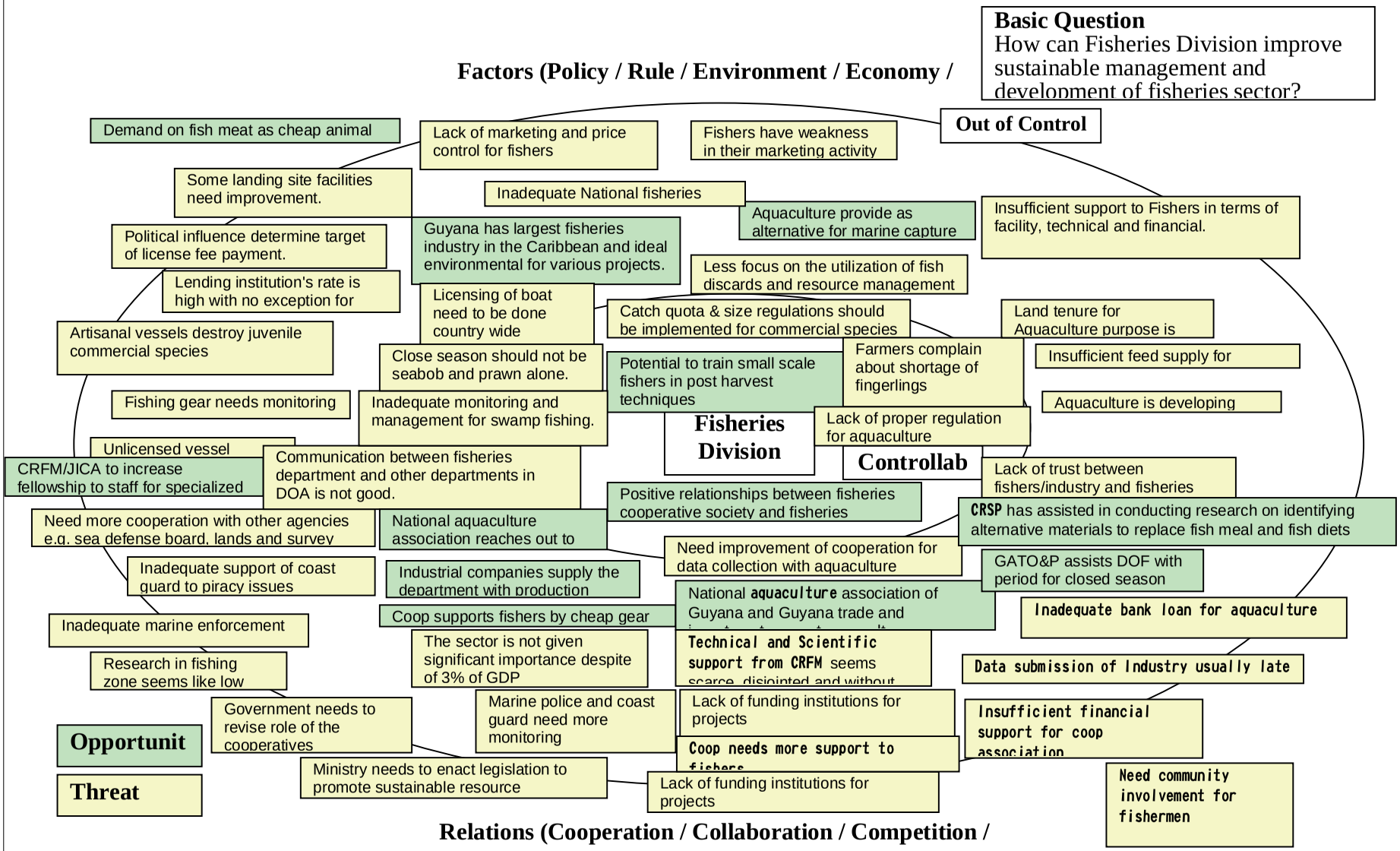
RESULT OF THE PCM WORKSHOP (Fisheries)



RESULT OF THE PCM WORKSHOP (Aquaculture)

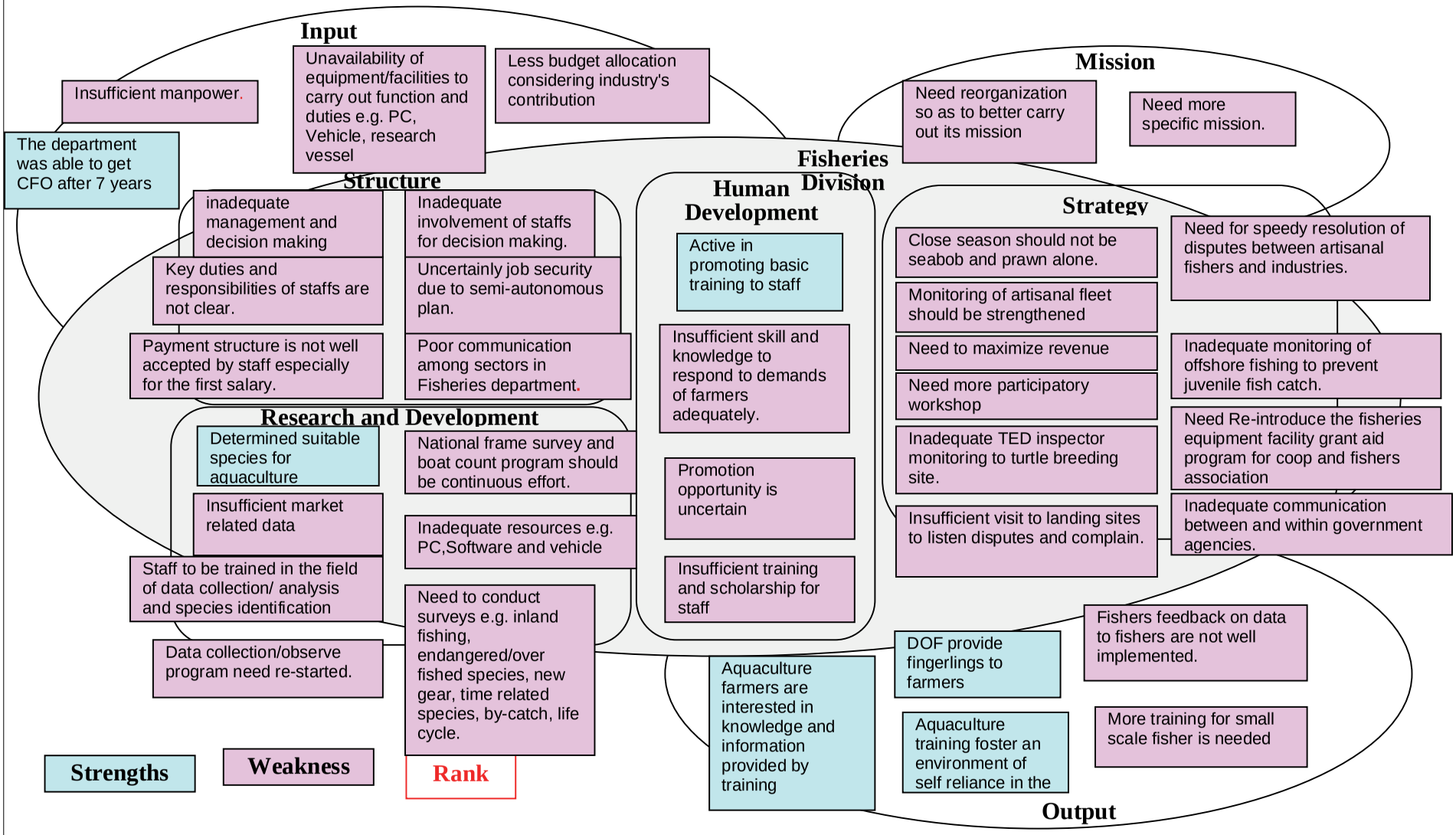


RESULT OF THE ID/OS WORKSHOP (External Factor Analysis)



RESULT OF THE ID/OS WORKSHOP (Internal Factor Analysis)

Basic Question
How can Fisheries Division improve sustainable management and development of fisheries sector?



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